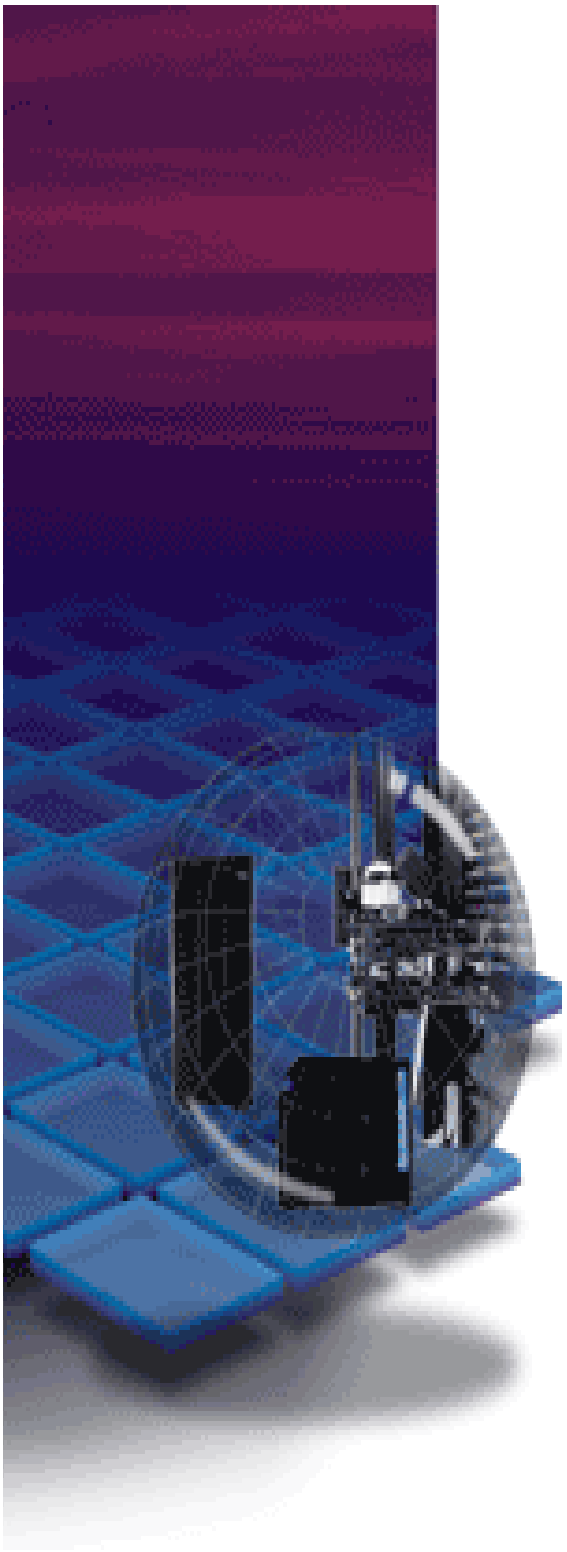

DR/Xpert®

User Guide

Release 2.2.4

OpenTech SYSTEMS, INC.

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DRUSR224
April 2012

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1 About This Guide

TOPICS COVERED IN THIS CHAPTER

Documentation Amendment History (page 1-2)
Software Documentation Library (page 1-4)
Customer Service (page 1-4)
Problem Reporting Information (page 1-4)
Cautionary and Notable Items (page 1-5)
JCL Example Conventions (page 1-5)
Reference Guide Chapter Summaries (page 1-5)

Introduction

This guide explains the implementation and usage of the DR/Xpert® product.

Documentation Amendment History

This section lists any notable amendments to the User Guide.

Table 1-1 Document History

Date	Revision Description
June 2005	Initial User Guide created.
June 2006	Updated product names and added information on additional features.
May 2007	Updated product name and added information on additional features.
December 2007	Updated document to reflect release 2.1.2
September 2008	Updated product version and added the following DR/Xpert PARMLIB library members: • BKUPJOBS • BKUPPDS • REQUIRED • RMONITOR • RDOBKUP • Backup Job JCL • Recovery Job JCL
November 2008	The members EDITRTNS and FACTSETS are obsolete. Added the following PARMLIB library members: • DMSDUMP • DMSRESTR • BKUPPNT Added Special Considerations for FDRABR.

Table 1-1 Document History

Date	Revision Description
July 2010	Added backup driver support to DISKDSS andTAPEASIS Added the following sections: • Special Considerations for DISKDSS (page 5-11) • Special Considerations for TAPEASIS (page 5-19) • Step 5 - Customizing Application Names (page 5-29) • Assigning DSNS to Applications (page 10-3) • Defining Application Rules in APPLDSNS (page 10-7) Added the following JCL example conventions: • APPLBKUP • APPLEND • BLDBVIRD • BVIRBLDS • UPFROM • VDRCFIRM • VDRCLEAN Added the following PARMLIB Library members: • APPLDSNS • KNOWBKUP • PRODRULE
April 2012	Added the following PARMLIB members: • DSNALLOC • EXCLVOLS • FVRESTOR • FVRXPORT • OTMSGID • RPTALLOC Added the following JCLLIB members: • DRXBKPDB • DRXBKPRO • EODSWEEP • EXTERNAL • NEWAPPLS • RCVYCOMP • UNCMPRUL • UPFROMJ Removed the following JCLLIB members: • DMSDUMP • DMSRESTR • LINKOBJ

Software Documentation Library

This documentation can also be found online on the OpenTech Systems Technical Support web site (http://www.opentechsystems.com/support.php). Registration is required to access the web site.

All documents in the OpenTech Systems Software Documentation Library are in PDF format and can be read using Adobe Acrobat Reader. Acrobat Reader can be downloaded free at:

http://www.adobe.com/acrobat.

Customer Service

OpenTech Systems Technical Support can be reached:

- By Phone: 469-635-1500
- By Fax: 469-635-1507
- By Email: support@opentechsystems.com

Normal business hours are Monday through Friday from 8:30 a.m. to 5:00 p.m., Central Standard Time. However, user assistance is available 24 hours a day, 7 days a week.

After hours support can be reached by calling 469-635-1500 and leaving a message. When leaving a message, specify whether your support request is urgent. If it is urgent, a Technical Support representative will contact you immediately. If it is not urgent, you will be contacted the following business day.

International customers should contact their local distributor in the event that they encounter problems with an OpenTech Systems product.

Problem Reporting Information

In order for Technical Support to research any problems you may have with DR/Xpert, please have the following information available:

- Product release, version and PTF level
- OS/390 or z/OS release number
- JCL that was submitted
- Job output and dump, if generated
- Any error message codes
- Any other information you think may be important to understanding the problem

Cautionary and Notable Items

The alert statements—**Note**, **Caution**, and **Warning**—are formatted in the following styles:

Note This symbol appears in the margin next to items that should be given special consideration. Understand these items completely before continuing with the installation and customization process.

Caution Advises of important information, such machine or data error that could occur should the user fail to take or avoid a specified action.

Note This symbol appears next to items that offer information about the use of this software or that describe differences between this and previous releases.

JCL Example Conventions

This guide and the DR/Xpert product libraries contain JCL and control statement examples. Keep in mind that these examples may not be appropriate for every environment. Most of these examples will require some modification before they will function properly in your specific environment.

Reference Guide Chapter Summaries

The DR/Xpert User Guide consists of the following chapters:

Chapter 1, “About This Guide” – This section provides an amendment history of the manual, customer service contact information and problem reporting tips.

Chapter 2, “Introduction to DR/Xpert” – This section provides an introductory overview to DR/Xpert and the components of the product.

Chapter 3, “Critical Dataset Identification” – This section explains the collection and dataset identification phases of DR/Xpert.

Chapter 4, “SMF Data Collector” – This section explains configuration and use of DR/Xpert’s real-time SMF data collection task.

Chapter 5, “Backing Up Your Critical Data” – This section explains the backup phase of DR/Xpert.

Chapter 6, “Job Trigger Started Task” – This section explains the use of the Job Trigger Started task.

Chapter 7, “Restoring Critical Datasets” – This section explains the restore phase of DR/Xpert.

Chapter 8, “Backup Auditing and Scratch Process” – This section explains the backup audit reporting and scratch process of DR/Xpert.

Chapter 10, “Applications and Groups” – This section explains the definition of applications and groups.

Chapter 11, “Collocation” – This section explains the definition of collocation rules.

Chapter 12, “Encryption” – This section explains the process of requesting encryption and decryption of the DR/Xpert managed backup data.

Chapter 13, “Reports” – This section provides information on some of the more common reports that can be generated by DR/Xpert.

Chapter 14, “ISPF Interface” – This section explains the usage of DR/Xpert’s ISPF panel interface.

Chapter 15, “Administration and Utilities” – This section explains the utilities and adhoc routines that can be used in the administration of DR/Xpert.

Appendix A, “ABARS Driver Setup” –

Appendix B, “Non-GDG Dataset “Patterning”” – This section provides instructions for identifying non-GDG datasets that follow patterns.

Appendix C, “JCLLIB Library” – This section provides a list of the members in the DR/Xpert JCLLIB library and their uses.

Appendix D, “PARMLIB Library” – This section provides a list of the members in the DR/Xpert PARMLIB library and their uses.

2 Introduction to DR/Xpert

TOPICS COVERED IN THIS CHAPTER

Introduction (page 2-2)

DR/Xpert Processing Overview (page 2-4)

Introduction

DR/Xpert saves valuable administrative and recovery time by automating cumbersome research and maintenance tasks. DR/Xpert automatically builds JCL to drive backup software and performs audits of the environment to identify all the critical input datasets for backup. Since the audit can be performed anytime, it ensures that updates are not missed so that image copy and recovery JCL is always current for the subsystems. Reports provide information about the overall recovery status so the administrator knows if changes will affect image copy and recovery JCL.

DR/Xpert Base Concepts

In order to identify all of the input datasets, the analysis process requires a beginning and end of a batch application cycle. DR/Xpert automatically determines this without any manual input, avoiding the inherent problems associated with this job no longer being the first job, the last job, or possibly the job no longer running.

In addition to identifying critical datasets, DR/Xpert can recognize when a file was output from a previous process in the batch cycle, and does not backup that particular dataset, since it is can be recreated by simply running previous processes. This may not seem important, but in a large data center, where several terabytes of application data are backed up each night, and many of these instances appear in application batch streams, add up to make a big difference. In fact, the critical dataset suite normally comes in at 25-30% of the entire permanent production data pool (excluding databases).

Note DR/Xpert doesn't limit its analysis for these types of datasets to simply the current or previous steps. The analysis process spans the entire application cycle.

Identification of Dataset Groups

Certain types of datasets are logically the same, even though the name changes every time a new dataset is created. Two types of datasets fall into this category: GDGs (Generation Data Groups) and what DR/Xpert treats as “patterns.”

DR/Xpert treats the base name of a GDG as the dataset, and ignores the last node, which is sometimes referred to as the “goovoo.” If DR/Xpert handled this dataset by its full name, every GDG entry would be a different dataset, but using the base name allows DR/Xpert to see that 'A.B.C.G0023V00', 'A.B.C.G0024V00', and 'A.B.C.G0025V00' are all logically related.

Many data centers follow a convention where a part of the dataset name contains a date. Some software vendors do the same with datasets created by their product. This is similar to a GDG, where the name can take on a different value at different times of execution. These data centers find it easier to tell which of the datasets in a group contain the transactions for Jan-2005, for example, with a name such as 'AR.TRANS.ACTIONS.JAN2005', rather than determining which of the goovoo's contains these transactions.

Since it is difficult to maintain this type of JCL manually, these data centers have either written SMF or JES exits or use the facilities of a scheduler to perform the task. An indicator in the dataset name allows the exits or scheduler to determine that a substitution needs to take place. These datasets are similar to GDG's, in that, while the dataset name continually changes, the group of datasets is logically related. DR/Xpert refers to this naming convention as “patterns,” and can handle them similar to GDG's.

Aggregate Backup Processes

DR/Xpert considers all of the datasets that need to be backed up as a single cycle. This cycle may contain a single backup (this only works with a very small amount of application data). Again, large data centers with huge volumes of data to back up and a short backup window can benefit by running the backups for datasets that have no more output activity before the end of the batch stream. This can cut down on the number of application datasets that must be backed up in the brief window between end of a batch cycle and the start of the next cycle.

When DR/Xpert runs one of these backups, it is called an *aggregate backup*. That means that a backup cycle is made up of one or more aggregate backups.

There are five types of aggregate backup processes:

- Static aggregate backups are used for defining a specific backup time for a predefined set of datasets.
- Dynamic aggregate backups are used for scheduling a backup of any job-triggered datasets available for backup.
- Scheduled sweep aggregate backups are used to back up datasets defined as sweep candidates.
- Forced sweep aggregate backups are used to backup all datasets that are not yet backed up in the current cycle.
- Final sweep (also called OTCDBTAL) backups can pick up all of the datasets at the end of the cycle that have not been backed up, as well as datasets whose previous backup attempt ended in an error.

The first three kinds of backups run as single jobs. The last two can be run as multiple jobs. The advantage is parallelism in the backup process. This is especially attractive for large data centers with large amounts of data. All of the backups, except the Final aggregate backup, allow DR/Xpert to get a "head start" on the backup process, instead of waiting until the very end of the application cycle to backup the datasets.

The main control file for DR/Xpert is called the *BKPDBASE*. This is where the entries are kept for all of the datasets that have been identified as critical, and where the backup/restore status for each of the critical datasets is kept. The stored detail also includes the size of the dataset and the datasets contained in each backup aggregate (group). History data is kept for 10-cycles. This would include 9-historical cycles, plus the current cycle.

DR/Xpert Processing Overview

Figure 2-1 shows the DR/Xpert processing flowchart, which consists of these basic components:

- Collection
- Identification and Analysis
- Job Trigger Task (OTCDTASK)
- Backup
- Restore
- Utilities or Adhoc Functions

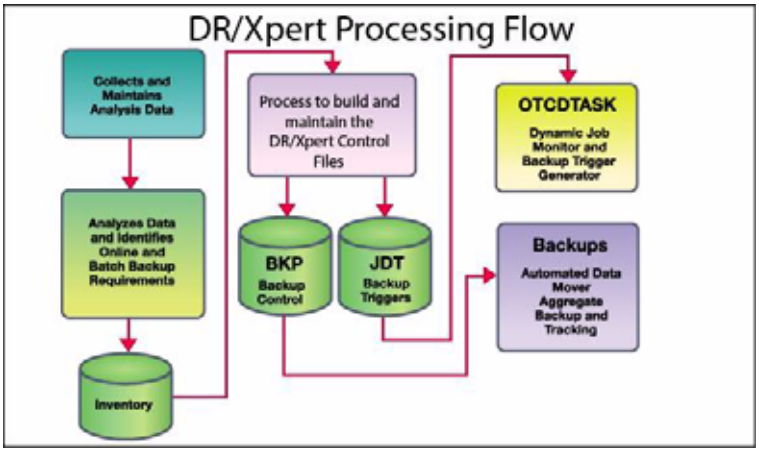

Figure 2-1 DR/Xpert Processing Flowchart

The subsections that follow outline the functions of these components and describe how each component relates to the others.

Collection

Collection is the process of obtaining the base data on a job and its datasets. The collection process occurs in two steps:

1. First, for all new jobs (production jobs added to the scheduling system), DR/Xpert analyzes the JCL. This builds the initial base for the job. The first sub-parameter of the DISP= operand is used to determine I/O intent according to the following chart (the second and third sub-parameters of the DISP= operand do not impact the results):

   Table 2-1 DISP= Operand

DISP=NEW	Output
DISP=MOD	Output
DISP=SHR	Input
DISP=OLD	Input

2. The JCL analysis also picks up three other types of datasets that are not available elsewhere: second and subsequent concatenations of PDS's, datasets that are never opened, and patterns.

   This type of information cannot be obtained from SMF records, but the dataset information obtained from the integrated JCL analysis can be improved with SMF data. This allows DR/Xpert to correct the I/O intent of the dataset, if necessary. Also, DR/Xpert can then pick up any dynamically allocated datasets that are not realized in the JCL analysis since there are no DD statements for dynamically allocated datasets. The SMF refresh process occurs on a weekly basis.

Note The combination of data from these two sources ensures that DR/Xpert picks up the maximum amount of information on dataset usage.

The processing overview for the collection component is depicted in Figure 2-2 and Figure 2-3.

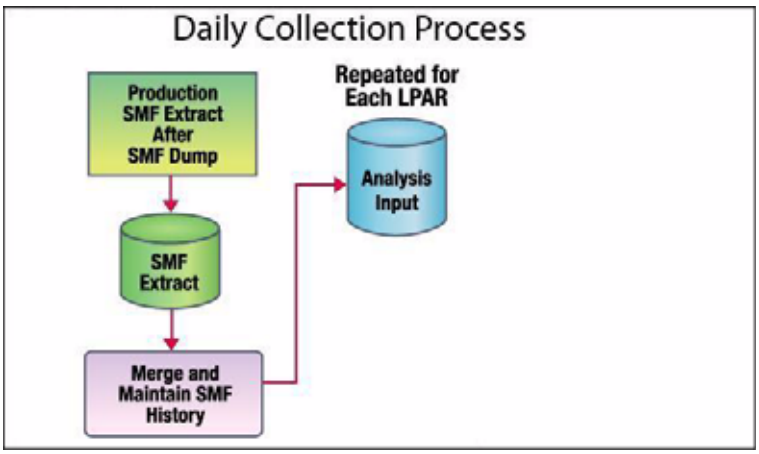

Figure 2-2 Daily Collection

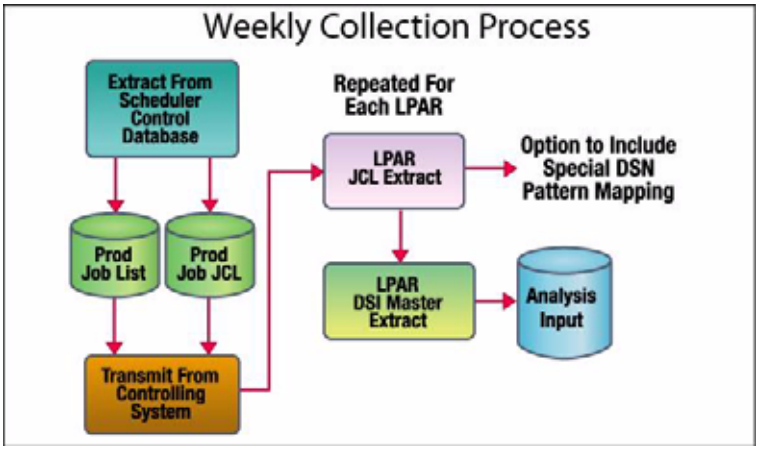

Figure 2-3 Weekly Collection

Identification and Analysis

Analysis is the complex process of analyzing the data that DR/Xpert has collected to determine which of the datasets are critical. The data from the collection component is analyzed for access patterns and job flow to identify the last update point within the application cycle. DR/Xpert's path analysis also drops any datasets that are part of the user-maintained filter lists.

This component also checks for all GDG accesses other than the current entry to ensure that all of those elements are included in the backup. Once the identification process has identified the application critical datasets, a second process analyzes the update patterns for the datasets. If a consistent update pattern is found, the job updating the critical dataset last (within the backup cycle) is identified and a Job-Dataset trigger relationship is recorded in the JDT control file. This control file drives the dynamic generation of backup requests using the scheduler interface task [*Job Trigger Task (OTCDTASK)*].

DR/Xpert can recognize the distinct differences in the access patterns of batch-only datasets versus online datasets. The datasets that DR/Xpert considers "online" are actually referenced by online tasks and batch tasks. They are the datasets that are used for online collection and batch processing. The batch only datasets tend to be referenced in cycles that correspond to the cycle of the application, and their particular purpose in the cycle, while the online datasets tend to be referenced every day. The online datasets tend to stay on DASD, while the seldom-referenced batch-only datasets tend to be archived by DFSMShsm (or other archival tool).

During the identification phase, DR/Xpert splits datasets into groups (BKPID's) such as those described above (batch and online groups). This splitting builds more parallelism in the backup stream, helping to get the backups completed within the time window.

The Identification processing overview for the DR/Xpert system is depicted in Figure 2-4.

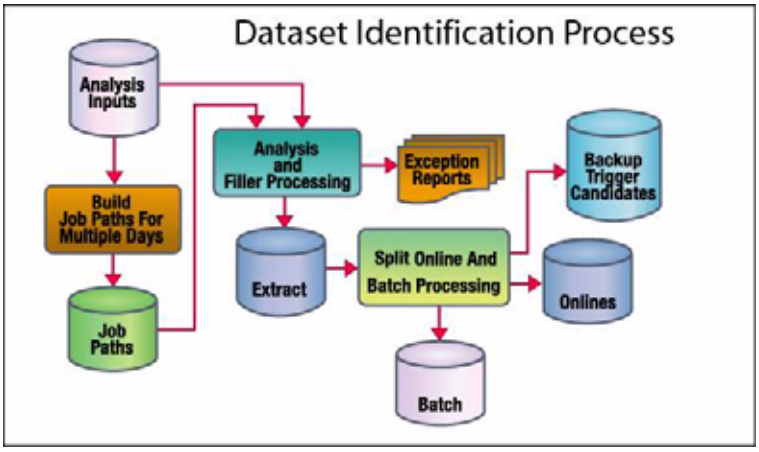

Figure 2-4 Identfification Processing

Backup

DR/Xpert knows, from previous analysis, which datasets should be backed up during each of its aggregates (backup jobs). The backup jobs are comprised of two pieces: the sweep and the backup driver.

The sweep job builds the backup jobs and creates the list of datasets for backup. The sweep job can submit the backup driver or the backup driver can be submitted by a scheduling system.

The backup driver chooses one of the seven backup programs (e.g., DFDSS or Tape/Copy) and dynamically allocates datasets required for backup program execution. The act of dynamically allocating files allows every backup driver job to be identical except for the job name. This makes it easier to submit the backup jobs from scheduling systems.

After the backup job runs, the output from the backup program is analyzed. Successes and failures are noted in each of the backup records in the BKPDBASE database. DR/Xpert reads all of these records during the final aggregate processing to determine which datasets have been missed, and retries the backup for these datasets. The Backup processing overview for the DR/Xpert system is depicted in Figure 2-5.

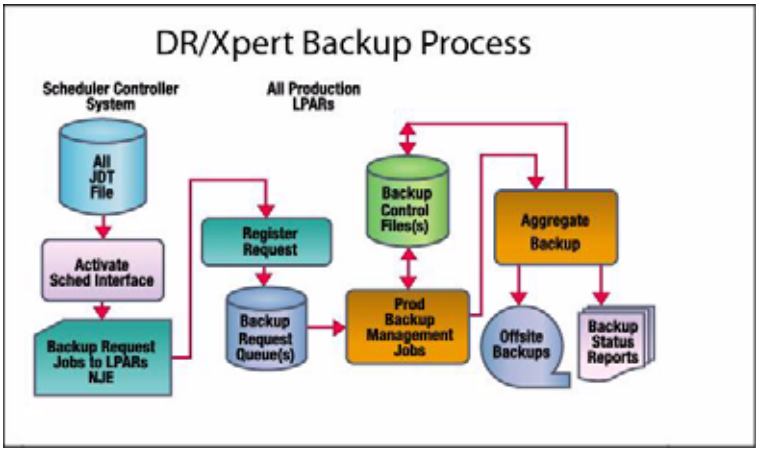

Figure 2-5 Backup Processing Overview

There are multiple backup and restores strategies that can be employed when using DR/Xpert; each with its merits and drawbacks. There are three strategies listed; they are permutations the following considerations:

- Dependence versus non-dependence on a datacenter wide-base backup period
- Incremental versus non-incremental backups

Smallest Recovery Set

This is a strategy where data center recovery timeliness is paramount. Also, this strategy is where an objective is limiting the number of recovery software products is important.

Use DR/Xpert to continuously back up critical production datasets. Take volume backups of system and test volumes. During disaster recovery, restore system and test volumes; and then use DR/Xpert to restore critical production files to empty volumes in the production storage pool.

This strategy provides the quickest recovery because the smallest number of full volume backups is recovered and older GDS files that are no longer critical are not recovered. Because DR/Xpert has its own backups of year-end and quarterly critical files, the recovery is not dependent on HSM recovery; thus, HSM recovery could be postponed and possibly eliminated.

DR/Xpert will manage backup and recover of critical files from daily through year-end file types; and recovery from archive systems is required only if DR/Xpert was directed to back files up using ABARS.

Recovering virtual tape systems with a similar strategy eliminates recovery of backend tapes which can be very long running. DR/Xpert restores a minimal set of critical tape files.

The intention of this strategy is to limit recovery of datasets required for next day or future operation. Older files that have fallen to non-critical status do not have to be restored. Current datasets that can be rebuilt might be important, but by definition non-critical. They can be recreated after the data center is recovered.

Continuous Backup, Recovery to Restored System

This is a strategy where recovery of historical data is important. This strategy is where an objective is limiting the number of recovery software products is important.

Make full volume backups of the production volume pool along with system and test volumes; use DR/Xpert to continuously back up critical production datasets. During disaster recovery, restore applicable volumes. Use DR/Xpert to restore critical production datasets in an environment where all volumes have been recovered from full volume restores.

This strategy is more reassuring to those responsible for production data because historical data is preserved; however there is some risk related to catalog status. This is because most volatile data are full volume backups from production pool. They are backed up independently from catalogues; and afterwards, both are restored outside of SMS. Some adjustment to the catalog might be required.

Similarly to the smallest recovery set strategy, DR/Xpert, with this strategy, will manage backup and recover of critical files from daily through year-end file types; and recovery from archive systems is required only if DR/Xpert was directed to back files up using ABARS.

Incremental Backup, Recovery to Restored System

Perform full volume backups at different intervals (e.g. weekly, monthly, or quarterly) establishing a base backup period. Use DR/Xpert to incrementally back up critical production datasets that have changed from the beginning of the backup period.

This strategy reduces the number of datasets controlled by DR/Xpert and reduces the number of datasets it restores; so its recovery set could be smaller. However, this strategy may increase dependence on HSM recovery for less frequently used critical datasets (year-end, quarterly, and month-end).

The focus of recovery for this strategy is shifted from DR/Xpert to the base point backups (full volume backup); and HSM recovery.

Considerations for Incremental and Non-Incremental Backup

The following is a list of keywords provided to support incremental backups as contrasted to continuous backup of critical files. DR/Xpert provides keywords related to disk and tape so that the two device types are controlled separately.

Please refer to these keywords in DR/Xpert's Parameter Reference Guide for a full description of proper values. However, in general, specify BKUPPNT-1 when DR/Xpert is providing incremental backups depending upon a base backup period (full volume backups); and, specify NONE when DR/Xpert is not depending on a backup point.

- EXPIRE-DISK-AGGREGATES-WHEN (affects AUDIT)
- DISK-RECOVERY-STARTS-FROM (affects recovery)
- EXPIRE-TAPE-AGGREGATES-WHEN
- TAPE-RECOVERY-STARTS-FROM

The environmental considerations for DR/Xpert within an "incremental backup" strategy require that the data center notify DR/Xpert when system-wide volume backups are complete. The BKUPPNT job stream provides time-of-day notification to begin a base backup period. This job can be run for tape and disk, separately.

- REGISTER-DISK-BACKUP-PERIOD
- REGISTER-TAPE-BACKUP-PERIOD

Restore

DR/Xpert uses the logical backup facility of DFSMSdss to backup DASD application datasets, which must be running in job-step mode (as opposed to stand-alone). Therefore, a base MVS infrastructure must exist before DR/Xpert can restore the application datasets.

The Restore requirements are as follows:

- Operational MVS system with a JES (JES2 or JES3)
- All of the catalog structures for the application datasets that you need to restore
- Functional tape management system along with its current catalog

- Facility to submit, monitor, and review Jobs (TSO/ISPF, etc.)
- Current copy of the DR/Xpert datasets

Current DR/Xpert datasets are crucial. First, they are referenced and updated during the restore process. The results of the restores are posted in the DR/Xpert datasets. One of the Restore programs allows the user to see the status of the overall restore by listing the datasets restored versus the datasets not restored. This helps when researching restore problems. If the list of backed-up datasets is not current, then the posting will be incomplete, resulting in meaningless information on the Restore Status Report.

Secondly, DR/Xpert creates the restore JCL during the backup process and stores the restore JCL in one of the DR/Xpert datasets. If these datasets are not current, the restore JCL will be incorrect and will need to be recreated at the restore site.

The Restore processing overview for the DR/Xpert system is depicted in Figure 2-6.

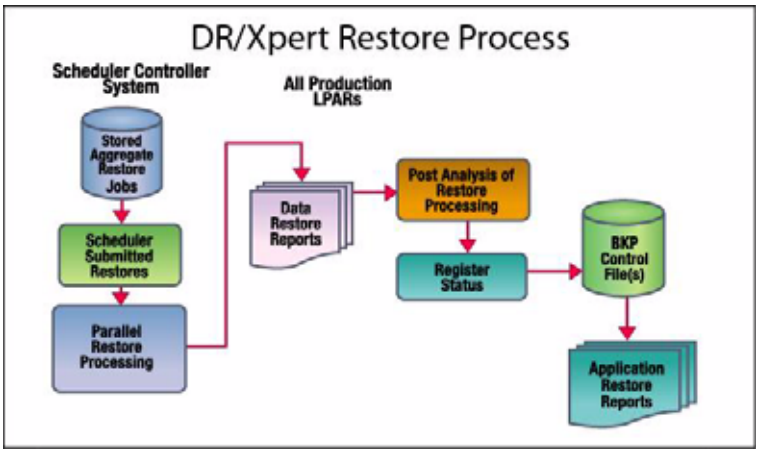

Figure 2-6 DR/XPERT Restore Process

Utilities or Adhoc Functions

The Utilities component of DR/Xpert is comprised of jobs used to perform adhoc maintenance requests. The JCL for these utilities can be found in the DR/Xpert JCLLIB library.

The uses of these utilities are detailed in Chapter 15. Table 2-2shows a list of utilities and functions.

Table 2-2 Utilities and Functions

Utility	Function
OTCDBMTD	Maintain/add dataset records
OTCDZDSN	Remove obsolete datasets from DR/Xpert data files
OTCDZJOB	Remove obsolete jobnames from DR/Xpert data files
OTCDZQUE	Clear backup queue records

Job Trigger Task (OTCDTASK)

The Job Trigger Task (OTCDTASK) is a started task that detects successful end of job status (via a customized scheduler interface) and generates the dynamic trigger request to the Backup request queue.

The processing overview for the Job Trigger Started Task is depicted in Figure 2-7.

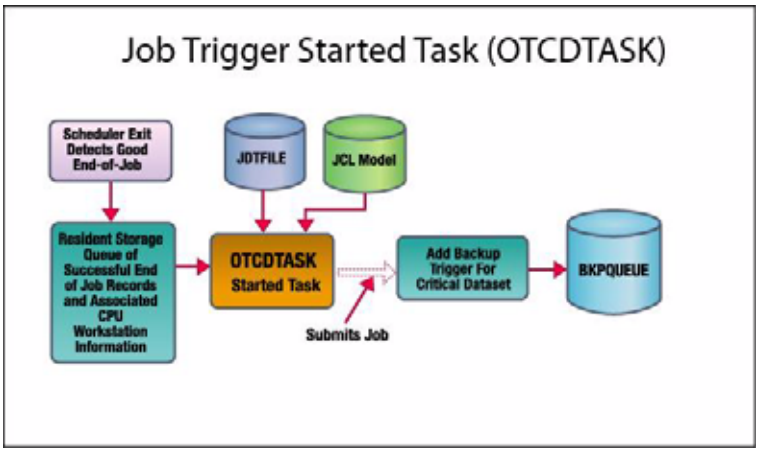

Figure 2-7 Job Trigger Started Task (OTCDTASK)

Note OTCDTASK is a supplemental tool that makes early detection of datasets ready for backup. It benefits customers who have smaller capacity tape drives because it schedules backup jobs more quickly. It does not benefit customers with large capacity tape drives because the objective of exploiting tape utilization pushes backup schedule later and more infrequently.

3 Critical Dataset Identification

TOPICS COVERED IN THIS CHAPTER

Overview (page 3-2)

Scheduled Collection and Identification Jobs (page 3-2)

SMF Collection (page 3-2)

Runtime Dependencies (page 3-2)

Order of Job Submission (page 3-3)

Daily Collection (page 3-4)

Weekly Collection (page 3-14)

Weekly Dataset Identification (page 3-20)

Generating ANALYSIS Reports (page 3-29)

Overview

The collection and analysis components make up the core of the DR/Xpert product. These components use data from multiple sources to extract, filter and compile a list of critical datasets required for application recovery and to evaluate and determine when each file is available for backup.

This chapter provides details on all jobs for these processes contained in the collections and dataset identification components.

Scheduled Collection and Identification Jobs

In DR/Xpert, there are three types of Collection jobs that should be scheduled:

- The Daily SMF job should run every day (7 days a week) to collect and screen SMF data.
- The Daily JCL Collection job should be scheduled every week to scan JCL libraries and pick out information not available in SMF data.
- The Daily Dataset Identification job should be scheduled every week to perform file access analysis within processing windows (or what DR/Xpert calls a PATH).

The subsections that follow describe these jobs.

SMF Collection

DR/Xpert provides an SMF Data Collector to limit the impact of collecting SMF 14 and 15 records. Although DR/Xpert's Collection and Identification Components can process SMF data from unloaded SMF files, there are some functions of the Backup Component that depend on the SMF Collector. However, an additional benefit of the SMF Data Collector task is providing DR/Xpert with SMF data in a timely manner.

Note See Chapter 4 for more information on the SMF Data Collector.

Runtime Dependencies

The Daily Collection job should run immediately before DR/Xpert's first end-of-day backup sweep (see Chapter 5), probably late during the 3rd shift. Once per week (most likely on Saturday or Sunday), run the weekly JCLSCAN analysis and the Dataset Identification Analysis.

Note Note that in addition to various reports generated by the Collection and Dataset Identification processes, the daily and weekly jobs also show DR/Xpert messages (output DD name CDIBRMSG) that give information about records that are incoming and filtered, as well as messages that result from the jobs.

Order of Job Submission

Table 3-1 outlines the processing order for the DR/Xpert data collection and critical dataset identification jobs.

Table 3-1 Job Submission Orders

Daily Job Submission Order	Daily Jobnames (JCLLIB member)	Weekly Job Submission Order	Weekly Jobnames (JCLLIB member)
1	*COLLECT*	1	*COLLECT*
N/A	N/A	2	*JCLSCAN*
N/A	N/A	3	*ANALYSIS*

Table 3-2 SMF Collection Job Streams

Scheduled Frequency	Jobnames (JCLLIB member)
SMF Data Collector started at IPL	*OTSMFDC*
SMF Data Collector LOGR Unload. Its frequency should be in consideration to avoid causing the LOGR dataset expanding into secondary extents.	*OTCDC020*

Note Refer to Chapter 4 for more information.

Daily Collection

The subsections that follow generally describe the process for Daily Collection.

COLLECT - Create Production Dataset and Job Profile

The daily collection process is a job named *COLLECT*. The input requirements for this job are a scheduler system's production job report, SMF data, and data from the *JCLSCAN*.

The *COLLECT* job performs eight functions, which are discussed in this chapter:

1. Extracts production job names and runtimes from your job scheduling software building a production job list.
2. Collects SMF data limited by the production job list and *JOBNAMES* filter.
3. Filters datasets using the *DSNAMES*, *SMFINFRA*, and *SYSIDTBL* filters.
4. Matches data from *JCLSCAN* with SMF data to build a Job/Dataset Usage Profile containing production datasets and jobs.
5. Creates a job start history profile.
6. Identifies online job streams.
7. Identifies application groups.
8. Keeps track of datasets that have been opened as output.

Scheduler Input

The *COLLECT* JCL member in DR/Xpert's JCLLIB contains JCL INCLUDE statements for each supported job scheduler (CA7, ESP, and OPC). Remove the comment for the INCLUDE statement that applies to your job scheduler. This will cause the *COLLECT* job to include the JCL that executes the program and control cards necessary for your job scheduler to generate a production job list.

Note As stated above, DR/Xpert supports CA7, ESP, and OPC. Support for other third-party scheduling products can be added, if needed. Contact OpenTech Systems support personnel about adding your scheduling product to the supported list.

The JCLLIB and PARMLIB members for each job scheduler are listed below. The JCLLIB member is included in *COLLECT*'s runtime through the INCLUDE JCL statement. The PARMLIB member contains the scheduler product's control statements to obtain a full run schedule for your data center's production jobs. These members should have been customized or reviewed during product customization. If not, review these JCLLIB and PARMLIB members before submitting *COLLECT*.

Table 3-3

Scheduler-specific job step (from JCLLIB)	Control cards (from PARMLIB)
CA7JOBS	*CA7DATA*
ESPJOBS	*ESPDATA*
OPCJOBS	*OPCRPT01*

SMF Input

The second purpose of the daily collection process is to collect SMF records types used by DR/Xpert from the data center's daily SMF data.

If your data center will be using the DR/Xpert SMF Data Collector, proceed to the next section "Specify Installation LOADLIB and PARMLIB".

If your data center will not be using the DR/Expert SMF Data Collector task, you will need to provide your data center's daily SMF data file name. Edit the job to include the data center's current day SMF data file(s) in DD name SMF.

Specify Installation LOADLIB and PARMLIB

Modify the *COLLECT* member of the DR/Xpert JCLLIB and update the dataset name prefixes for the STEPLIB and OTPRMLIB DD statements.

Filter Data Center Infrastructure Datasets

The PARMLIB members below are used to eliminate SMF records that pertain to infrastructure or system datasets, or eliminate SMF data by system ID. The members below control what SMF data is ultimately stored in DR/Xpert's Job and Dataset Usage Profile. These members may have been customized during DR/Xpert installation; but if not, the user should review these members before submitting the *COLLECT* JCL.

- *SMFINFRA* – filter infrastructure/system datasets (e.g. - SYS1.* or *.DB@). Specify datasets that are normally recovered by other strategies. This might include datasets that are required before IPL, thus, requiring full volume recoveries. Another example might be DB2 Table Spaces.

Note SMFINFRA is similar to the *DSNAMES* filter except it can completely eliminate SMF records from DR/Xpert's collection process. See the description of *DSNAMES* filter in the next section. OpenTech Systems recommends using *SMFINFRA* for data center class datasets and *DSNAMES* for production application datasets.

- *SYSIDTBL* – filter by SMF system ID. Use this filter to exclude SMF records from test LPARS.

Filter Application Datasets

The third purpose of the *COLLECT* job is to identify application datasets (or groups of datasets) that should not be classified as critical. The *DSNAMES* filter is used to identify application datasets for backup and recovery.

This filter differs from the *SMFINFRA* filter because it does not eliminate the dataset from DR/Xpert's job and Dataset Usage Profiles.

Create Job/Dataset Usage Profile

The fourth purpose of the COLLECT job is to create a Job/Dataset Usage Profile. The Job/Dataset Usage Profile is filtered by the production jobs found in your Job Scheduler's Production Job Report.

The *COLLECT* job uses the *JOBNAMES* filter member found in DR/Xpert's PARMLIB to supplement your scheduling system's production job list. Use *JOBNAMES* to add any additional jobs that are considered production. These jobs may be critical to application jobs that are not scheduled through your job scheduler. These production jobs are those that would be submitted manually by an operator.

JOBNAMES can also eliminate production jobs that are found in your scheduling system's production job report, but that you do not include in production job analysis.

Create Job Start History Profile

The fifth purpose of the *COLLECT* job is to build a Job Start History Profile. The Job Start History Profile influences DR/Xpert's job PATH Analysis logic by identifying the historical instances of each production job.

The *SMF-SELECT-FOR-EXTRACT* parameter value will determine how long the job history data is retained. This parameter is set to 365 (days) by default, but the value for this parameter can be extended or shortened in the USERSETS member of the DR/Xpert PARMLIB.

Identify Online Job Streams

The sixth purpose of the *COLLECT* job is to identify your data center's online job streams. The purpose of identifying online work is to segregate online recoveries from batch ones. This document uses CICS as its example for online job streams.

DR/Xpert uses two filters to identify online systems: *ONLPGMS* and *ONLJOBS*. SMF records are passed through the *ONLPGMS* filter first, and then further qualified by the *ONLJOBS* filter. Using two online filters allows DR/Xpert to identify online jobs using two different strategies.

The first strategy is to select programs that invoke your online job stream; for example, DFHSIP. Specify online program names in the *ONLPGMS* filter, and then use the *ONLJOBS* filter to discern between production and test. This strategy is recommended because it is less likely to require changes when new online regions are created.

The second strategy is to explicitly specify online job names in the *ONLJOBS* filter. For example, in *ONLPGMS*, you can instruct DR/Xpert to look at all jobs that execute DFHSIP (in *ONLPGMS*) and then further qualify that selection by production jobs (in *ONLJOBS*).

The combination of the two filters identifies your online jobs, as shown in the following example:

Content of *ONLPGMS* :	`INCL=DFHSIP Or INCL=DFH*`
Content of *ONLJOBS*:	`INCL=P* Jobs that start with P` `INCL=????P* Jobs with 'P' in the fifth character`

Alternatively, you can explicitly identify each CICS job in *ONLJOBS* and broadly specify program names in *ONLPGMS*, as shown in the following example:

Content of *ONLPGMS* :	`INCL=*`

Content of *ONLJOBS*:	`INCL=PCICS*`
	`INCL=PORDERS`
	`INCL=CICSP001`

Identify Application Groups

The seventh purpose of the *COLLECT* job is to identify your data center's application groups according to your data center's objectives for recovery.

Application groups are not limited to applications. Groups can be multi-leveled or contain a single level. An example of a single-level group is simply an application name. Examples of multi-tiered application groups might be COMPANY, DIVISION, and APPLICATION. When multi-tiered groups are defined, the application group name contains a plus sign to separate each tier.

The application group has two functions:

- Many of DR/Xpert's reports are ordered or have control breaks by the application group name
- An application group is one of the selection criteria for recovery.

Consider these issues when constructing application names:

- During reporting, too many unique applications may require a lot of report pages with only a few detail lines per page.
- During recovery, too many unique applications may require a lot more control cards containing each application name in order to group applications together.

The APPLDSNS member in DR/Xpert's PARMLIB is used to override APPLRULE. Use APPLDSNS to override the application assignments by dataset name.

The *APPLRULE* member is used to define applications by a variety of information including parts of job names, accounting information, and security product IDs. Modify this member to control the assignment of application group names to production job streams.

Note See Chapter 10 for more information on defining application groups.

Tracking Datasets Opened for Output

The collection process identifies datasets that have been opened for output. This information is noted in DR/Xpert's Backup Database.

If the backup database is not available, a related message appears on an accompanying report and a return code of 4 is set.

Note This is always the case before the first *OTCDBIN1* job stream is run. You may ignore this as an error when you first install DR/Xpert or if you never run OTCDBIN1.

OTCDBIN1 is described in *Chapter 5, Step 1 - Weekly Backup Maintenance Job Stream*.

COLLECT Action Items In Review

You must complete the actions before submitting the *COLLECT* job stream:

1. Uncomment the JCL INCLUDE statement that represents the third-party scheduling system your data center uses. Tailor the included JCL member and the corresponding PARMLIB control member to match your runtime environment.
2. Modify the *JOBNAMES* member to supplement the production job list DR/Xpert will use.
3. Modify the OTPRMLIB and STEPLIB DD statements to conform to the dataset names under which DR/Xpert was installed.
4. If you do not plan to use DR/Xpert's SMF Collector or DR/Xpert's Backup component, you may add your data center's daily SMF dataset to the *COLLECT* JCL.
5. Modify *SMFINFRA* and *SYSIDTBL* filters to eliminate data center class (infrastructure) datasets from DR/Xpert's analysis.
6. Modify *DSNAMES* to inhibit certain datasets from being critical.
7. Identify CICS or other online applications by tailoring *ONLPGMS* and *ONLJOBS*.
8. Modify the *APPLRULE* member to define your application names.
9. Modify the APPLDSNS member to override applications assignments as exceptions to the APPLRULE member. These exceptions are on a dataset-by-dataset basis.

Note If the NEWNAMES CLIST was executed during production installation, the DR/Xpert product dataset names and job cards may already be updated in the JCL used to execute these phases. If the NEWNAMES CLIST was not used, the user will need to update the dataset names (@dsprefix) as instructed in the JCL comments.

Daily Collection Reports

The subsections that follow describe the different daily collection reports.

SMF Record Selection and Processing Report

Review the SMF Record Selection and Processing Report (shown in Figure 3-1) to ensure that all record types have collected SMF records.

```
REL x.x.x  PTF x                                    D R / X P E R T                                    PROGRAM
OTCDC001

DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     SMF INFASTRUCTURE DSNAME FILTER FOR OPENTECH_SYSTEMS
PAGE     01

                 TYPE-14     TYPE-15   START JOB     END JOB    END STEP        VSAM       OTHER       TOTAL
  ---------------------------------------------------------------------------------------------------------
     SYS1          2,329         392          33          33          34          96         404       3,321
    TOTAL          2,329         392          33          33          34          96         404       3,321
  ---------------------------------------------------------------------------------------------------------
 INC DISK          2,251         344           0           0           0          76           0       2,671
 INC TAPE             48          38           0           0           0           0           0          86
 TOT DATA          2,299         382           0           0           0          76           0       2,757
  ---------------------------------------------------------------------------------------------------------
 TOT DATA          2,299         382           0           0           0          76           0       2,757
    INFRA             30          10           0           0           0          20           0          60
     TEMP              0           0           0           0           0           0           0           0
 JOB/STEP              0           0          33          33          34           0           0         100
      N/A              0           0           0           0           0           0           0           0
    OTHER              0           0           0           0           0           0         404         404
    TOTAL          2,329         392          33          33          34          96         404       3,321


REL x.x.x  PTF x                                    D R / X P E R T                                    PROGRAM
OTCDC001

DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     SMF SYSTEM ID FILTER PROGRAM FOR OPENTECH_SYSTEMS
PAGE     01

                        COUNTS  INCLUDED FILTERS
           +----------------+  +-----------------------------------------+
                         3,321  *

                        COUNTS  EXCLUDED FILTERS
           +----------------+  +-----------------------------------------+
                                "NONE"

                        COUNTS  SUMMARY
           +----------------+  +-----------------------------------------+
                         3,321  TOTAL INCLUDED
                             0  TOTAL NOT INCLUDED
                             0  TOTAL EXCLUDED
                         3,321  INSPECTED RECORDS

OTCC0300 - 000000000 PMF RECORDS LOADED
```

Figure 3-1 SMF Record Selection and Processing Report

Create Job and Dataset Profile Report

The Create Job and Dataset Profile Report, shown in Figure 3-2 and Figure 3-3 should be reviewed to ensure that filters are specified correctly. One of the counters in this report are those that represent online jobs; another represents counters for the *DSNAMES* filter. A filter count containing zeros may indicate a problem in the way a filter is specified.

```
 REL x.x.x  PTF x                                    D R / X P E R T                                          PROGRAM OTCDC001
 DATE:  xx/xx/xxxx   TIME:  xx:xx:xx    IDENTIFY APPLICATION GROUPS FOR OPENTECH_SYSTEMS                            PAGE
01

 ---------------------------------------------------------------------------------------------------------------------------------
----------
 CREATING JOB SELECTION LIST
 ---------------------------------------------------------------------------------------------------------------------------------
----------

                           57  START HISTORY RECORDS (INPUT)
                        2,857  SMF RECORDS (INPUT)
                           33  SMF START RECORD COUNT
                           90  JOB SELECTION RECORDS (OUTPUT)


REL x.x.x  PTF x                                     D R / X P E R T                                          PROGRAM OTCDC001
 DATE:  xx/xx/xxxx   TIME:  xx:xx:xx    CREATE JOB/DATA SET PROFILE FOR OPENTECH_SYSTEMS                            PAGE
01

                            8  SUSPEND FILE RETENTION DAYS
                      0107122  SUSPEND FILE CUTOFF (0CYYDDD)
           WED, MAY 02, 2007  SUSPEND FILE CUTOFF

 ---------------------------------------------------------------------------------------------------------------------------------
---------
 FILTER PRODUCTION JOBS
 ---------------------------------------------------------------------------------------------------------------------------------
---------

                       COUNT  DESCRIPTION
          +----------------+  +----------------------------------------+
                          19  JOB FILTER TABLE SIZE
                       2,857  SMFDAILY INPUT
                          49  SMF JOB MATCHES
                       2,742  SMF WITHOUT JOB MATCHES
                          20  SMF TYPE-30 RECORDS
                          29  FILTERED SMF RECORDS


 ---------------------------------------------------------------------------------------------------------------------------------
---------
 MERGING NEW SMF WITH YESTERDAY'S INFOUPD FILE
 ---------------------------------------------------------------------------------------------------------------------------------
---------

                       COUNT  DESCRIPTION
          +----------------+  +----------------------------------------+
                          27  SORTED SMF RECORDS
                          66  SORTED INFOUPD RECORDS
                          93  COMBINED INFOUPD RECORDS

 ---------------------------------------------------------------------------------------------------------------------------------
---------
 REMOVING DUPLICATE RECORDS FROM NEW INFOUPD FILE
 ---------------------------------------------------------------------------------------------------------------------------------
---------

                       COUNT  DESCRIPTION
          +----------------+  +----------------------------------------+
                          93  COMBINED INFOUPD RECORDS
                           0  DUPLICATE INFOUPD RECORDS
                          93  NEW INFOUPD RECORDS

 ---------------------------------------------------------------------------------------------------------------------------------
---------
 LIST OF ONLINE JOBNAMES
 ---------------------------------------------------------------------------------------------------------------------------------
---------

                              ONLINE JOB NAMES
          +----------------+  +----------------------------------------+

                       COUNT  DESCRIPTION
          +----------------+  +----------------------------------------+
                           0  RETAINED ONLINE JOBS
                           0  NEW ONLINE JOBS
                           0  DROPPED JOBS
                           0  TOTAL ONLINE JOBS
```

Figure 3-2 Create Job and Dataset Profile Report (1 of 2)

```
 REL x.x.x  PTF x                                    D R / X P E R T                                                    PROGRAM OTCDC001
 DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     IDENTIFY APPLICATION GROUPS FOR OPENTECH_SYSTEMS                                   PAGE     01

  ---------------------------------------------------------------------------------------------------------------------------------
------
  JOB HISTORY INFORMATION
  ---------------------------------------------------------------------------------------------------------------------------------
------

                    INFORMATION  DESCRIPTION
           +-----------------+  +----------------------------------------+
                      00000365  JOB EXEC HISTORY RETENTION DAYS
                       0107130  TODAY'S DATE (0CYYDDD)
                       0106130  JOB EXEC HISTORY RETENTION CUTOFF (0CYYDDD)
             THU, MAY 10, 2007  TODAYS DATE
             WED, MAY 10, 2006  JOB EXEC HISTORY RETENTION CUTOFF

  ---------------------------------------------------------------------------------------------------------------------------------
------
  APPLICATION TABLE
  ---------------------------------------------------------------------------------------------------------------------------------
------

                           54  HASH TABLE COUNT
                            0  HASH TABLE INSERTS
                           34  HASH TABLE MATCHES
                            0  HASH TABLE MISSES
                           49  HASH DEPTH COUNT
                           88  REQUESTS
                         0.56  HASH CHAIN TO REQUEST RATIO

                            0  NEW APPLICATIONS FOUND

  ---------------------------------------------------------------------------------------------------------------------------------
------
  JOB START HISTORY MAINTENANCE
  ---------------------------------------------------------------------------------------------------------------------------------
------

                          191  START HISTORY RECORDS (INPUT)
                        2,857  SMF RECORDS (INPUT)
                            0  START HISTORY RECORDS (DROPPED)
                           33  SMF START RECORD COUNT
                          224  START HISTORY RECORDS (OUTPUT)

             WED, MAY 09, 2007  START HISTORY (STARTING DATE)
             THU, MAY 10, 2007  START HISTORY (ENDING DATE)


 REL x.x.x  PTF x                                    D R / X P E R T                                                    PROGRAM OTCDC001
 DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     CREATE JOB/DATA SET PROFILE FOR OPENTECH_SYSTEMS                                   PAGE     01

 OTCC0920  - TODAY'S DATE IS 0107130;JOB EXEC HISTORY RETENTION DAYS = 00000365
 OTCC0920  - JOB EXEC HISTORY RETENTION CUTOFF VALUE IS 0098365(CCYYDDD)
 OTCC0920  - JOB EXEC HISTORY RETENTION CUTOFF IS SAT, DEC 31, 1898
 OTCC0920  - JFILTER  COUNT=00000019
 OTCC0920  - IFILTER  COUNT=00000042
 OTCC0920  - DSN INCL COUNT=00000001
 OTCC0920  - DSN EXCL COUNT=00000000

REL x.x.x  PTF x                                    D R / X P E R T                                                    PROGRAM OTCDC001
 DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     CREATE JOB/DATA SET PROFILE FOR OPENTECH_SYSTEMS                                   PAGE     02

                      COUNTS  JFILTER AND IFILTER
          +----------------+  +----------------------------------------+
                       2,888  TOTAL INPUT

                           0  RECORD'S DATE IS OUT OF RANGE, BYPASSED
                         100  JOB OR STEP START/STOP RECORD BYPASSED
                       2,727  NON-PRODUCTION BYPASSED
                          61  PRODUCTION-JOB (PASSED TO DSNFILT)
                           0  NON-PRODUCTION CRITICAL (PASSED TO DSNFILT)

                          61  PASSED TO DSNFILT

                      COUNTS  INCLUDED FILTERS
          +----------------+  +----------------------------------------+
                          61  *

                      COUNTS  EXCLUDED FILTERS
          +----------------+  +----------------------------------------+
                              "NONE"

                      COUNTS  SUMMARY
          +----------------+  +----------------------------------------+
                          61  TOTAL INCLUDED
                           0  TOTAL EXCLUDED
                           0  TOTAL SKIPPED
                          61  INSPECTED RECORDS
```

Figure 3-3 Create Job and Dataset Profile Report (2 of 2)

Include/Exclude Filter Tables Report

The Include/Exclude Filter Tables Report, shown in Figure 3-4, is provided to help Technical Support and the user identify what inclusion and exclusion patterns/tables were in use when the DR/Xpert job ran. The report lists which inclusions and exclusions were in use by each phase of the job that uses that type of selection criteria.

```
 REL x.x.x  PTF x                                    D R / X P E R T                                    PROGRAM
OTCDC001

 DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     INCLUDE/EXCLUDE FILTER TABLES REPORT FOR OPENTECH_SYSTEMS
PAGE      1


 PROCESSING PHASE     TBL NAME LEN FILTER DATA
 +------------------+ +------+ +-+ +-----------------------------------------------------------------------------------------
------+

 SMF SYSTEM ID FILTER SYSIDTBL   6 INCL=*

 DSNAME FILTER        SMFINFRA  11 EXCL=SYS1.*
                                11 EXCL=SYS2.*

 ADHOC JOB SELECTION  JOBNAMES  13 INCL=OT18%%%!
                                 9 EXCL=FTP*
                                10 EXCL=DFHSM

 ONLINE JOB FILTERS   ONLJOBS    6 INCL=*

 ONLINE PGM FILTERS   ONLPGMS   11 INCL=DFHSIP

 DSNAME FILTER        DSNAMES    6 INCL=*
```

Figure 3-4 Include/Exclude Filter Tables Report

SMF Infrastructure DSNAME Filter Report

The SMF Infrastructure DSNAME Filter report, shown in Figure 3-5, helps to verify that the user-specified filters are working as anticipated.

```
 REL x.x.x  PTF x                                    D R / X P E R T                                    PROGRAM
OTCDC001
 DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     SMF INFASTRUCTURE DSNAME FILTER FOR OPENTECH_SYSTEMS
PAGE     01

 ---------------------------------------------------------------------------------------------------------------------
---------------
 SOURCE MEMBER: SMFINFRA
 ---------------------------------------------------------------------------------------------------------------------
---------------

                     COUNTS  INCLUDED FILTERS
          +----------------+ +-----------------------------------------+
                      2,757  *

                     COUNTS  EXCLUDED FILTERS
          +----------------+ +-----------------------------------------+
                          0  SYS1.*
                         60  SYS2.*

                     COUNTS  SUMMARY
          +----------------+ +-----------------------------------------+
                      2,757  TOTAL INCLUDED
                          0  TOTAL NOT INCLUDED
                         60  TOTAL EXCLUDED
                      2,817  INSPECTED RECORDS
```

Figure 3-5 SMF Infrastructure DSNAME Filter Report

Rules Processor Report

The Rules Processor Report serves as a cross reference between the user-defined rules table and the DR/Xpert generated Rule ID's. A section will be printed for each rules processing function that is in effect when the DR/Xpert job runs. Figure 3-6 shows the Rules Processor Report for the *APPLRULE* table.

The Rules Processor Report does not list the statement specified by a BY rule logic sub-modifier. It will list the rules that were generated based on the BY statement and the contents of the table it specified.

```
REL x.x.x  PTF x                                    D R / X P E R T                                    PROGRAM
OTCDC001

DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     RULES PROCESSOR REPORT FOR TABLE: APPLRULE FOR OPENTECH_SYSTEMS
PAGE      1

 +  RULE   +          COMPARE
 +---ID----+          +FIELD+     +-----------------COMPARE DATA-----------------+

           1  IF      JOB      EQ ????XXX!

              THEN    APPL-XXX

           2  IF      JOB      EQ ????JOB!

              THEN    APPL-JOB

              DEFAULT ALL-APPLICATIONS
```

Figure 3-6 Rules Processor Report

Update BKPDBASE w/Open for O/P Flag Report

The report shown in Figure 3-7 reflects open-for-update situations discovered in SMF data.

```
REL x.x.x  PTF x                                    D R / X P E R T                                    PROGRAM
OTCDC001

 DATE:  xx/xx/xxxx   TIME:  xx:xx:xx    UPDATE BKPDBASE W/OPEN FOR O/P FLAG FOR OPENTECH_SYSTEMS
PAGE      1

 EXECUTION START DATE AND TIME:                05/10/07 15:28:44.20

 LOWEST DATE AND TIME FOUND IN SMFDAILY:        2007/05/10 14:41:31
 HIGHEST DATE AND TIME FOUND IN SMFDAILY:       2007/05/10 15:27:14

 NUMBER OF SMF RECORDS READ FROM SMFDAILY:                    2,857
 NUMBER OF SMF RECORDS TAGGED AS INPUT:                       2,430
 NUMBER OF SMF RECORDS TAGGED AS OUTPUT/UPDATE:                 427
 NUMBER OF SMF RECORDS NOT FOUND IN BKPDBASE:                   393
 NUMBER OF SMF RECORDS APPLIED TO BKPDBASE:                      34

 NUMBER OF BKPDBASE DATASET RECORDS READ:                        21
 NUMBER OF BKPDBASE DATASET RECORDS UPDATED:                     14

 EXECUTION END DATE AND TIME:                  05/10/07 15:28:46.27

REL x.x.x  PTF x                                    D R / X P E R T                                    PROGRAM
OTCDC001

 DATE:  xx/xx/xxxx   TIME:  xx:xx:xx    UPDATE BKPDBASE W/OPEN FOR O/P FLAG FOR OPENTECH_SYSTEMS
PAGE      1

 *** BKPDBASE CONTAINS NO DATA SET DEFINITIONS, SO ALL OTHER WORK WAS BYPASSED ***

 EXECUTION START DATE AND TIME:                05/10/07 15:28:46.41

 LOWEST DATE AND TIME FOUND IN SMFDAILY:        YYYYMMDDHH HH:MM:SS
 HIGHEST DATE AND TIME FOUND IN SMFDAILY:       YYYYMMDDHH HH:MM:SS

 NUMBER OF SMF RECORDS READ FROM SMFDAILY:                        0
 NUMBER OF SMF RECORDS TAGGED AS INPUT:                           0
 NUMBER OF SMF RECORDS TAGGED AS OUTPUT/UPDATE:                   0
 NUMBER OF SMF RECORDS NOT FOUND IN BKPDBASE:                     0
 NUMBER OF SMF RECORDS APPLIED TO BKPDBASE:                       0

 NUMBER OF BKPDBASE DATASET RECORDS READ:                         0
 NUMBER OF BKPDBASE DATASET RECORDS UPDATED:                      0

 EXECUTION END DATE AND TIME:                  05/10/07 15:28:48.39
```

Figure 3-7 Update BKPDBASE W/Open for O/P Flag Report

Weekly Collection

The Weekly Collection processing is a program that extracts data from production JCL libraries. The execution JCL for this program is the *JCLSCAN* member in DR/Xpert's JCLLIB dataset. The subsections that follow describe the different aspects of Weekly Collection processing.

Input

The input to the *JCLSCAN* program is your data center's production JCL libraries. These JCL libraries are defined in the *JCLLIBS* member in DR/Xpert's PARMLIB.

To limit data going to critical file analysis, the *JCLSCAN* program uses the *SMFINFRA* and *DSNAMES* filters as described in the *Daily Collection* section.

JCLLIBS Member

The *JCLLIBS* member contains the JCL libraries definitions. Each row in this table has two tokens. The first token is a 44-byte JCL Library dataset name. The second token is an association token for JCL library Sets. The JCL Library names should be the same ones your third-party scheduling product uses to submit JCL. If there are additional JCL

libraries other than those known by your scheduling product, the JCL Scan job stream could produce additional critical files.

Library dataset names are dynamically allocated before calling the *JCLSCAN* engine. Library dataset names that have the same association token are allocated as a concatenated dataset. They should be specified together and appear in the order you want them concatenated. Each group of libraries allocated as a single dataset or concatenated together represent a Library Set. The Library Set is known by each entry's second token.

The *JCLLIBS* PARMLIB member may have been customized during DR/Xpert installation. If not, the user should review these members before submitting the *JCLSCAN* JCL. Edit the *JCLLIBS* member and add your data center's production JCL libraries to it.

The Check Sum Dataset

For each JCL library Set, a check sum dataset is created. The Check Sum dataset is identified by the node ".CHECKSUM." followed by the Library Set name; that is, the second token as described in the previous section.

OpenTech Systems uses its own JCL Scanning software to develop the Check Sum for all JCL components, including external JCL, included members, and catalog procedures (PROCLIB members). Module check sums that change between two instances of *JCLSCAN* are further processed extracting dataset information not found in SMF data, such as DISP parameters and concatenated datasets.

The Check Sum dataset should be kept indefinitely for performance reasons. However, if it is deleted, *JCLSCAN* will produce the same results.

Weekly Collection Reports

The subsections that follow describe the Weekly Collection reports.

Track JCL Library Change History Report

The Track JCL Library Change History Report, shown in Figure 3-8, gives information concerning the number of JCL members processed and the resultant JCL Master File record counts. In addition, it reports JCL scans for individual members that were processed unsuccessfully. Unsuccessful JCL scans are usually caused by missing PROCLIB members or missing PROCLIB datasets.

```
REL x.x.x  PTF x                                        D R / X P E R T                                          PROGRAM OTCDC015

DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     TRACK JCL LIBRARY CHANGE HISTORY FOR OPENTECH_SYSTEMS                          PAGE     01

  ---------------------------------------------------------------------------------------------------------------------------------
  RUNNING ANALYSIS ON KEMPER WHERE LIBRARIES ARE
    OT.JCLLIB.CNTL
  ---------------------------------------------------------------------------------------------------------------------------------
                         5,172  MEMBERS READ
                         5,138  MEMBERS WITH MATCHING CHECKSUMS
                            34  MEMBERS UPDATED
                             0  NEW MEMBERS
                           251  NEW MASTER FILE RECORDS FROM ANALYSIS
                             0  PATTERN MASTER FILE RECORDS FROM ANALYSIS
  ---------------------------------------------------------------------------------------------------------------------------------
  MEMBERS TO INVESTIGATE
  ---------------------------------------------------------------------------------------------------------------------------------
       BADJCL01 00000000 005   PROCLIB MEMBER NOT FOUND      BADJCL02 00000000 003   PROCLIB NOT FOUND
       BADJCL03 00000000 005   PROCLIB MEMBER NOT FOUND      BADJCL04 00000000 005   PROCLIB MEMBER NOT FOUND
       BADJCL05 00000000 003   PROCLIB NOT FOUND             BADJCL06 00000000 005   PROCLIB MEMBER NOT FOUND
       BADJCL07 00000000 005   PROCLIB MEMBER NOT FOUND      BADJCL08 00000000 005   PROCLIB MEMBER NOT FOUND
       BADJCL09 00000000 005   PROCLIB MEMBER NOT FOUND      BADJCL00 00000000 005   PROCLIB MEMBER NOT FOUND
       BADJCL11 00000000 005   PROCLIB MEMBER NOT FOUND      BADJCL12 00000000 005   PROCLIB MEMBER NOT FOUND
       BADJCL13 00000000 005   PROCLIB MEMBER NOT FOUND      BADJCL14 00000000 003   PROCLIB NOT FOUND
       BADJCL15 00000000 003   PROCLIB NOT FOUND             BADJCL16 00000000 003   PROCLIB NOT FOUND
       BADJCL17 00000000 003   PROCLIB NOT FOUND             BADJCL18 00000000 003   PROCLIB NOT FOUND
       BADJCL19 00000000 003   PROCLIB NOT FOUND             BADJCL20 00000000 003   PROCLIB NOT FOUND
       BADJCL21 00000000 003   PROCLIB NOT FOUND             BADJCL22 00000000 003   PROCLIB NOT FOUND
       BADJCL23 00000000 003   PROCLIB NOT FOUND             BADJCL24 00000000 003   PROCLIB NOT FOUND
       BADJCL25 00000000 003   PROCLIB NOT FOUND             BADJCL26 00000000 003   PROCLIB NOT FOUND
       BADJCL27 00000000 003   PROCLIB NOT FOUND             BADJCL28 00000000 003   PROCLIB NOT FOUND
       BADJCL29 00000000 003   PROCLIB NOT FOUND             BADJCL30 00000000 003   PROCLIB NOT FOUND
       BADJCL31 00000000 003   PROCLIB NOT FOUND             BADJCL32 00000000 003   PROCLIB NOT FOUND
       BADJCL33 00000000 005   PROCLIB MEMBER NOT FOUND      BADJCL34 00000000 005   PROCLIB MEMBER NOT FOUND
       PLEASE INVESTIGATE THE MEMBERS LISTED IN THE PRECEDING REPORT AND CORRECT THEM AS NEEDED
       IF ALL MEMBERS ARE UNIMPORTANT, THE ABEND CAN BE IGNORED
  ---------------------------------------------------------------------------------------------------------------------------------
  TOTALS
  ---------------------------------------------------------------------------------------------------------------------------------
                         5,172  MEMBERS READ
                         5,138  MEMBERS WITH MATCHING CHECKSUMS
                            34  MEMBERS UPDATED
                             0  NEW MEMBERS
                             0  OLD MASTER FILE RECORDS COPIED
                           251  NEW MASTER FILE RECORDS FROM ANALYSIS
                             0  JCL RECORDS DROPPED FROM OLD MASTER FILE
                           251  JCL RECORDS DROPPED FOR BEING NON-PRODUCTION
                             0  JCL RECORDS DROPPED BY SOME FILTER

REL x.x.x  PTF x                                        D R / X P E R T                                          PROGRAM OTCDC015
  DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     TRACK JCL LIBRARY CHANGE HISTORY FOR OPENTECH_SYSTEMS                          PAGE     02
                             0  JCL RECORDS PASSED TO SORT
                             1  PATTERN MASTER FILE RECORDS WRITTEN
                             0  PATTERN MASTER FILE RECORDS FROM ANALYSIS
                             0  PMF RECORDS DROPPED FROM OLD MASTER FILE
                             1  PMF RECORDS DROPPED FOR BEING NON-PRODUCTION
                             0  PMF RECORDS DROPPED BY SOME FILTER
                             0  PMF RECORDS PASSED TO SORT
```

Figure 3-8 Track JCL Library Change History

Note If the *JCLSCAN* had one or more members requiring investigation, the *JCLSCAN* job stream terminates with a return code 7. The *JCLSCAN* completed its analysis for all members except those members that are listed. After investigating, you may decide that the members are never scheduled for work; thus no correction is necessary. If that is true, the output from *JCLSCAN* is correct and the return code can be ignored.

Filtered Items found in Track JCL Library Change History Report

The Filtered Items found in Track JCL Library Change History Report, shown in Figure 3-9, contains information about datasets that will be passed to Critical Dataset Identification Processing or that have been eliminated because of the filters applied during the *JCLSCAN* job stream. Review the filtered items in this report to ensure that no unexpected items are listed.

```
REL x.x.x  PTF x                                          D R / X P E R T
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     TRACK JCL LIBRARY CHANGE HISTORY FOR OPENTECH_SYSTEMS

-------------------------------------------------------------------------------------------------------------------------------
--------------
 SOURCE MEMBER: SMFINFRA
-------------------------------------------------------------------------------------------------------------------------------
--------------

                       COUNTS  INCLUDED FILTERS
          +----------------+  +----------------------------------------+
                            0  *

                       COUNTS  EXCLUDED FILTERS
          +----------------+  +----------------------------------------+
                            0  SYS1.*
                            0  SYS2.*

                       COUNTS  SUMMARY
          +----------------+  +----------------------------------------+
                            0  TOTAL INCLUDED
                            0  TOTAL NOT INCLUDED
                            0  TOTAL EXCLUDED
                            0  INSPECTED RECORDS

REL x.x.x  PTF x                                          D R / X P E R T
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     TRACK JCL LIBRARY CHANGE HISTORY FOR OPENTECH_SYSTEMS
 ------------------------------------------------------------------------------------------------------------------------------
---------------
 SOURCE MEMBER: DSNAMES
 ------------------------------------------------------------------------------------------------------------------------------
---------------

                       COUNTS  INCLUDED FILTERSS
          +----------------+  +----------------------------------------+
                            0  CXCICS.*
                            0  DST.*
                            0  ECT.*
                            0  FXT.*

                       COUNTS  EXCLUDED FILTERS
          +----------------+  +----------------------------------------+
                               "NONE"

                       COUNTS  SUMMARY
          +----------------+  +----------------------------------------+
                            0  TOTAL INCLUDED
                            0  TOTAL NOT INCLUDED
                            0  TOTAL EXCLUDED
                            0  INSPECTED RECORDS
                       63,903  INSPECTED RECORDS

REL x.x.x  PTF x                                          D R / X P E R T
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     TRACK JCL LIBRARY CHANGE HISTORY FOR OPENTECH_SYSTEMS
-------------------------------------------------------------------------------------------------------------------------------
--------------
 SOURCE MEMBER: DDNAMES
 ------------------------------------------------------------------------------------------------------------------------------
---------------

                       COUNTS  INCLUDED FILTERS
          +----------------+  +----------------------------------------+
                            0  *

                       COUNTS  EXCLUDED FILTERS
          +----------------+  +----------------------------------------+
                               "NONE"

                       COUNTS  SUMMARY
          +----------------+  +----------------------------------------+
                            0  TOTAL INCLUDED
                            0  TOTAL NOT INCLUDED
                            0  TOTAL EXCLUDED
                            0  INSPECTED RECORDS
```

Figure 3-9 Track JCL Library Change History (1 of 2)

```
REL x.x.x  PTF x                                        D R / X P E R T
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     TRACK JCL LIBRARY CHANGE HISTORY FOR OPENTECH_SYSTEMS

-------------------------------------------------------------------------------------------------------------------------------
--------------
 SOURCE MEMBER: PROGRAMS
 -----------------------------------------------------------------------------------------------------------------------------
--------------

                      COUNTS  INCLUDED FILTERSS
          +----------------+  +----------------------------------------+
                           0  *

                      COUNTS  EXCLUDED FILTERS
          +----------------+  +----------------------------------------+
                           0  ACPMAIN
                           0  ADRDSSU
                           0  ADUUMAIN
                           0  AMUUMAIN
                           0  ARUUMAIN
                           0  FASTDUMP
                           0  FDR/

                      COUNTS  SUMMARY
          +----------------+  +----------------------------------------+
                           0  TOTAL INCLUDED
                           0  TOTAL NOT INCLUDED
                           0  TOTAL EXCLUDED
                         0  INSPECTED RECORDS
REL x.x.x  PTF x                                        D R / X P E R T
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     TRACK JCL LIBRARY CHANGE HISTORY FOR OPENTECH_SYSTEMS

-------------------------------------------------------------------------------------
SOURCE MEMBER: ONLJOBS
-------------------------------------------------------------------------------------

                     COUNTS  INCLUDED FILTERSS
         +----------------+  +----------------------------------------+
                     16,288  *

                     COUNTS  EXCLUDED FILTERS
         +----------------+  +----------------------------------------+
                             "NONE"

                     COUNTS  SUMMARY
         +----------------+  +----------------------------------------+
                     16,288  TOTAL INCLUDED
                          0  TOTAL NOT INCLUDED
                          0  TOTAL EXCLUDED
                     16,288  INSPECTED RECORDS

REL x.x.x  PTF x                                        D R / X P E R T
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     ONLINE PROGRAM NAME FILTER FOR OPENTECH_SYSTEMS

-------------------------------------------------------------------------------------
SOURCE MEMBER: ONLPGMS
-------------------------------------------------------------------------------------

                     COUNTS  INCLUDED FILTERSS
         +----------------+  +----------------------------------------+
                          0  DFHSIP

                     COUNTS  EXCLUDED FILTERS
         +----------------+  +----------------------------------------+
                             "NONE"

                     COUNTS  SUMMARY
         +----------------+  +----------------------------------------+
                          0  TOTAL INCLUDED
                     16,288  TOTAL NOT INCLUDED
                          0  TOTAL EXCLUDED
                     16,288  INSPECTED RECORDS
```

Figure 3-10 Track JCL Library Change History (2 of 2)

Include/Exclude Filter Tables Report

The Include/Exclude Filter Tables Report, shown in Figure 3-11, helps Technical Support and the user identify what inclusion and exclusion patterns/tables were in use when the DR/Xpert job ran. The report lists which inclusions and exclusions were in use by each phase of the job that uses that type of selection criteria.

```
 REL x.x.x  PTF x                                    D R / X P E R T                                    PROGRAM
OTCDC001

 DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     INCLUDE/EXCLUDE FILTER TABLES REPORT FOR OPENTECH_SYSTEMS
PAGE      1


 PROCESSING PHASE     TBL NAME LEN FILTER DATA
 +------------------+ +------+ +-+ +-----------------------------------------------------------------------------
------+

 DSNAME FILTER        SMFINFRA  11 EXCL=SYS1.*
                                11 EXCL=SYS2.*

                      DSNAMES   13 INCL=CXCICS.*
                                10 INCL=DST.*
                                10 INCL=ECT.*
                                10 INCL=FXT.*
                                 9 INCL=GD.*
                                10 INCL=GDT.*
                                14 INCL=GWIMVST.*
                                10 INCL=GWT.*
                                 9 INCL=GZ.*
                                14 INCL=GZIMVST.*
                                10 INCL=GZT.*
                                10 INCL=KST.*
                                 9 INCL=UR.*
                                 9 INCL=UT.*
                                 9 INCL=XX.*
                                10 INCL=XXT.*

 STORCLAS FILTER      DDNAMES    6 INCL=*

                      PROGRAMS   6 INCL=*
                                12 EXCL=ACPMAIN
                                12 EXCL=ADRDSSU
                                13 EXCL=ADUUMAIN
                                13 EXCL=AMUUMAIN
                                13 EXCL=ARUUMAIN
                                13 EXCL=FASTDUMP
                                 9 EXCL=FDR/

                      ONLJOBS    6 INCL=*

                      ONLPGMS   11 INCL=DFHSIP
```

Figure 3-11 Include/Exclude Filter Tables Report

Weekly Dataset Identification

Weekly Dataset Identification processing is a program that evaluates Collection data, superimposes data accesses on a timeline, and decides what datasets are critical relevant to the work day in which data was created. The execution JCL for this program is the *ANALYSIS* member in DR/Xpert's JCLLIB dataset.

The *ANALYSIS* job performs nine functions:

1. Removes duplicate records before analysis
2. Merges data from *JCLSCAN* and *COLLECT* job streams (Adding new DD-Statements to Master Extract)
3. Establishes a sample window (PATH Building)
4. Discovers files affected by filters (*xxx (2 of 2)*)
5. Makes critical and non-critical decisions upon files (Building Interim Extract Record)
6. Splits critical dataset list into batch and online lists
7. Discovers job trigger candidates for batch
8. Discovers job trigger candidates for online
9. Generates trigger names

Input

The inputs to the *ANALYSIS* program are the essential outputs from *COLLECT* and *JCLSCAN*.

Output

The output from *ANALYSIS* is a critical list dataset and a reporting database. The critical list is formatted into a report and stored in a file ending with the node DSIREPRT. DSIREPRT and the reporting database are accessible through DR/Xpert's ISPF application.

Controlling *ANALYSIS*

The *ANALYSIS* job stream is controlled through different filters. These filters assign attributes to dataset entries in the reporting database. These attributes influence the *ANALYSIS* engine when it assigns a final critical or non-critical attribute. Datasets with the "critical" attribute are passed to DR/Xpert's Backup Component, but all datasets are added to DR/Xpert's reporting database.

Table 3-4 lists filters residing in DR/Xpert's PARMLIB dataset that can be used to fine-tune the analysis environment.

Table 3-4 ANALYSIS Filters

Member	Description
DSNAMES	This member is a dataset filter list. This member provides a means of excluding datasets you do not want DR/Xpert to backup.
VOLUMES	This member is a volume filter list. DR/Xpert does not back up datasets that reside on volumes excluded by this list. The intent of this filter is to prevent DR/Xpert from backing up datasets that reside on volumes you plan to recover by full volume recovery. Multi-volume datasets catalogued on both included and excluded volumes are considered residing on included volumes. If this attribute pertains to a critical dataset, DR/Xpert's backup component will back it up. DR/Xpert considers these datasets straddling volumes that may be recovered different ways. Any assumption that a full volume recovery would restore a dataset like that would be incorrect. DR/Xpert will backup this dataset.
MIRRORED	This member is a volume and UCB list identifying mirrored devices. It is a special variation of the *VOLUMES* filter with the same considerations for multi-volume datasets. Datasets residing on these devices are considered mirrored. Multi-volume datasets that are catalogued on both mirrored and non-mirrored devices are considered non-mirrored. DR/Xpert determines whether to backup these mirrored volumes based on the *BACKUP-FILES-ON-MIRRORED-VOLUMES* parameter. See *Step 8 - Filter Specific DASD Volumes* in the Installation Guide for discussion on mirrored volumes and see also, *MIRRORED* in the DR/Xpert PARMLIB.
STORCLAS	This member is a SMS storage class filter. This filter is part of DR/Xpert to provide a means of excluding backups by storage class.
PROGRAMS	This member is a list of programs that act as dataset creators. Datasets excluded from this list are denied as critical datasets. This filter was created to prevent files from backup software from being backed up by DR/Xpert; that is, DR/Xpert will not backup a backup.
DDNAMES	This member is a list of DDNAMES, that when excluded, prevents a DDNAME from influencing the Critical Dataset Analysis Engine. This filter is part of DR/Xpert to provide a means of preventing STEPLIB and JOBLIB statements from being the reason for a critical/non-critical decision. The dataset may be critical for other reasons, but not because of DDNAMES in this list.
ONLDDNF	This member is a special variation of the DDNAMES filter. Its purpose is to provide DDNAME exclusion from backup for online system-type applications.

Reports created by the *ANALYSIS* job stream are stored in disk files and are accessible from DR/Xpert's ISPF application. The reports should be viewed from this platform because the ISPF application gives context of the backup cycles by date.

Note See Chapter 14 for information about the DR/Xpert ISPF Interface.

Weekly Identification Reports

The subsections that follow describe the Weekly Identification Reports.

Summary Report for Critical Analysis Engine

The Critical Analysis Summary report, shown in Figure 3-12, contains counters that reflect critical and non-critical decisions. The decision counters begin where the line entry is titled CRITICAL FILES. The detail lines that follow that line are non-critical decisions.

```
REL x.x.x  PTF x                                        D R / X P E R T
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     CRITICAL ANALYSIS SUMMARY FOR OPENTECH_SYSTEMS

-------------------------------------------------------------------------------------------------------
CRITICAL FILE ANALYSIS REPORT
-------------------------------------------------------------------------------------------------------

                     COUNT  DESCRIPTION
         +----------------+ +----------------------------------------+
                    17,346  TOTAL PRODUCTION FILES
                    51,246  TOTAL FILE ACCESS RECORDS
                     2,650  JOBS FOUND IN PATH

                     28180  LONGEST I-EXTRACT RECORD
                     2,417  TOTAL IEXTRACT RECORDS
                    51,287  TOTAL IEXTRACT SEGMENTS
                     32734  LONGEST S-EXTRACT RECORD

                     4,291  CRITICAL FILES
                         0  UNKNOWN STATUS
                         0  FILES DELETED BEFORE END-OF-CYCLE
                     3,478  FILES START CYCLE AS OUTPUT
                         0  FILES DELETED AT START-OF-CYCLE
                         0  FILES DELETED WITH DISP=(MOD,DELETE)
                         0  FILES FILTERED
                     9,577  FILES FILTERED, BUT COULD HAVE BEEN CRITICAL
                         0  FILES USED BY ONLY ONE JOB
                         0  NEW FILES CREATED WITH DISP=(MOD,CATLG)
                         0  ILLOGICAL CONDITION RENDERED FILES CRITICAL

-------------------------------------------------------------END OF REPORT-------------------------------

REL x.x.x  PTF x                                        D R / X P E R T
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     SPACE EXCEPTION REPORT FOR OPENTECH_SYSTEMS

                     COUNT  DESCRIPTION
         +----------------+ +----------------------------------------+
                     4,291  NUMBER OF NON-MIGRATED DATA SETS
                         0  NUMBER OF MIGRATED DATA SETS
REL x.x.x  PTF x                                        D R / X P E R T
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     ADDITIONAL DATASET FILTER FOR OPENTECH_SYSTEMS

                    COUNTS  INPUT/OUTPUT DESCRIPTION
         +----------------+ +----------------------------------------+
                     4,291  IDENTIFIED CRITICAL DATA SETS BEFORE FILTER
                         0  EXCLUDED BY ADDLFILT
                     4,291  CRITICAL DATA SETS AFTER FILTER
```

Figure 3-12 Critical Analysis Summary

Ongoing Runtime Messages from ANALYSIS Execution

Figure 3-13 shows an example of a report that contains ongoing runtime messages about significant points in the *ANALYSIS* program's execution.

The report contains a subreport entitled "SPLIT CRITICAL DATA SET LIST INTO BATCH AND ONLINE LISTS." This report gives counts of datasets discovered as critical for Batch and Online systems.

```
REL x.x.x  PTF x                                        D R / X P E R T
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     DSI JOB SELECT FOR OPENTECH_SYSTEMS

--------------------------------------------------------------------------------
LIMITS EXCEEDED DURING JOB SELECTION
--------------------------------------------------------------------------------

                     COUNT  DESCRIPTION
         +----------------+  +----------------------------------------+
                         0  DUPLICATE RECORDS DELETED

--------------------------------------------------------------------------------
ADD NEW DD-STATEMENTS TO MASTER EXTRACT
--------------------------------------------------------------------------------

                     COUNT  DESCRIPTION
         +----------------+  +----------------------------------------+
                    51,278  MASTER RECORDS IN
                    16,284  JCLMAST RECORDS IN
                       317  JOB FOUND
                       301  MASTER FILE MATCHES
                         8  NEW DDNAME ADDED
                         1  CONCATENATION IDENTIFIED
                    51,287  MASTER RECORDS OUT
REL x.x.x  PTF x                                        D R / X P E R T
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     CONSTRUCTING EXECUTION PATH SAMPLE FOR OPENTECH_SYSTEMS

-----------------------------------------------------------------------------
PATH BUILDING
-----------------------------------------------------------------------------

                DESCRIPTION  INFORMATION
         +----------------+  +----------------------------------------+
                     START  SUNDAY, MARCH,20, 2005 AT 00:15
                       END  SUNDAY, APRIL,03, 2005 AT 06:45
              JOBS IN PATH            2,651

-----------------------------------------------------------------------------
APPLICATION TABLE
-----------------------------------------------------------------------------

                    COUNT  DESCRIPTION
        +----------------+  +----------------------------------------+
                       73  HASH TABLE COUNT
                        0  HASH TABLE INSERTS
                       40  HASH TABLE MATCHES
                        0  HASH TABLE MISSES
                       56  HASH DEPTH COUNT
                      113  REQUESTS
                     0.50  HASH CHAIN TO REQUEST RATIO

                        0  NEW APPLICATIONS FOUND

REL x.x.x  PTF x                                        D R / X P E R T
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     GENERATE VOLUME AND PDS EXCLUSION FILTERS FOR OPENTECH_SYSTEMS

-----------------------------------------------------------------------------
PDS FILE ANALYSIS
-----------------------------------------------------------------------------

                     COUNT  PDS FILE FILTERS
         +----------------+  +----------------------------------------+
                     1,826  NUMBER OF PDS FILES FOUND
```

Figure 3-13 Runtime Messages from ANALYSIS execution (1 of 2)

```
REL x.x.x  PTF x                                        D R / X P E R T
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     BUILD INTERIM EXTRACT FILE FOR OPENTECH_SYSTEMS

-------------------------------------------------------------------------------
BUILDING INTERIM EXTRACT RECORD
-------------------------------------------------------------------------------

                     COUNT  DESCRIPTION
         +----------------+  +----------------------------------------+
                    51,287  MASTER EXTRACT RECORD
                     2,417  INTERIM EXTRACT RECORD
                    28,180  LARGEST IEXTRACT RECORD


REL x.x.x  PTF x                                        D R / X P E R T
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     DSI JOB SELECT FOR OPENTECH_SYSTEMS

-----------------------------------------------------------------------------------------
SPLIT CRITICAL DATA SET LIST INTO BATCH AND ONLINE LISTS
-----------------------------------------------------------------------------------------

                     COUNT  DESCRIPTION
         +----------------+  +----------------------------------------+
                     4,291  TOTAL FILE NAMES ON INPUT
                       557  ONLINE DSNAME FILTER SIZE
                     4,244  NUMBER OF DSNS FOR BATCH
                        47  NUMBER OF DSNS FOR ONLINE

-----------------------------------------------------------------------------------------
DISCOVERING JOB TRIGGER CANDIDATES FOR BATCH
-----------------------------------------------------------------------------------------

                     COUNT  DESCRIPTION
         +----------------+  +----------------------------------------+
                     4,244  INPUT DSNAMES
                       146  SELECTED TRIGGER CANDIDATES

-----------------------------------------------------------------------------------------
DISCOVERING JOB TRIGGER CANDIDATES FOR ONLINE
-----------------------------------------------------------------------------------------

                     COUNT  DESCRIPTION
         +----------------+  +----------------------------------------+
                        47  INPUT DSNAMES
                         1  SELECTED TRIGGER CANDIDATES

-----------------------------------------------------------------------------------------
GENERATING TRIGGER NAMES
-----------------------------------------------------------------------------------------

                     COUNT  DESCRIPTION
         +----------------+  +----------------------------------------+
                       147  TOTAL INPUT RECORDS
                       147  NUMBER OF CANDIDATE DSNAMES
                       147  NUMBER OF GENERATED DSNAMES AS TRIGGERS

-------------------------------------------------------------------------------------
GENERATE STATIC TRIGGERS FOR ONLINE DATASETS THAT ARE NOT UPDATED IN BATCH
-------------------------------------------------------------------------------------

                     COUNT  DESCRIPTION
         +----------------+  +-----------------------------------------------+
                        47  NUMBER OF ONLINE CRITICAL DATA SETS
                       557  NUMBER OF ITEMS IN ONLINE DSNAME LIST
                        42  NUMBER OF STATIC TRIGGER RECORDS CREATED
```

Figure 3-14 xxx (2 of 2)

Filtered File Items Reports

The report shown in Figure 3-15 through Figure 3-17 represents filters applied before critical file analysis. The filter application occurs at the same time that partitioned dataset analysis occurs.

```
REL x.x.x  PTF x                                        D R / X P E R T
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     FILTER FILE ITEMS BY VOLUME FOR OPENTECH_SYSTEMS

-----------------------------------------------------------------------------------------------
SOURCE MEMBER: MIRRORED (REPORTED BY VOLUME NAME)
-----------------------------------------------------------------------------------------------

        COUNT VOLUME    UCB             COUNT VOLUME    UCB             COUNT VOLUME    UCB
------------+ +----+  +----+   +------------+ +----+  +----+   +------------+ +----+  +----+   +----

          0   BRGE41   0A8F
          0   OS39M1   0A82
          0   PPVL41   0AA6
                |
                |
                |
                |
                |
          4   W4RES1   0A80
          0   W4RES2   0A81
          0   W4USS1   0A87

REL x.x.x  PTF x                                        D R / X P E R T
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     FILTER FILE ITEMS BY VOLUME FOR OPENTECH_SYSTEMS

-------------------------------------------------------------------------------------------------
SOURCE MEMBER: MIRRORED (REPORTED BY UCB ADDRESS)
-------------------------------------------------------------------------------------------------

        COUNT VOLUME    UCB             COUNT VOLUME    UCB             COUNT VOLUME    UCB             COU
------------+ +----+  +----+   +------------+ +----+  +----+   +------------+ +----+  +----+   +-----------

          4   W4RES1   0A80
          0   W4RES2   0A81
          0   OS39M1   0A82
          4   W4DB21   0A83
                |
                |
                |
                |
                |
                |
          0   VTAP46   0AD8
          0   VTAP47   0AD9
        COUNTS SUMMARY
+------------+ +------------+
             8 MIRRORED DATASETS
        21,103 NON-MIRRORED DATASETS
        21,111 INSPECTED RECORDS

REL x.x.x  PTF x                                        D R / X P E R T
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     FILTER FILE ITEMS BY VOLUME FOR OPENTECH_SYSTEMS

-----------------------------------------------------------------------------------------
SOURCE MEMBER: VOLUMES
-----------------------------------------------------------------------------------------

                     COUNTS  INCLUDED FILTERS
         +----------------+  +----------------------------------------+
                     21,103  *

                     COUNTS  EXCLUDED FILTERS
         +----------------+  +----------------------------------------+
                             "NONE"

                     COUNTS  SUMMARY
         +----------------+  +----------------------------------------+
                     21,103  TOTAL INCLUDED
                          0  TOTAL NOT INCLUDED
                          0  TOTAL EXCLUDED
                     21,103  INSPECTED RECORDS
```

Figure 3-15 Filter File Items Report (1 of 2)

```
REL x.x.x  PTF x                                        D R / X P E R T
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     FILTER FILE ITEMS BY STORAGE CLASS FOR OPENTECH_SYSTEMS

-------------------------------------------------------------------------------------
SOURCE MEMBER: STORCLAS
-------------------------------------------------------------------------------------
                      COUNTS  INCLUDED FILTERS
          +----------------+  +----------------------------------------+
                      21,103  *
                      COUNTS  EXCLUDED FILTERS
         +----------------+  +----------------------------------------+
                              "NONE"

                      COUNTS  SUMMARY
         +----------------+  +----------------------------------------+
                      21,103  TOTAL INCLUDED
                           0  TOTAL NOT INCLUDED
                           0  TOTAL EXCLUDED
                      21,103  INSPECTED RECORDS

REL x.x.x  PTF x                                        D R / X P E R T
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     BYPASS DATA BY PROGRAM NAME FOR OPENTECH_SYSTEMS

-----------------------------------------------------------------------------------------
SOURCE MEMBER: PROGRAMS
-----------------------------------------------------------------------------------------

                      COUNTS  INCLUDED FILTERSS
         +----------------+  +----------------------------------------+
                      51,269  *

                      COUNTS  EXCLUDED FILTERS
         +----------------+  +----------------------------------------+
                           0  ACPMAIN
                          11  ADRDSSU
                           0  ADUUMAIN
                           0  AMUUMAIN
                           0  ARUUMAIN
                           0  FASTDUMP
                           7  FDR/

                      COUNTS  SUMMARY
         +----------------+  +----------------------------------------+
                      51,269  TOTAL INCLUDED
                           0  TOTAL NOT INCLUDED
                          18  TOTAL EXCLUDED
                      51,287  INSPECTED RECORDS

REL x.x.x  PTF x                                        D R / X P E R T
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     BYPASS DATA BY DDNAME FOR OPENTECH_SYSTEMS

-------------------------------------------------------------------------------------
SOURCE MEMBER: DDNAMES
-------------------------------------------------------------------------------------

                      COUNTS  INCLUDED FILTERSS
         +----------------+  +----------------------------------------+
                      51,287  *

                      COUNTS  EXCLUDED FILTERS
         +----------------+  +----------------------------------------+
                              "NONE"

                      COUNTS  SUMMARY
         +----------------+  +----------------------------------------+
                      51,287  TOTAL INCLUDED
                           0  TOTAL NOT INCLUDED
                           0  TOTAL EXCLUDED
                      51,287  INSPECTED RECORDS
```

Figure 3-16 Filter File Items Report (2 of 2)

```
REL x.x.x  PTF x                                        D R / X P E R T
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     BYPASS DATA BY DSNAME FOR OPENTECH_SYSTEMS

-------------------------------------------------------------------------------------------
SOURCE MEMBER: DSNAMES
-------------------------------------------------------------------------------------------
                     COUNTS  INCLUDED FILTERS
         +----------------+  +----------------------------------------+
                      1,345  PROD.*
                             |
                             |
                             |
                        234  XXT.*
                     COUNTS  EXCLUDED FILTERS
         +----------------+  +----------------------------------------+
                             "NONE"
                     COUNTS  SUMMARY
         +----------------+  +----------------------------------------+
                     20,439  TOTAL INCLUDED
                     30,848  TOTAL NOT INCLUDED
                          0  TOTAL EXCLUDED
                     51,287  INSPECTED RECORDS
REL x.x.x  PTF x                                        D R / X P E R T
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx ONLINE JOBS FILTER FOR OPENTECH_SYSTEMS
-------------------------------------------------------------------------------------------
ONLINE JOBS FILTER
-------------------------------------------------------------------------------------------
                     COUNTS  SUMMARY
         +----------------+  +----------------------------------------+
                     51,287  TOTAL READ
                      1,126  TOTAL WRITTEN
                      1,126  ONLINE JOBNAMES IN FILTER
REL x.x.x  PTF x                                        D R / X P E R T
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     FILTER ONLINE DDNAMES FOR OPENTECH_SYSTEMS
-------------------------------------------------------------------------------------------
ONLINE DDNAME FILTERS
-------------------------------------------------------------------------------------------
                     COUNTS  SUMMARY
         +----------------+  +----------------------------------------+
                        557  TOTAL READ
                         17  PDS FILTER APPLIED
                        228  TOTAL WRITTEN
REL x.x.x  PTF x                                        D R / X P E R T
DATE:  xx/xx/xxxx  TIME:  xx:xx:xx     FILTER ONLINE DDNAMES FOR OPENTECH_SYSTEMS

-------------------------------------------------------------------------------------------
SOURCE MEMBER: ONLDDNF
-------------------------------------------------------------------------------------------
                     COUNTS  INCLUDED FILTERSS
         +----------------+  +----------------------------------------+
                        312  *

                     COUNTS  EXCLUDED FILTERS
         +----------------+  +----------------------------------------+
                        228  DFH*
                          0  STEPLIB
                          0  JOBLIB
                     COUNTS  SUMMARY
         +----------------+  +----------------------------------------+
                        312  TOTAL INCLUDED
                          0  TOTAL NOT INCLUDED
                        228  TOTAL EXCLUDED
                        540  INSPECTED RECORDS
REL x.x.x  PTF x                                        D R / X P E R T
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     ADDITIONAL DATASET FILTER FOR OPENTECH_SYSTEMS
-------------------------------------------------------------------------------------------
SOURCE MEMBER: ADDLFILT
-------------------------------------------------------------------------------------------
                     COUNTS  INCLUDED FILTERSS
         +----------------+  +----------------------------------------+
                      4,291  *
                     COUNTS  EXCLUDED FILTERS
         +----------------+  +----------------------------------------+
                             "NONE"
                     COUNTS  SUMMARY
         +----------------+  +----------------------------------------+
                      4,291  TOTAL INCLUDED
                          0  TOTAL NOT INCLUDED
                          0  TOTAL EXCLUDED
                      4,291  INSPECTED RECORDS
```

Figure 3-17 Filter File Items Report (3 of 3)

Include/Exclude Filter Tables Report

The Include/Exclude Filter Tables Report, shown in Figure 3-18, indicates the Include and Exclude Filter Tables. These filter tables are imported from DR/Xpert's PARMLIB. The report reflects the content of the members before they are populated internal filter tables.

```
REL x.x.x  PTF x                                        D R / X P E R T

DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     INCLUDE/EXCLUDE FILTER TABLES REPORT FOR OPENTECH_SYSTEMS


PROCESSING PHASE     TBL NAME LEN FILTER DATA
+------------------+ +------+ +-+ +-------------------------------------------------------------

MIRRORED FILTER      MIRRORED   8 VOLUMES:
                               10 INCL=VTAP*
                               11 EXCL=VTAP41
                                5 UCBS:
                                9 INCL=0A8*
                               14 INCL=0AA0-0AA8
                                9 EXCL=0AA1

VOLUMES FILTER       VOLUMES    6 INCL=*

STORCLAS FILTER      STORCLAS   6 INCL=*

                     PROGRAMS   6 INCL=*
                               12 EXCL=ACPMAIN
                               12 EXCL=ADRDSSU
                               13 EXCL=ADUUMAIN
                               13 EXCL=AMUUMAIN
                               13 EXCL=ARUUMAIN
                               13 EXCL=FASTDUMP
                                9 EXCL=FDR/

                     DDNAMES    6 INCL=*

DSNAME FILTER        DSNAMES   13 INCL=CXCICS.*
                               10 INCL=DST.*
                               10 INCL=ECT.*
                               10 INCL=FXT.*
                                9 INCL=GD.*
                               10 INCL=GDT.*
                               14 INCL=GWIMVST.*
                               10 INCL=GWT.*
                                9 INCL=GZ.*
                               14 INCL=GZIMVST.*
                               10 INCL=GZT.*
                               10 INCL=KST.*
                                9 INCL=UR.*
                                9 INCL=UT.*
                                9 INCL=XX.*
                               10 INCL=XXT.*

STORCLAS FILTER      ONLDDNF    6 INCL=*
                                9 EXCL=DFH*
                               12 EXCL=STEPLIB
                               11 EXCL=JOBLIB

DSNAME FILTER        ADDLFILT   6 INCL=*
```

Figure 3-18 Include/Exclude Filter Tables Report

Generating ANALYSIS Reports

DR/Xpert provides an interface module to its reporting database. The *REPORTS* member of DR/Xpert's JCLLIB contains JCL to print critical and non-critical datasets. The reports are ordered by application and then by dataset name. The sample control statements for *REPORTS* splits reportable data to two files: CRITICAL (for critical files) and LESSER (for non-critical files). The selectable attributes for reporting are as follows:

CRITICAL	A string containing 'YES' or 'NO'
BKPID	A string 'BATCH' or 'ONLINE'
DSNAME	A dataset name or a dataset containing wildcard characters
APPLNAME	An application string or an application string with wildcard characters
MEDIA	"DISK" or "TAPE"
DSORG	PS, PO, VS representing Sequential, Partition Dataset, VSAM; respectively
CAUSE	A string containing the job name that caused the dataset to be critical or non critical; or the filter that excluded the dataset.
SPECIAL	Special attributes, most notably "MIRRORED"

The rules language represents IF predicates and conditions that select data, while THEN and DEFAULT verbs return a processing string. In the follwing examples, the first part of the string defines the file item for reporting, specifically, the target DSNAME. The remaining part of the string represents the TITLE on the report.

Example 1

`IF CRITICAL EQ YES`
`THEN CRITICAL-`
`REPORT_OF_CRITICAL_FILES`
`DEFAULT LESSER-`
`REPORT_OF_NON_CRITICAL_FILES`
	The IF predicate selects items in the reporting database with a critical indicator set. The IF predicate directs these items to the object of the THEN verb; all others are directed to the object of the DEFAULT verb.
	The THEN verb is followed by a two-pieced string. The first piece is delimited by a dash and contains the DDNAME of the target report: CRITICAL. The remaining part of the string is the report TITLE. All critical files will be directed to CRITICAL.
	The DEFAULT clause represents all non-critical datasets.

Example 2

IF CRITICAL EQ YES AND MEDIA EQ TAPE THEN CTAPE:CRITICAL_TAPES * IF CRITICAL EQ YES AND MEDIA EQ DISK THEN CDISK:CRITICAL_DISK * DEFAULT NONE *	There are two compound IF predicates: one directing critical tape file names to a report file named CTAPE; the other IF predicates directing critical disk file names to a file named CDISK. The object of the DEFAULT verb is a special condition (NONE). No report is created.

Figure 3-18 shows an example Analysis Report of critical files filtered by DSNAME.

```
REL x.x.x  PTF x                                        D R / X P E R T
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx    REPORT_OF_CRITICAL_FILES FOR OPENTECH_SYSTEMS

-----------------------------------------------------------------------------------------------------------------------
JOBS-FOR-I
-----------------------------------------------------------------------------------------------------------------------

BKP                    DSNAME                      MEDIA  DSORG CRITICAL  SPECIAL   CAUSE  MORE INFORMATION
+-+ +-------------------------------------------+ +------+ +---+ +------+ +------+ +------+ +----------------------
 B  PROD.SYSTEM.TEST.FILE001                      DISK      PS     YES             TESTJOB1 STEP001 , PGM=IEBGENER
 B  PROD.SYSTEM.TEST.FILE002                      DISK      PS     YES             TESTJOB1 STEP002 , PGM=IEBGENER
 B  PROD.SYSTEM.TEST.FILE003                      DISK      PS     YES             TESTJOB1 STEP003 , PGM=IEBGENER
 B  PROD.SYSTEM.TEST.FILE004                      DISK      PS     YES             TESTJOB1 STEP004 , PGM=IEBGENER
 B  PROD.SYSTEM.TEST.FILE005                      DISK      PS     YES             TESTJOB1 STEP005 , PGM=IEBGENER
 B  PROD.SYSTEM.TEST.FILE006                      DISK      PS     YES             TESTJOB1 STEP006 , PGM=IEBGENER
 B  PROD.SYSTEM.TEST.FILE007                      DISK      PS     YES             TESTJOB1 STEP007 , PGM=IEBGENER
 B  PROD.SYSTEM.TEST.FILE008                      DISK      PS     YES             TESTJOB1 STEP008 , PGM=IEBGENER
 B  PROD.SYSTEM.TEST.FILE009                      DISK      PS     YES             TESTJOB1 STEP009 , PGM=IEBGENER
 B  PROD.SYSTEM.TEST.FILE010                      DISK      PS     YES             TESTJOB1 STEP010 , PGM=IEBGENER
 B  PROD.SYSTEM.TEST.FILE011                      DISK      PS     YES             TESTJOB1 STEP011 , PGM=IEBGENER
 B  PROD.SYSTEM.TEST.FILE012                      DISK      PS     YES             TESTJOB1 STEP012 , PGM=IEBGENER
 B  PROD.SYSTEM.TEST.FILE013                      DISK      PS     YES             TESTJOB1 STEP013 , PGM=IEBGENER
 B  PROD.SYSTEM.TEST.FILE014                      DISK      PS     YES             TESTJOB1 STEP014 , PGM=IEBGENER
 B  PROD.SYSTEM.TEST.FILE015                      DISK      PS     YES             TESTJOB1 STEP015 , PGM=IEBGENER
 B  PROD.SYSTEM.TEST.FILE016                      DISK      PS     YES             TESTJOB1 STEP016 , PGM=IEBGENER
 B  PROD.SYSTEM.TEST.FILE017                      DISK      PS     YES             TESTJOB1 STEP017 , PGM=IEBGENER
```

Figure 3-19 Analysis Report

4 SMF Data Collector

TOPICS COVERED IN THIS CHAPTER

Overview (page 4-2)

Using the SMF Data Collector (page 4-2)

Supported Console Commands (page 4-6)

Overview

As described in Chapter 3 the Collection and Identification functions of DR/Xpert provide job streams that use typical methods of collecting raw SMF data as input by reading the SMF.MANx datasets on a daily or weekly basis and extracting the SMF records relevant to DR/Xpert (record types 14, 15, 30, and 64).

However, the recommended implementation of DR/Xpert is to use the SMF Data Collector task that provides real-time SMF data collection to ensure that the most current SMF records are always available. Using the SMF Data Collector provides these benefits:

- DR/Xpert has a feature that keeps track of older backups of read-only files and schedules backups of files as they become newly written. The use of this feature is recommended, and if used, the SMF Data Collector is a requirement. The requirement provides the earliest notification of critical files being written.
- The collected record types can be suppressed. Data centers that currently do not collect SMF 14 and 15 records may have to increase their SMF dataset size if the SMF records are not suppressed. The SMF Data Collector can either suppress or pass these records for recording into traditional SMF collection files.
- The SMF Data Collector extracts minimum fields from SMF data to create a significantly smaller set of SMF data for DR/Xpert's use.
- The SMF Data Collector records to a z/OS System Logger stream (LOGR). This LOGR stream can be shared between SYSPLEXes and LPARs. SMF data is immediately available from systems that share the LOGR. This simplifies operation of DR/Xpert preventing special considerations for merging traditional SMF data before providing it to DR/Xpert.

Using the SMF Data Collector

The SMF Data Collector utility controls the activation and deactivation of the SMF exits, such as IEFU83, which are used to capture the SMF data. The exits capture the data to a common data space, then copies the captured SMF data to a System Logger stream (LOGR).

Note The SMF Data Collector can be run either as a started task, or as a batch job. Running the collector as a started task is the preferred method. One SMF Data Collector task must be active for each LPAR for which data is needed by DR/Xpert.

The JCL for the SMF Data Collector task is located in the *OTSMFDC* member of the DR/Xpert JCLLIB. Edit this member and update the job card, STEPLIB DD, and the OTPRMLIB DD. In addition, there are several configuration requirements as detailed on the next few pages.

Warning Review the following configuration requirements in their entirety before starting the SMF Data Collector.

- *Parameter Configuration*
- *Configuring the System Logger Stream (LOGR)*
- *Configuring SMFSPRES to Suppress Writing SMF Data*

After the *OTSMFDC* member has been customized, the LOGR dataset has been defined, and the configuration changes have been made, a copy of the *OTSMFDC* JCL should be added to a PROCLIB from which it can be initiated as a started task after IPL. Refer to *Supported Console Commands* for the START command and other available commands.

The started task name can be changed according to your data center's standards, if desired. In this documentation, the started task is referred to by the member name *OTSMFDC*.

Parameter Configuration

The subsections that follow describe the parameters used to configure the SMF Data Collector.

SYSTEM-LOGGER-STREAM-NAME

This parameter is used to identify the system logger stream (LOGR) that DR/Xpert's SMF Data Collector uses to save DR/Xpert's SMF data information. The dataset name must be 26-characters or less. This name is defined to the operating system using IBM's IXCMIAPU utility.

Note The value of this dataset must exactly match the dataset name used in the job that defines the LOGR dataset to your system. Refer to *Configuring the System Logger Stream (LOGR)* for more information on the LOGR dataset.

The default value for the *SYSTEM-LOGGER-STREAM-NAME* parameter is DRXPERT.LOGGER.

SMF-LOGGER-DATA-DISP

This parameter specifies whether the LOGR data should be deleted when the LOGR data is unloaded. Specify DELETE or NODELETE. (DELETE is recommended.)

Note Refer to *Offloading the LOGR Dataset* for more information on unloading the LOGR dataset.

COMMON-DATASPACE-MAX-SIZE-IN-K

This parameter is used to set the maximum number of bytes the collection data space uses as a buffer for captured SMF data. The buffer contains data that has not been written to the log stream. The value is a decimal integer from 0 to 2097152. The integer is rounded to the next multiple of 4 and is expressed in Kilobytes (the integer is multiplied by 1024).

DR/Xpert creates a 200-byte record for each SMF type-14 or 15 record it encounters. These records are written to the LOGR every 5 seconds. The parameter value should be large enough to retain 200-byte records for a 5-second interval.

If this parameter is set to Zero (0), which is the default value, DR/Xpert uses the maximum data space size (2 gigabytes).

Configuring the System Logger Stream (LOGR)

Before using the SMF Data Collector, the user must define a LOGR for use by DR/Xpert. The *CDIXCDEF* member in the JCLLIB library provides a sample definition which executes an IBM utility named IXCMIAPU. (More information concerning this utility can be found in this IBM manual: *Setting Up a Sysplex*, Document Number GC28-1779.)

The *CDIXCDEF* job contains SYSIN control cards that must be customized for your installation. The data center personnel responsible for system configuration should modify the *CDIXCDEF* job according to data center standards and execute it to define the LOGR.

Table 4-1 LOGR Control Cards

Control Card Parm	Description
HLQ(@HLQ)	single node (up to 8 characters); high-level qualifier
LOGSTREAM NAME(@LSN)	name of the log stream
LS_SIZE(12000)	Defines the disk file size. The default value provided in the sample will define a disk file for the LOGR with 1000 tracks, or about 66 cylinders. This will provide space for 490,000 SMF records as compressed by DR/Xpert.
STG_SIZE(1200)	Defines the staging dataset storage size in 4K blocks. The default value provided in the sample defines 100 tracks, which holds about 48,000 records.

Warning The @HLQ and @LSN together identify the fully qualified LOGR dataset name. The value for @LSN must match the value defined for the *SYSTEM-LOGGER-STREAM-NAME* parameter in DR/Xpert's USERSETS.

For example, if the following values were used in the executed *CDIXCDEF* job:

```
HLQ(OT)

LOGSTREAM NAME(DRXPERT.LOGR)
```

Then the following parameter and value should be in the USERSETS member of the DR/Xpert PARMLIB library:

```
SYSTEM-LOGGER-STREAM-NAME:  DRXPERT.LOGR
```

Temporary Logging Warning Conditions

The staging dataset allocated for the log stream must be unloaded to prevent it from filling up. If the dataset becomes full, DR/Xpert will issue the following message:

OTCD1043E SYSTEM LOGGER SERVICE CALL IXGWRITE FAILED, RETURN CODE=08 REASON CODE=00000865 FOR <DR LOGGER STREAM NAME>

This is a recoverable error, but exposure to this error can be reduced by increasing the size of the staging dataset using the STG_SIZE parameter [refer to *Configuring the System Logger Stream (LOGR)*].

Offloading the LOGR Dataset

If the LOGR dataset is large enough, the LOGR dataset is unloaded when the *COLLECT* process executes. However, standalone JCL for unloading LOGR dataset used by the SMF Data Collector is also provided in JCLLIB member *OTCDC020*. The *OTCDC020* job can be scheduled to run periodically to avoid causing the LOGR dataset expanding into secondary extents.

When executed, *OTCDC020* will offload the log stream created by the SMF Data Collector function onto a sequential GDG dataset with a name constructed as follows:

```
@dsprefix.SMFLOGGR(+1).
```

Warning This utility program may run frequently, if desired, but the frequency will depend on the number of SMF records produced by your data center. Note that if the number of generations in the data group named @DSPREFIX.SMFLOGGR is exceeded, any attempt to create a new generation may fail, or the oldest generation may be deleted. The limit for this GDG is 255, so you may not run this job more than 255 times per day.

The *OTCDC020* job produces the SMF Data Collector Offload Report, as shown in Figure 4-1.

```
REL x.x.x  PTF x                                  D R / X P E R T                    PROGRAM OTCDC020

DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     SMF DATA COLLECTOR OFFLOAD REPORT FOR OPENTECH_SYSTEMS,_INC.
PAGE      1


    SYSTEM LOGGER STREAM NAME: DRXPERT.LOGGER


 CAPTURED SMF RECORDS WRITTEN:        3321
```

Figure 4-1 SMF Data Collector Offload Report

Configuring SMFSPRES to Suppress Writing SMF Data

The SMF Data Collector uses the *SMFSPRES* member of the DR/Xpert PARMLIB to suppress specified SMF records for traditional SMF recording. DR/Xpert will process these SMF records: 014, 015, 030, and 064. In order to collect these SMF records, verify that the data center's SMFPRMxx member contains the following control statement:

```
SYS(TYPE(...,14,15,61,64,65,30(1,2,3,4,5)...),
```

If your data center does not currently collect these records, the SMF Data Collector can capture the information from these records and optionally discard them so that they are not written to SMF's SYS1.MANx files.

The *SMFSPRES* member is used to control recording or suppression by traditional SMF data recording. Each record in the member must contain two values. The first value must be a 1 to 3 digit decimal number of a SMF record type that must be one of the following values: 14, 15, 30 or 64. The second value must be either the letter S or the letter W. One or more spaces must separate the two values on each record.

If the second value is W or if no record is specified for a SMF record type, that record type will be recorded to the SMF datasets. If the second value is S, that record type will be suppressed from being recorded to the SMF datasets.

The default is to pass records to SMF for traditional SMF capture; therefore, those record types that are not present in *SMFSPRES* are passed to SMF.

Warning SMF records that are not specified in the data center's SMFPRMnn member are never recorded and captured by the SMF Data Collector task. Make sure all relevant record types are in the SMFPRMnn member for your system.

Since SMF data collection is an issue belonging to your data center's infrastructure, you should work with the appropriate personnel to select the values consistent with your data center's SMF collection objectives.

Supported Console Commands

Once the SMF Data Collector task is started, it is designed to run until stopped by the user. Users can communicate with the task through the console interface. The operator commands listed in Table 4-2can be used to control the execution of the *OTSMFDC* started task.

Table 4-2 OTSMFDC Control Commands

Command	Description
S OTSMFDC	Start the SMF Data Collector Task
P OTSMFDC	Terminate the SMF Data Collector Task
F OTSMFDC,HELP	Display a list of commands and a description of each command
F OTSMFDC,DISPLAY STATUS	Display the current status of the SMF Data Collector. The number of SMF records collected and the number of records written to the log stream are included in the informational messages.
F OTSMFDC,DISPLAY CONFIG	Display the current configuration of the SMF Data Collector, as defined by the user parameter settings.
F OTSMFDC,STOP	Stop SMF data collection, remove DR/Xpert's SMF IEFU83 collection exits, but retain collection data space. The OTSMFDC region remains running, but does not perform any functions.
F OTSMFDC,STOP FULL	Same as STOP, but deletes DR/Xpert's collection data space. The OTSMFDC region remains running, but does not perform any functions.
P OTSMFDC	Terminate the OTSMFDC region

5 Backing Up Your Critical Data

TOPICS COVERED IN THIS CHAPTER

Introduction (page 5-2)

Backup Driver Overview (page 5-3)

Key Files in Backup Processing (page 5-21)

Dataset “Trigger” Classification (page 5-22)

Types of Backup Aggregate Jobs (page 5-23)

Initializing Files for the Backup Process (page 5-27)

Daily Backup Processing (page 5-30)

Weekly Backup Process (page 5-34)

Recovering BKPDBASE or BKPQUEUE (page 5-35)

Clearing DR/Xpert’s Backup Scheduling Queue (page 5-37)

Introduction

The DR/Xpert backup component uses the critical file list created by the *ANALYSIS* job to keep a catalog of datasets that are available for backup before the end of the batch cycle.

Note The scheduled backup is known as an "aggregate backup." In this document, "aggregate" refers to either one DFSMSdss logical backup or a tape-to-tape copy managed by the DR/Xpert backup component.

Also, "cycle" refers to a 24-hour period running between DR/Xpert synchronization jobs (roughly from end of one third-shift to end of next third-shift).

DR/Xpert considers all of the datasets that need to be backed up to be in a single cycle. For data centers with only a small amount of application data to back up, the cycle may only consist of one backup. However, in an environment containing a large amount of application data that needs to be backed up, users are challenged by the task of backing up a large quantity of data between the end of a batch cycle and the start of the next processing day.

The DR/Xpert backup component phase consists of the following processes:

- Daily Backup Process
  - Batch Dataset Backup
  - Online Dataset Backup
  - Combined End-of-Day Process (for both batch and online datasets)
- Weekly Maintenance Process
- Job Trigger Started Task (OTCDTASK)

This chapter provides details on all of the jobs for each process required to complete the backup phase.

Warning Because the frequency and number of backup jobs will vary from one data center to the next, this chapter provides details on the type of datasets, the different jobs used to schedule backups, and provides tips for implementing effective backup job streams. Users should read this section thoroughly to plan and adjust the implementation of the backup process.

Note Beginning with DR/Xpert R2.2.3, online and batch backup definitions can reside in the same database (the batch database). Customers who want to use one database can ignore references to the online databases and datasets (prefix.O.dsname), and online backup jobs (OTCDOTAL). See *DR/Xpert Parameter Reference Guide* discussion on the ONLINE-DATABASE keyword.

Backup Driver Overview

DR/Xpert supports nine different drivers through which critical data is backed up. Work is assigned to drivers using a rules language contained in DR/Xpert's collocation member. OpenTech Systems distributes an initial version of this rules table in the product's parameter library (refer to the member named COLOCTBL).

Details regarding collocation rules syntax are described briefly below and in *Appendix D, COLOCTBL*. The purpose of this section is to describe the different driver names, the product to which they relate, and where parameters for these drivers can be found.

Specification of Driver

Work is assigned to each driver based on a collocation string limited and controlled through a rules member. The driver name is in the second node in the collocation string.

The string has two formats. The format of the strings and description of each token in the string follows:

```
<group>.<driver>
```

or

```
<group>.<driver>.<backup>.<restore>
```

Where:

- <group> refers to a one to eight character group name of your choosing.
- <driver> is one of the nine driver names described in this section.
- <backup> is the name of a parameter member containing backup control cards for a driver program. Generally, these members contain //SYSIN control statements passed to the driver program.

  <Backup> is an optional field; each backup driver has a default value for this token.
- <restore> is the name of a parameter member containing restore control cards passed to driver program.

  <restore> is optional; each recovery driver has a default value for this token.

Driver Support

The following names represent backup drivers supported by DR/Xpert:

- DFDSS – Backup work assigned to this driver is serviced by IBM's DFSMSdss program. This driver is intended for datasets that reside on disk.
- DISKDSS - Backup work assigned to this driver is serviced by DFSMSDss, but the backup file is stored on disk instead of tape.
- CRYPTDSS – Work assigned to this driver is backed up using IBM's DFSMSdss program, but data is encrypted using OpenTech Systems' CopyCrypt Product. This driver requires license for CopyCrypt in addition to DR/Xpert. The driver is similar to the DFDSS driver and is intended for disk datasets.
- TAPECOPY – Backup work assigned to this driver is serviced by DR/Xpert's built-in tape copy driver. This driver is intended for datasets that reside on tape. The driver stacks datasets from multiple volumes to a single tape volume.

- TAPEASIS - Backup work assigned to this driver is serviced by DR/Xpert's TAPECOPY driver, except for the output volumes retain the same multi-dataset stacking as the source volumes. This driver is primarily intended for small capacity tape volumes.
- ABARS – Backup work assigned to this driver is serviced by ABARS, a subcomponent of IBM's DFSMShsm system. The ABARS driver can be used for backing up datasets residing on any device (including files originating on tape) or the driver can be limited for datasets that are migrated.
- FAVER – Backup work assigned to this driver is serviced by Computer Associates' FAVER product. This driver is intended for VSAM datasets.
- FDRABR - Backup work assigned to this driver is serviced by Innovation Data Processing's FDRABR product.
- DMS – Backup work assigned to this driver is serviced by Computer Associates' DMS product. This driver is intended for disk files. If datasets are archived through DMS, DR/Xpert can recall them before being serviced by any of its drivers.

Backup Job JCL

The Prototype Member

DR/Xpert generates backup job' streams using a prototype member in PARMLIB. The member is identified using the first token from the following USERSETS keyword, the default member name is DMPMODEL. The

```
JCL-MODEL-STATEMENTS-MEMBER: DMPMODEL.RESMODEL
```

Tailor this member with a jobname pattern that conforms to data center requirements and with STEPLIB information containing DR/Xpert, and possibly, tape management load libraries.

The Jobname Pattern

The jobname pattern in DMPMODEL should conform to data center standards. The name can also include meta-characters in which DR/Xpert substitutes with scrolling characters, backup system identifiers, and device or driver identifiers.

The following is of DR/Xpert's job card as distributed in DMPMODEL by OpenTech Systems. Even though the distributed version should be modified for your company's purposes, the distributed version demonstrates all three meta-characters.

```
//BKP>!??? JOB (ACCTA,ACCTB),'PROG.NAME',REGION=0M,
// CLASS=A,MSGCLASS=A,MSGLEVEL=(1,1),NOTIFY=&SYSUID
```

The Jobname's Scrolling Meta-Character

The scrolling meta-character provides jobname incrementing so that the backup jobs will be unique. This meta-character is a question mark (?). The question marks are replaced with a counter that is incremented each time a backup job is generated. Three question marks, as shown in the previous example, will be replaced with a three scrolling characters. The scrolling counter beginning value takes the right-most position; the remaining characters are replaced with zeros through the left-most question marks until arithmetic rollover occurs.

DR/Xpert has three keywords that control the scrolling characters in terms of being numeric or character and numeric. These keywords also describe when elementary arithmetic carry takes place. These keywords are described in detail in DR/Xpert's Parameter Guide.

```
JOB-NAME-SCROLLING-LIMIT:    10

JOB-NAME-CHARS:              0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ

SCROLL-JOB-NAMES-FROM:       1
```

Given the default value of 10 for JOB-NAME-SCROLLING-LIMIT, DR/Xpert will use the first ten characters of JOB-NAME-CHARS as scrolling substitution characters; thus, the default is numeric only. Specifying 36 allows the scrolling character to go from 0 to 9 and A to Z before elementary arithmetic carry occurs.

The Jobname's Media/Driver Meta-Character

The media type or driver meta-character is the greater than sign (>). DR/Xpert uses first token from BKUPJOBS to determine whether the meta-character represents a media type or a driver. Media types are "D" for disk and "T" for tape. Driver media types are controlled by the following DEFAULTS keyword:

```
DRIVER-CODES: ABCDEFGHIJ
```

DR/Xpert's Parameter Guide contains a description of DRIVER-CODES describing the mapping of codes to drivers.

The Jobname's Backup System Meta-Character

DR/Xpert uses an exclamation mark (!) as the meta-character to represent the system for which given JCL is generate. There are two substitution characters: "B" for batch and "O" for online. The substitution characters originate from the BACKUP-IDENTIFIER keyword found in PGMSETS at the time the JCL is generated.

Driver Control Card Input

Table 5-1 describes control card input member for each driver. The content of control card input is unique to the third-party programs the specific drivers call; therefore, the content description of these members can be found in the vendor documentation for those programs (for example, DFSMSdss).

Table 5-1 also pertains to the third and fourth tokens that would be used with the members OpenTech Systems distributes for DR/Xpert and the corresponding drivers. These member names and the token names can be changed according to the customer's requirements. However, if the member names are changed, the token specified in the third and fourth positions must exist in DR/Xpert's parameter library.

Table 5-1 Backup Driver Control Card Input Members

Product	Dump Control Card Members	Restore Control Card Members
ABARS	N/A	N/A
CRYPTDSS	DUMP	RESTORE
DFDSS	DUMP	RESTORE
DMS	DMSDUMP	DMSRESTR

Table 5-1 Backup Driver Control Card Input Members

Product	Dump Control Card Members	Restore Control Card Members
FAVER	FVRXPORT	FVRMPORT
TAPECOPY	N/A	N/A
FDRABR	FDRDUMP	FDRREST
TAPEASIS	N/A	N/A
DISKDSS	DUMP	RESTORE

Special Considerations for ABARS

This section describes advantages, limitations, and setup for the ABARS driver. This section also describes how the ABARS driver can interact with other DR/Xpert drivers. Refer to Appendix A, “ABARS Driver Setup”, for more information about ABARS.

Note Unlike other drivers, DR/Xpert requires special setup with ABARS software. Refer to Appendix A, “ABARS Driver Setup”.

ABARS and DR/Xpert Interaction

Each ABARS aggregate belongs to a DR/Xpert aggregate of the same number. When a DR/Xpert aggregate is assigned, DR/Xpert populates the matching ABARS' selection control dataset and directs HSM to start the ABARS backup. The DR/Xpert ABARS driver waits until the HSM (that is, ABARS) is complete and determines successful completion of the backup.

ABARS Features and Limitations

The following list provides some ABARS archiving strategies for use with DR/Xpert, as well as features and limitations. The information may help customers determine whether to use ABARS exclusively or not at all.

1. DR/Xpert supports varying degrees of ABARS implementation. ABARS can be the exclusive backup driver for datasets, or it can be the backup driver based on file naming rules.
2. The scope of datasets backed up using the ABARS driver depends on each data center's implementation strategy, as follows:
   - **a** DR/Xpert can recall all migrated datasets immediately before backup. In this case, using ABARS as a driver is not necessary.
   - **b** DR/Xpert can use the ABARS driver to backup datasets residing in HSM's migration level-2. Other drivers can backup datasets that are not migrated and datasets residing at migration level-1 can be recalled before back up (e.g. DFDSS).
   - **c** DR/Xpert can use the ABARS driver to backup datasets residing in HSM's migration levels 1 and 2. Similar to strategy (b), this strategy assumes another driver will backup non-migrated datasets.

d DR/Xpert can use the ABARS driver to back up all disk datasets including those that are on primary disk. Tape datasets can be backed up by the TAPECOPY driver.

e DR/Xpert can use ABARS to back up all datasets including those that are not migrated and those residing on tape.

3 DR/Xpert can direct the recall of datasets or bypass recall based on the run-time parameter.

4 ABARS does not have native encryption support, and OpenTech Systems does not have facilities to provide CopyCrypt services through ABARS. This eliminates ABARS as a backup driver for any data for that DR/Xpert or one of its drivers must encrypt. Note the following additional considerations for data encryption:

a DR/Xpert can be very selective regarding datasets that need to be encrypted (through rules in the collocation table, COLOCTBL). The selection criteria can be dataset name, the device type (tape versus disk) upon which the dataset resides, or dataset organization (e.g. VSAM versus sequential). These datasets can be directed to a non-ABARS driver for encryption.

b DR/Xpert has no control of Encryption Enabled Tape Drives. Certainly, ABARS data can be encrypted through one of these devices.

c Whenever IBM provides encryption facilities through ABARS, DR/Xpert must be able to exploit that facility immediately.

5 Consider using the TAPECOPY driver instead of ABARS for backing up tape datasets because TAPECOPY provides multiple recovery options including "in-place" recovery.

6 Some data centers archive data as soon as the creating job finishes. If your data center archives data quickly, you may want to use ABARS exclusively as the disk backup tool to prevent DR/Xpert from recalling large amounts of data.

7 Other data centers allow datasets to remain on primary disk for a few days before the datasets are migrated. If critical datasets remain on primary disk at least 24 hours, DR/Xpert can use a non-ABARS driver to do its backup. In this case, the ABARS driver can be avoided. DR/Xpert does not need to recall archived datasets unless it needs to consolidate datasets in its recycle process.

8 The data center can use DR/Xpert's critical file list to influence ACS rules to archive critical datasets after 24 hours. This gives the data center the ability to specify a limited set of files that remain on primary disk until a backup is performed.

9 To limit and control ABARS activity to migrated files, DR/Xpert has the following collocation fields that reflect a file's migration status and its migration level. This information is described in detail in Chapter 11, “Collocation”; refer to Table 11-3 COLOCTBL Comparison Fields.

a MIGRATED can be “YES” or “NO”

b MIGLEVEL can be “ML1”, “ML2”, or “NONE”

c “MIGRATED NO” is the same as “MIGLEVEL NONE”

d All files where MIGRATED is “YES” have MIGLEVEL equal to ML1 or ML2. MIGLEVEL equal to “ML*” is the same as MIGRATED equal to “YES”

Keyword Parameters for ABARS

The following list contains keyword parameters related to the ABARS driver. The parameters can exist in DEFAULTS load module or USERSETS members found in DR/Xpert's parameter library. Customer changes are kept in the USERSETS member. Refer to DR/Xpert's Parameter Reference Guide for more information regarding these keywords and the way they relate to ABARS.

- ABEND-IF-CC-EXCEEDS
- ABARS-CONTROL-DATASET
- HSM-LOG-PREFIX
- HSM-UID-PREFIX
- ABARS' Driver Setup

Recovery Considerations

Warning The following considerations pertain to DFSMShsm 1.6 and earlier. Users with DFSMShsm 1.7 or later can ignore this section. The HSM release number pertains to the recovery data center's running system.

For DFSMShsm users up through and including 1.6, DR/Xpert use of ABARS during recovery requires a skip exit, ARCSKEXT. DR/Xpert's recovery module will activate this exit, but the exit must be available to the ABARS region.

There are three ways you can install this exit, you only have to perform one of these methods. Use the one you like best.

1 Modify your ABARS PROC to include DR/Xpert's execution library in its //STEPLIB. You might consider copying and renaming of the ABARS procedure to a new member. IBM distributes DFHSMABR as the JCL default member.

a Copy 'SYS1.PROCLIB(DFHSMABR)' to your.PROCLBI(DRXABARS)

b Modify the JCL to include DR/Xpert's LOAD library as the //STEPLIB. Here is an example:

```
//*************************************************************
//*                                                           *
//*      DFHSM SECONDARY ADDRESS SPACE START PROCEDURE        *
//*                                                           *
//*************************************************************
//DFHSMABR PROC
//DFHSMABR EXEC PGM=ARCWCTL,REGION=6M
//STEPLIB  DD DISP=SHR,DSN=@DSPREFIX.DRXPERT.LOADLIB <-New statement
//SYSUDUMP DD SYSOUT=Q
//MSYSOUT  DD SYSOUT=Q
//MSYSIN   DD DUMMY
```

Note Replace @DSPREFIX with the high-level prefix chosen for the DR/Xpert installation.

c Issue the following command to HSM to change the ABARS Start Procedure:

```
SETSYS ABARSPROCNAME(DRXABARS)
```

2. Copy ARCSKEXT from DR/Xpert's LOAD library to a dataset in your data center's Link List. Or, add DR/Xpert to your data center's Link List. This LINK List can be temporarily defined during recovery, thusly:

```
SETPROG LNKLST,ADD,NAME=NEWLINK,DSNAME=@DSPREFIX.DRXPERT.LOADLIB,ATBOTTOM
SETPROG LNKLST,DEFINE,NAME=NEWLINK,COPYFROM=CURRENT
SETPROG LNKLST,ACTIVATE,NAME=NEWLINK
```

Special Considerations for CRYPTDSS

DR/Xpert's CRYPTDSS driver is a special version of the DFDSS driver employing OpenTech Systems' CopyCrypt encryption technology.

CRYPTDSS and DR/Xpert Interaction

DR/Xpert assigns backup work to one of its aggregates. It creates a filter file for DFDSS to use, and it invokes DFDSS dynamically. Information related to encryption is passed to the CRYPTDSS engine from rules specified in the CRYPTRUL member found in DR/Xpert's parameter library.

Keyword Parameters that Affect CRYPTDSS

The following list contains keyword parameters used by the CRYPTDSS driver. These parameters can exist in DEFAULTS load module or USERSETS members found in DR/Xpert's parameter library. Customer changes are kept in the USERSETS member. Refer to DR/Xpert's Parameter Reference Guide for more information regarding these keywords and the way they relate to CRYPTDSS.

- ABEND-IF-CC-EXCEEDS
- BACKUP-MEDIA-TYPE
- DUPLEX-MEDIA-TYPE

PARMLIB Members that Affect CRYPTDSS

The following members are used by the CRYPTDSS driver.

- DUMP – Contains a DFDSS DUMP control statement and its sub parameters. The syntax and content of this member are described in IBM's DFSMS Storage Administration Reference.
- RESTORE – Contains a DFDSS RESTORE control statement and its sub parameters. The syntax and content of this member are described in IBM's DFSMS Storage Administration Reference.
- CRYPTRUL – This member is a DR/Xpert rules member that assigns encryption strings to backup aggregates. CRYPTRUL is described in detail in Appendix C of this manual.

CRYPTDSS Features and Limitations

The following are features and limitations to consider when using CRYPTDSS with DR/Xpert.

1. DR/Xpert's implementation of CRYPTDSS dumps and restores disk files. The output media for backup is currently limited to tape.
2. Because encryption is an integral part of CRYPTDSS and there is no analogous option for encryption from HSM migration levels, this driver will always recall migrated datasets in order encrypt the dataset.
3. If the encryption rule results in a value “ASIS”, the backup created by CRYPTDSS is a traditional, unencrypted DFDSS backup.
4. The collocation rule that assigns work to the DFDSS driver should implicitly or explicitly have the collocation comparison field MEDIA equal to "DISK". This comparison field is described in detail in the chapter on Collocation found in this manual; see table 10-3 collocation comparison fields.

Special Considerations for DFDSS

DR/Xpert was originally built around DFSMSdss as a backup driver. The filter dataset for DR/Xpert is based on DFSMSdss' filter file and other drivers have been adapted to use it. The advantage of using the DFDSS driver is its wide breadth of file support and its simplicity of configuration requirements compared to other backup software. Finally, only DR/Xpert and DFSMSdss are required for backup and recovery.

DFDSS and DR/Xpert Interaction

DR/Xpert assigns backup work to one of its aggregates. It creates a filter file for DFDSS to use, and it invokes DFDSS dynamically.

Keyword Parameters that Affect DFDSS

The following list contains keyword parameters used by the DFDSS driver. These parameters can exist in DEFAULTS load module or USERSETS members found in DR/Xpert's parameter library. Customer changes are kept in the USERSETS member. Refer to DR/Xpert's Parameter Reference Guide for more information regarding these keywords and the way they relate to DFDSS.

- ABEND-IF-CC-EXCEEDS
- ARCHIVE-RECALL-ACTION
- BACKUP-MEDIA-TYPE
- DUPLEX-MEDIA-TYPE

PARMLIB Members that Affect DFDSS

The following members are used by the DFDSS driver.

- DUMP – Contains a DFSMSdss DUMP control statement and its sub parameters. The syntax and content of this member are described in IBM's DFSMS Storage Administration Reference.

- RESTORE – Contains a DFSMSdss RESTORE control statement and its sub parameters. The syntax and content of this member are described in IBM's DFSMS Storage Administration Reference.
- CRYPTRUL – This member is a DR/Xpert rules member that assigns encryption strings to backup aggregates. CRYPTRUL is described in detail in Appendix C of this manual.

Features and Limitations of DFDSS

The following are features and limitations to consider when using DFDSS with DR/Xpert.

1. DR/Xpert's implementation of DFDSS dumps and restores disk files. The output media for backup is directed to tape. Refer to DR/Xpert's DISKDSS driver to direct backups to disk.
2. Although the DFDSS driver does not backup migrated files, DR/Xpert's DFDSS driver can optionally recall or inhibit the recall of migrated datasets before backup is performed.
3. If the customer has installed IBM's Encryption Facility for z/OS, the DFDSS driver can produce encrypted backup files using DFSMSdss's intrinsic encryption feature. The DFDSS driver dynamically inserts ENCRYPT and RSA keywords into DFSMSdss parameters. The values for these DFSMSdss keywords are derived from rules coded in the CRYPTRUL member found in DR/Xpert's parameter library.
4. As an alternative to (3), the customer can modify and hardcode encryption statements in the DFDSS control members DR/Xpert's DFDSS driver will use for backup and recovery.
5. The collocation rule that assigns work to the DFDSS driver should implicitly or explicitly have the collocation comparison field MEDIA equal to “DISK”. This comparison field is described in detail in Chapter 11, “Collocation”; refer to Table 11-3 COLOCTBL Comparison Fields.

Special Considerations for DISKDSS

DR/Xpert provides the DISKDSS driver to create DFSMSdss backups where the backup files are directed to disk. The driver is the same as the DFDSS driver; the destination of the backup file is different.

The DISKDSS driver resembles DR/Xpert’s DFDSS driver in every other respect.

DFDSS and DR/Xpert Interaction

DR/Xpert assigns backup work to one of its aggregates. It creates a filter file for DISKDSS to use, and it invokes DFDSS dynamically.

Keyword Parameters that Affect DFDSS

The following list contains keyword parameters used by the DISKDSS driver. These parameters can exist in the DEFAULTS load module or USERSETS member found in DR/Xpert’s parameter library. Customer changes are kept in the USERSETS member. Refer to *DR/Xpert Parameter Reference Guide* for more information regarding these keywords and the way they relate to DISKDSS.

- ABEND-IF-CC EXCEEDS
- ARCHIVE-RECALL-ACTION
- BACKUP-MEDIA-TYPE
- DUPLEX-MEDIA-TYPE
- BACKUP-TO-DISK-DATA-CLASS
- BACKUP-TO-DISK-MANAGEMENT-CLASS
- BACKUP-TO-DISK-SPACE-UNIT-TRACK-LIMIT
- BACKUP-TO-DISK-STORAGE-CLASS
- BACKUP-TO-DISK-UNIT
- BACKUP-DFDSS-BLKSIZE

PARMLIB Members that Affect DISKDSS

The following members are used by the DFDSS driver.

- DUMP – Contains a DFSMSdss DUMP control statement and its sub-parameters. The syntax and content of this member are described in IBM's DFSMS Storage Administration Reference.
- RESTORE – Contains a DFSMSdss RESTORE control statement and its sub-parameters. The syntax and content of this member are described in IBM's DFSMS Storage Administration Reference.
- CRYPTRUL – This member is a DR/Xpert rules member that assigns encryption strings to backup aggregates. CRYPTRUL is described in detail in Appendix C, "JCLLIB Library" of this manual.

Features and Limitations of DISKDSS

The following are features and limitations to consider when using DISKDSS driver with DR/Xpert.

1. DR/Xpert's implementation of the DISKDSS driver dumps and restores disk files. The output media for backup is directed to disk; use the DFDSS driver to send DFDSS backup to tape.
2. Although DISKDSS does not back up migrated files, DR/Xpert's DISKDSS driver can optionally recall or inhibit the recall of migrated datasets before backup is performed.
3. If the customer has installed IBM's Encryption Facility for z/OS, the DISKDSS driver can produce encrypted backup files using DFSMSdss' intrinsic encryption feature. The DISKDSS driver dynamically inserts ENCRYPT and RSA keywords into DFSMSdss' parameters. The values for these keywords are derived from rules coded in the CRYPTRUL member found in DR/Xpert's parameter library.
4. As an alternative to (3), the customer can modify and hardcode encryption statements in the DFDSS control members that DR/Xpert's DISKDSS driver will use for backup and recovery.

5. The collocation rule that assigns work to the DISKDSS driver should implicitly or explicitly have the collocation comparison field MEDIA equal to “DISK”. This comparison field is described in detail in Table 11-3, “COLOCTBL Comparison Fields.”
6. Although the block size for DFSMSdss backup files is one of DR/Xpert’s parameter, DR/Xpert does not require it. If BACKUP-DFDSS-BLKSIZE is not specified, DFSMSdss will use an output block size compatible with disk. One might use this parameter to improve the disk file utilization.

Special Considerations for DMS

DMS is the driver for a program product of the same name produced and sold by Computer Associates. The DMS driver is intended for customers who have made CA-DMS their primary backup tool for files residing on the disk, and for customers who have made CA-DMS central to their DASD management plan.

DMS Operational Considerations

OpenTech Systems recommends that customers who implement CA-Disk as DR/Xpert's disk backup driver use a different Files Data Set (FDS) specifically for DR/Xpert's use. The reason OpenTech recommends a different FDS is because archive volumes controlled by DR/Xpert should be sent to an off-sight vault; thus, production work cannot recall any datasets residing on those volumes. Specify the FDS name in the DMS/CA DISK FILES DATASET keyword.

Plan to copy CA-Disk's FILEDEFN parameter library member and edit it for the purpose of describing a new FDS. The item rows in the FDS will consist of the same flags set as the original FILEDEFN; however, only DSNINDEX and ARCHVOLS SUBFILE names need capacity values, the remaining item rows may have capacities of zero.

The customer should plan to run an additional and different IXMAINT job stream to service obsolete DR/Xpert archives; this job can be scheduled to run with their normal weekly CA-DISK maintenance; or, it can be scheduled to run after DR/Xpert's AUDIT job stream.

```
*  RUN THE FILES STATUS REPORT TO GET A LIST OF CAPACITY RANGES
*  OPTIMIZED FOR YOUR FILES DATA SET.  SELECT A VALUE IN THE
*  CAPACITY RANGE YOU NEED, AND THEN UPDATE THE SUBFILE ENTRY BELOW.
*
*SUBFILE -------------------- SUBFILE NAME
*      LRL ---------------- SUBFILE LOGICAL RECORD LENGTH
*        KLN ------------- SUBFILE KEY LENGTH
*           C ------------ INDICATOR THAT CAPACITY FIELD FOLLOWS
*            XXXXXXXX ---- CAPACITY NEEDED FOR THE SUBFILE
*                  Y --- Y MEANS SHARED ACCESS (MULTIPLE TASKS)
*                   Y -- Y MEANS NO DUPLICATE KEYS ALLOWED
*                    Y - Y MEANS DEFERRED WRITES ARE SUPPORTED
*                     Y- Y MEANS VALIDATE THE FILE DURING RELOAD
DSNINDEX256044C00075000YNNY    <-- CHANGE CAPACITY FIELD AS NEEDED
ARCHVOLS110006C00009000YYNY
DMSPOOLS090026C00000000YYNY
RETEXCLD082044C00000000YNNN
MIGRECAT252030C00000000YNNN
```

```
ARCHCMDS164045C00000000YYNN
RESTCMDS164044C00000000YYNN
DMSPARMS100008C00000000YNNN
DASDSPCB084050C00000000NNYN
RACFENCD090049C00000000YYNY
```

DMS and DR/Xpert Interaction

DR/Xpert assigns backup work to one of its aggregates. Then, it combines the dataset the data from an aggregate's filter file with DMS' control member (DMSDUMP) before invoking DMS.

Keyword Parameters that Affect DMS

The following list contains keyword parameters used by the DMS driver. These parameters can exist in DEFAULTS load module or USERSETS members found in DR/Xpert's parameter library. Customer changes are kept in the USERSETS member. Refer to DR/Xpert's Parameter Reference Guide for more information regarding these keywords and the way they relate to DMS.

- BACKUP-MEDIA-TYPE
- DMS/CA-DISK-FILES-DATASET
- DMS/CA-DISK-PARMLIB
- DUPLEX-MEDIA-TYPE
- GENERIC-AUTO-RECALL-TASK-LIMIT
- RECOVER-FROM-DUPLEX

PARMLIB Members that Affect DMS

The following members are used by the DMS driver. Refer to DMS/CA-DISK product documentation for detail explanation of these members.

- DMSDUMP – Contains the DMS/CA-DISK statements used to backup files to a DR/Xpert managed DMS/CA-DISK backup tape. This member must include a DMS/CA-DISK BACKUP parameter to tell DMS to perform the backup. The “Find Dsn=” control cards are supplied by DR/Xpert from the filter file.
- DMSRESTR – Contains the DMS/CA-DISK statements to restore files from a DR/Xpert managed DMS/CA-DISK backup tape. The “RESTORE” control card for each file to be restored will be supplied by DR/Xpert from its filter file. This member is available for specification of extra control cards or SYSPARMS.

Features and Limitations of DMS

The following are features and limitations of DMS when used with DR/Xpert.

1. DMS is a product of Computer Associates and must be licensed to the customer.
2. DR/Xpert's DMS driver does not support encryption.
3. datasets archived to DMS must be recalled before the dataset can be backed up.

Special Considerations for FAVER

FAVER is the driver for a program product of the same name produced and sold by Computer Associates. The FAVER driver is intended for the backup and recovery of VSAM files.

FAVER and DR/Xpert Interaction

DR/Xpert assigns backup work to one of its aggregates. Then it combines the data from an aggregate's filter file with FAVER's control member (DMSDUMP) before invoking FAVER.

Keyword Parameters that Affect FAVER

The following list contains keyword parameters used by the FAVER driver. These parameters can exist in DEFAULTS load module or USERSETS members found in DR/Xpert's parameter library. Customer changes are kept in the USERSETS member. Refer to DR/Xpert's Parameter Reference Guide for more information regarding these keywords and the way they relate to FAVER.

- ABEND-IF-CC-EXCEEDS
- ARCHIVE-RECALL-ACTION
- BACKUP-MEDIA-TYPE
- DUPLEX-MEDIA-TYPE

PARMLIB Members that Affect FAVER

The following members are used by the FAVER driver:

- FVRXPORT – Contains control statements associated with FAVER EXPORT control statement. The FVROUT control statement is supplied by DR/Xpert.
- FVRMPORT – Contains a FAVER RESTORE control statement.

Features and Limitations of FAVER

The following are features and limitations of FAVER when used with DR/Xpert.

1. FAVER is a program product of Computer Associates and must be licensed to the customer.
2. The collocation rule that assigns work to the FAVER driver should limit backup work to files that are VSAM. One method for identifying VSAM files in a collocation rule is to test the value for the comparison field DSORG equal to “VS”. Customers who have naming conventions for VSAM files can use the dataset name as criteria. These comparison fields are described in detail in Chapter 11, “Collocation”; refer to Table 11-3 COLOCTBL Comparison Fields.
3. DR/Xpert's FAVER driver does not support encryption.

Note If desired, the user may code collocation rules that can cause some VSAM files to be serviced by FAVER and some to some to be serviced by DFDSS.

Special Considerations for FDRABR

FDRABR is the driver for a program product of the same name produced and sold by Innovation Data Processing. The FDRABR driver is intended for customers who have chosen FDR as central to their DASD management plan.

FDRABR and DR/Xpert Interaction

DR/Xpert assigns backup work to one of its aggregates. Then, it combines the data from an aggregate's filter file with FDRABR's control member (FDRDUMP) before invoking FDRABR.

Keyword Parameters that Affect FDRABR

The following list contains keyword parameters used by the FDRABR driver. These parameters can exist in DEFAULTS load module or USERSETS members found in DR/Xpert's parameter library. Customer changes are kept in the USERSETS member. Refer to DR/Xpert's Parameter Reference Guide for more information regarding these keywords and the way they relate to FDRABR.

- ABEND-IF-CC EXCEEDS
- ARCHIVE-RECALL-ACTION
- BACKUP-MEDIA-TYPE
- DUPLEX-MEDIA-TYPE

PARMLIB Members that Affect FDRABR

The following members are used by the FDRABR driver:

- **FDRDUMP** – Contains control statements associated with FDRABR's DUMP TYPE=APPL control statement. DR/Xpert supplies the ARCB1DSN keyword and individual SELECT CATDSN statements.
- **FDRREST** – Contains a FDRABR RESTORE control statement. DR/Xpert provides COPY, ARCB1DSN, and individual SELECT CATDSN statements.

Features and Limitations of FDRABR

The following are features and limitations of FDRABR when used with DR/Xpert.

1. FDRABR is a program product of Innovation Data Processing and must be licensed to the customer.
2. DR/Xpert's FDRABR driver does not support encryption.

Special Considerations for TAPECOPY

TAPECOPY is DR/Xpert's intrinsic tape-to-tape backup driver. It requires no other software and the data stored on the backup file are simple, stacked, sequential files.

DR/Xpert assigns backup work to one of its aggregates. It creates a filter file for TAPECOPY containing dataset names that need to be backed up. Datasets are copied to a stacked volume given new file names with encoded information relating back to the original file's volume and sequence number and the last seventeen characters of the dataset name.

Keyword Parameters that Affect TAPECOPY

The following list contains keyword parameters used by the TAPECOPY driver. These parameters can exist in DEFAULTS load module or USERSETS members found in DR/Xpert's parameter library. Customer changes are kept in the USERSETS member. Refer to DR/Xpert's Parameter Reference Guide for more information regarding these keywords and the way they relate to TAPECOPY.

- ABEND-IF-CC-EXCEEDS
- ARCHIVE-RECALL-ACTION
- BACKUP-MEDIA-TYPE
- CNV-JOB-RESET-AFTER-OPERATOR-CANCEL
- COMPRESS-OUTPUT-DATA-BEFORE-ENCRYPTING
- DUALCOPY-RECOVERY-MODE
- DUPLEX-MEDIA-TYPE
- ERASE-DATA-AT-END-OF-LAST-OUTPUT-TAPE
- ESTAE-ENVIRONMENT-ACTIVE
- EXCP-ASSUME-18-BYTE-PADDING
- EXCP-BYPASS-SPECIAL-RECFMVB-HANDLING
- EXCP-PERFORMANCE-REPORT
- EXCP-SKIP-UNREADABLE-BLOCKS
- EXCPVR-IO-APPENDAGE-SUFFIX
- EXCPVR-MODE
- EXCPVR-NONSWAPPABLE
- FORCE-EOV-ON-OUTPUT
- OUTPUT-VOLUME-TEMPORARY-RETENTION
- READ-INPUT-TAPES-AS-98000
- REPORT-PAGE-LENGTH
- SNAP-FULL-DUMP
- SPAN-ONTO-ADDITIONAL-OUTPUT-VOLUMES
- TAPE-MANAGEMENT-SYSTEM
- USE-ADVR-INTERFACE
- USE-BUFFERED-TAPEMARK-FEATURE

PARMLIB Members that Affect the TAPECOPY Driver

The following members are used by the TAPECOPY driver. All of the following members are described in detail in Appendix D, "PARMLIB Library".

- CRYPTRUL – This member is a DR/Xpert rules member that assigns encryption strings to backup aggregates.
- BADMEDIA – This member contains a list of volumes that were involved with an abnormal termination from the tape copy engine. The user removes volumes listed in this member when the bad media issue has been resolved for that volume. In addition, when the BADMEDIA report is being produced each volume contained within the BADMEDIA parmlib member will be checked against the TMC, volumes with datasets created after the date listed in the BADMEDIA entries will be declared obsolete and will be removed from the BADMEDIA parmlib member.
- IOCNTLTB – This member contains tape media type to unit name conversions associated with BACKUP MEDIA TYPE and DUPLEX MEDIA TYPE.
- LIBRYDEF – This member describes the VTS library and associated driver routine to access a VTS. The customer modifes this member to tell DR/Xpert what type of VTS system is in use.
- LOSTVOLS – This member is a list of lost volumes that are bypassed during tape-to-tape copies. The user removes volumes listed in the member when the volume has been located.
- NEWNAUTO – This member contains the prefix renaming instructions for constructing primary backup files names for TAPECOPY and TAPEASIS aggregate volumes.
- NEWNDPLX – This member contains the prefix renaming instructions for constructing duplex backup files names for TAPECOPY and TAPEASIS aggregate volumes.

Features and Limitations of the TAPECOPY Driver

The following are features and limitations of the TAPECOPY driver when used with DR/Xpert.

1. DR/Xpert's implementation of the TAPECOPY driver copies tape files to a stacked tape volume.
2. Upon recovery, DR/Xpert can restore a backup tape's file to new volumes (typically a VTS). This is known as "copy recovery."
3. Alternatively, DR/Xpert can change the ICF catalog and modify the customer's tape catalog to treat DR/Xpert's backup as the new location for the critical tape file. This is known as "in-place recovery."
4. Migrated files are not applicable to the TAPECOPY driver.
5. The collocation rule that assigns work to the TAPECOPY driver should implicitly or explicitly have the collocation comparison field MEDIA equal to "TAPE". This comparison field is is described in detail in Table 11-3, "COLOCTBL Comparison Fields."

Special Considerations for TAPEASIS

TAPEASIS is a special version of DR/Xpert's intrinsic tape to tape backup driver. It resembles TAPECOPY in every way except for one: it begins a new backup volume whenever the source volume set changes (that is, the first volume changes).

Therefore, if the source volume is unstacked, the backup volume will be unstacked. If the source volume is stacked with some critical and some non-critical files; TAPEASIS will copy and stack the critical files. The file sequence numbers for the critical files may change, but they will be in a consistent order that they appeared on the source tape.

DR/Xpert's collocation string, controls to which driver a backup is sent. To invoke TAPEASIS, one would code TAPEASIS in the collocation string similarly to coding TAPECOPY. See the discussion on collocation strings in Chapter 11, "Collocation" of this manual.

Keyword Parameters that Affect TAPEASIS

The following list contains keyword parameters used by the TAPEASIS driver. They are applicable to the TAPEASIS driver as well. These parameters can exist in the DEFAULTS load module or USERSETS members found in DR/Xpert's parameter library. Customer changes are kept in the USERSETS member. Refer to *DR/Xpert Parameter Reference Guide* for more information regarding these keywords and the way they relate to the TAPEASIS driver.

- ABEND-IF-CC EXCEEDS
- ARCHIVE-RECALL-ACTION
- BACKUP-MEDIA-TYPE
- CNV-JOB-RESET-AFTER-OPERATOR-CANCEL
- COMPRESS-OUTPUT-DATA-BEFORE-ENCRYPTING
- DUALCOPY-RECOVERY-MODE
- DUPLEX-MEDIA-TYPE
- ERASE-DATA-AT-END-OF-LAST-OUTPUT-TAPE
- ESTAE-ENVIRONMENT-ACTIVE
- EXCP-ASSUME-18-BYTE-PADDING
- EXCP-BYPASS-SPECIAL-RECFMVB-HANDLING
- EXCP-PERFORMANCE-REPORT
- EXCP-SKIP-UNREADABLE-BLOCKS
- EXCPVR-IO-APPENDAGE-SUFFIX
- EXCPVR-MODE
- EXCPVR-NONSWAPPABLE
- FORCE-EOV-ON-OUTPUT
- OUTPUT-VOLUME-TEMPORARY-RETENTION
- READ-INPUT-TAPES-AS-98000
- REPORT-PAGE-LENGTH
- SNAP-FULL-DUMP

- SPAN-ONTO-ADDITIONAL-OUTPUT-VOLUMES
- TAPE-MANAGEMENT-SYSTEM
- USE-ADVR-INTERFACE
- USE-BUFFERED-TAPEMARK-FEATURE

PARMLIB Members that Affect TAPEASIS

The following members are used by the TAPEASIS driver. All of the following members are described in detail in Appendix D , "PARMLIB Library.".

- **CRYPTRUL** – This member is a DR/Xpert rules member that assigns encryption strings to backup aggregates.
- **BADMEDIA** – This member contains a list of volumes that were involved with a tape copy engine abnormal termination. The user removes volumes listed in this member when the bad media issue has been resolved for that volume. In addition, when the BADMEDIA report is being produced, each volume contained within the BADMEDIA parmlib member will be checked against the TMC, volumes with datasets created after the date listed in the BADMEDIA entries will be declared obsolete and will be removed from the BADMEDIA PARMLIB member.
- **IOCNTLTB** – This member contains tape media type to unit name conversions associated with BACKUP-MEDIA-TYPE and DUPLEX-MEDIA-TYPE.
- **LIBRYDEF** – This member describes the VTS library and associated driver routine to access a VTS. The customer modifies this member to tell DR/Xpert the type of VTS system that is in use.
- **LOSTVOLS** – This member is a list of lost volumes that are bypassed during tape to tape copies. The user removes the volumes listed in the member when the volume has been located.
- **NEWNAUTO** – This member contains the prefix renaming instructions for constructing primary backup files names for TAPEASIS and TAPECOPY aggregate volumes.
- **NEWNDPLX** – This member contains the prefix renaming instructions for constructing duplex backup files names for TAPEASIS and TAPECOPY aggregate volumes.

Features and Limitations of TAPEASIS

The following are features and limitations of TAPEASIS when used with DR/Xpert.

1. DR/Xpert's implementation of TAPEASIS copies to a stacked tape volume until the first volume of the source volume set changes. Thus, the first critical file of a volume set constitutes a new aggregate.
2. Upon recovery, DR/Xpert can restore a backup tape's file by changing the catalog entry and changing the TMC to point to the backup volume. This procedure is known as "in-place recovery." There are limitations for in-place recovery. The original file name must be 17 characters or longer; otherwise, a copy recovery is performed.
3. Alternatively, DR/Xpert can copy the backup file to a new tape volume, usually a VTS. This is known as "copy recovery."

4 Migrated files are not applicable to the TAPEASIS driver.

5 DR/Xper's collocation rule assigns work to the TAPEASIS driver should implicitly or explicitly have the collocation comparison field MEDIA equal to “TAPE”. This comparison field is is described in detail in Table 11-3, “COLOCTBL Comparison Fields.”

Key Files in Backup Processing

The subsections that follow describe the key files that are used in backup processing.

BKPDBASE

The main managing file for the DR/Xpert backup component is called the BKPDBASE (backup database). The initial weekly backup maintenance job stream loads the backup database (BKPDBASE) with the critical dataset names identified by the *ANALYSIS* process. The BKPDBASE also includes the backup status for each record so that DR/Xpert knows which datasets have already been backed up, not backed up, or if there was an error preventing the dataset from being backed up. The BKPDBASE contains the critical datasets and the datasets contained in each backup aggregate (DR/Xpert's basic run-unit). History data is kept for 10-cycles (9-historical cycles, plus the current cycle).

Once the backup database has been initialized, subsequent periodic runs of the backup maintenance job stream will perform maintenance on the BKPDBASE to add, delete, and update critical datasets based on weekly analysis results.

Note See “*Step 1 - Weekly Backup Maintenance Job Stream*” for more information on initializing the BKPDBASE.

BKPQUEUE

The BKPQUEUE (backup queue) is a file consisting of the records for datasets that are ready to be backed up. Records are added to the BKPQUEUE by various jobs in the backup process.

Note Refer to *Step 1 - Weekly Backup Maintenance Job Stream*, for more information on initializing the BKPQUEUE.

JDTFILEX (Job/Dataset Trigger File)

The JDTFILEX contains records (job name and dataset name relationships) used by the DR/Xpert started task (OTCDTASK) to generate dataset backup requests when the data center's job scheduler recognizes that the trigger job has completed successfully.

Note See Chapter 6, “Job Trigger Started Task”, for more information on the OTCDTASK started task.

Dataset “Trigger” Classification

During critical file analysis, DR/Xpert classifies each dataset in the BKPDBASE as either: job triggered datasets or sweep datasets. The two categories will determine the type of aggregate job that schedules the dataset for backup.

Job Trigger Datasets

Job-trigger datasets are created or updated during batch processing and can be backed up after the completion of a specific job, or set of jobs. When all jobs end that have a job-triggered dataset relationship, the Job Trigger Started Task (OTCDTASK) adds that dataset to DR/Xpert's scheduling queue. If, after all of the jobs have run and one of the jobs runs again, then the job-trigger is considered tripped and the dataset will be added to DR/Xpert's scheduling queue again.

When the queue's content reaches a size threshold, the Job Trigger Started Task (OTCDTASK) will initiate an aggregate backup. The threshold at which OTCDTASK will initiate a job-triggered backup is defined using the *TRIGGER-BACKUP-ON-FILE-SIZE* parameter.

The forced sweep jobs (*OTCDOA99* and *OTCDOTAL*) are safety net jobs for job-triggered datasets. These jobs will assign any job-triggered dataset to an aggregate if it has not been backed up. This safety net concept includes files whose full job set did not complete, or if a backup failed for some reason.

Sweep Datasets

Sweep datasets are any dataset created or updated by the daily batch workload but that do not qualify for job-trigger status. These datasets will be scheduled for backup by the sweep jobs (*OTCDBSWP*).

Classification Examples

The following scenarios show how datasets are classified as either job-triggered or sweeps.

Example 1 – Job 1 creates Dataset A. Jobs 2 through 5 use Dataset A as input but do not update it. Dataset A is job triggered and eligible to be backed up anytime after Job 1 completes.

Example 2 – Job 1 creates Dataset B. Jobs 2 through 4 update Dataset B. Dataset B is job triggered and eligible to be backed up when jobs 1 through 4 successfully complete. The job completion sequence is not important.

Types of Backup Aggregate Jobs

There are five types of aggregate backups (refer to Table 5-2), performed in two different phases. Dynamic aggregate jobs are considered Phase 1 jobs, and they schedule the datasets to be backed up by the Phase 2 jobs. Phase 2 jobs are from JCL models in the DR/Xpert PARMLIB and perform the actual backup using DFDSS or the tape-to-tape copy engine, TAPECOPY.

Note Refer to *Step 2 - Customize Backup and Recovery JCL Models* for more information on the JCL models.

Sweep jobs (sometimes referred to as "splitter jobs") are used to divide the backup workload among aggregates to make workloads more manageable.

Table 5-2 Backup Aggregate Jobs

Phase	Aggregate	Description	JCLLIB Member	PARMLIB Member
1	Dynamic aggregate	These aggregates are used for scheduling a backup of any job-triggered or time triggered datasets available for backup.	N/A	*OTCDBA01*
	Online aggregate	This job is used to schedule backups for the online datasets that will not be updated or modified by any batch job.	*OTCDBONL*	N/A
	Scheduled sweep	These aggregate backups are used to back up datasets defined as sweep candidates (see *Dataset "Trigger" Classification*).	*OTCDBSWP*	N/A
	Forced sweep	These aggregate backups are used to backup all datasets that are not yet backed up in the current cycle, job-triggered datasets that have not been backed up, and any failed backups.	*OTCDOTAL*	*OTCDOA99*
2	Final Aggregate (Aggregate 99)	This is the last aggregate of the day. The phase-2 job submitted by the final aggregate backup will finalize the daily processing cycle for DR/Xpert and produce reports describing each backup and its success in performing that backup.	N/A	*OTCDBA99* *OTCDOA99*

Note The reason that some of the JCL is located in JCLLIB, while others are listed as members in PARMLIB, is because there are user parameters available to allow some jobs to be submitted upon completion of phase-2 backups. In order to submit the jobs the JCL must be found in the DR/Xpert PARMLIB library. See *Automating Phase 2 Sweeps* for details on using this function.

Job-Triggered Backups

The first datasets available for backup are job-triggered. Datasets controlled by job triggered backups are eligible for backup any time after the trigger is tripped. However, the Job Trigger started task waits until the accumulated storage size for the aggregate reaches a threshold value controlled through the *TRIGGER-BACKUP-ON-FILE-SIZE* parameter so that resources can be used optimally.

The Job Trigger started task services backups throughout the cycle, to alleviate some of the workload required by the end-of-day backup sweeps. Setting *TRIGGER-BACKUP-ON-FILE-SIZE* to a small threshold increases the frequency with which backups run. A larger threshold reduces the number of backups and makes better use of the tape media. Anything not serviced by a dynamic backup is backed up when end-of-day backup sweeps are executed.

When accumulated work reaches the threshold specified by *TRIGGER-BACKUP-ON-FILE-SIZE*, DR/Xpert's started task can perform an action to initiate offloading available work to a DR/Xpert controlled backup (an aggregate).

The Job Trigger started task supports three actions controlled by the following USERSETS parameters. Refer to DR/Xpert's Parameter Reference Guide for details regarding each of these parameters, and then decide which parameter best serves the data center standards.

- *The CRYPTDSS driver will always recall migrated files because OpenTech Systems' encryption product does not interface with ABARS. The file must be recalled to effect software encryption.*
- *AT-THRESHOLD-MESSAGE*
- *AT-THRESHOLD-SUBMIT*

Note DR/Xpert's Aggregate and Sweep jobs can be run in simulation mode so that users can see how many/which datasets would have been scheduled for backup without altering the BKPDBASE or submitting backup jobs. Before simulation mode can be used, the procedure described in the *Initializing Files for the Backup Process* must be completed.

Scheduled Sweep

The scheduled sweep jobs are run once per day to backup datasets that, for some reason or another, were not identified as job-triggered. Everything that is not job-triggered is a sweep dataset. The appropriate time to run the sweep jobs is after the production window.

DR/Xpert's sweep program scans the backup database and populates DR/Xpert's scheduling queue with datasets designated for “sweep.” This collection of datasets is normally large enough that Phase 1 processing divides scheduled backup work into multiple aggregates.

DR/Xpert uses the *BACKUP-TAPE-SIZE-OBJECTIVE* parameter value as the dividing line for separating DR/Xpert's scheduling queue into smaller pieces. This sizing is the result of the Phase 1 program dividing total dataset size, as found in DR/Xpert's scheduling queue by the *BACKUP-TAPE-SIZE-OBJECTIVE*. This parameter is specified in terms of megabytes, gigabytes, or percent capacity of the device to which the backup is written.

Although, the *BACKUP-TAPE-SIZE-OBJECTIVE* parameter defines a specific size, there are implications and considerations that this parameter has on other resources besides filling up a tape. The issue during sweep processing is available time versus tape utilization.

There are two types of Sweep jobs available:

- **Scheduled sweep** – job *OTCDBSWP* for batch; job *OTCDOTAL* for online files. These jobs identify available “sweep” datasets that are available for backup, but the sweep does not look for job-triggered datasets.
- **Forced sweep** – Job *OTCDOA99* for batch; job *OTCDOTAL* for online files. These jobs are almost identical to OTCDBSWP except that OTCDBSWP is limited to selecting "sweep" type datasets, and *OTCDOA99* and *OTCDOTAL* extract the names for all datasets not yet backed up in the current cycle. The purpose for *OTCDOA99* and *OTCDOTAL* are to backup job-triggered datasets whose complete set of updating jobs did not run or to repeat an attempt to backup a dataset whose backup failed. These jobs are intended to run before the final sweep (aggregate 99).

Scheduling Suggestions for Sweep

The data center must consider which competing objectives have the most value: available time at the end of third shift for servicing backups, or high utilization of tape volume capacity. As mentioned, the significant parameter for controlling the number and size of sweep jobs is *BACKUP-TAPE-SIZE-OBJECTIVE*.

- **Tape Utilization** – If the objective is optimal use of tape volumes, the specified value for *BACKUP-TAPE-SIZE-OBJECTIVE* should approach the target device's capacity without going over. Because compression ratios and accumulated file sizes are estimates, it would be wise to specify a value less than full capacity to allow for expansion between this value and truly full.
- **Throughput** – If the objective is throughput, then the number of job streams generated by the sweep jobs is indirectly controlled by *BACKUP-TAPE-SIZE-OBJECTIVE*. When this parameter is relatively small more backup job streams are generated. When this parameter is relatively large, fewer are generated. The objective to set this parameter is to generate just enough job streams to use all of your available tape drives without going over.

DR/Xpert's sweep jobs (OTCDBTAL, OTCDBSWP, and OTCDOTAL) consist of two steps. The first step places dataset names into DR/Xpert's scheduling queue; the second step builds aggregate backup jobs based on the specified size limit in *BACKUP-TAPE-SIZE-OBJECTIVE*. This parameter is the dividing line between aggregates. The number of backup jobs generated by the sweep jobs depends on the total storage for backup divided by *BACKUP-TAPE-SIZE-OBJECTIVE* (rounded up). This is also the number of tape drives needed.

For optimum throughput, consider the number of tape drives available for backup purposes. Then consider the typical nightly backup size when the sweep runs. Adjust the value for *BACKUP-TAPE-SIZE-OBJECTIVE* to derive the number of tape drives when applied to this calculation. Divide the parameter's value into typical nightly backup size using the count of tape drives that is already known. If the specified value for *BACKUP-TAPE-SIZE-OBJECTIVE* is greater than the target tape device's capacity, carefully consider things such as the amount of data that would go to the second tape, thus avoiding situations where the first tape is filled and only a fraction of the second tape is used.

Automating Phase 2 Sweeps

DR/Xpert offers user parameters to control the actions taken when the final Phase 2 end-of-day sweep jobs complete. Specifically, each Phase 2 job examines the status of DR/Xpert's backup run-units to determine if more work is outstanding. If no more work exists, the active Phase 2 backup job performs one of the actions below, as defined by the user.

Table 5-3 Phase 2 Sweep Control Cards

Parameter	Description / Action
CDIBR-NEXT-PHASE-CREATE	This parameter will cause the last in a set of phase-2 backup job streams to create a dataset with the name specified by the parameter. If this parameter is set to NONE, no dataset is created.
CDIBR-NEXT-PHASE-MESSAGE	This parameter will cause the last in a set of phase-2 backup job streams to issue a WRITE TO OPERATOR message using the text specified in the specified PARMLIB member. (Members *WTOA99B*, *WTOA99O*, and *WTOTALB* are provided in the PARMLIB as examples.) If this parameter is set to NONE, no WTO message is issued.
CDIBR-NEXT-PHASE-SUBMIT	This parameter will cause the last in a set of phase-2 backup job streams to submit the JCL in the specified PARMLIB member. If this parameter is set to NONE, no JCL is submitted.

The intended use of *CDIBR-NEXT-PHASE-CREATE* and *CDIBR-NEXT-PHASE-MESSAGE* is to cause scheduling systems to submit jobs on behalf of DR/Xpert. *CDIBR-NEXT-PHASE-SUBMIT* causes the object of this parameter (whichever PARMLIB member) to be submitted. When the action defined by the user has been performed by DR/Xpert, the next phase of the DR/Xpert's backup cycle can be initiated. The jobs that use this function are OTCDBSWP, OTCDBTAL, and OTCDOTAL.

For example:

1. Using the *CDIBR-NEXT-PHASE-SUBMIT* parameter to submit JCL in a PARMLIB member, you can request each of these jobs to submit the next job.
2. In the PGMSETS DD of the *OTCDBSWP* job, specify *CDIBR-NEXT-PHASE-SUBMIT*: *OTCDOA99*.
3. Then, in the PGMSETS DD of the *OTCDOA99*, specify *CDIBR-NEXT-PHASE-SUBMIT*: OTCDBA99.

The preceding example causes OTCDBSWP to run and submit its associated Phase 2 backup jobs. When the last of those backup jobs complete, OTCDBTAL would be automatically submitted and its associated Phase 2 backups are run. Upon completion of the last backup job from OTCDBTAL, the final sweep OTCDBA99 is submitted. See Figure 5-1.

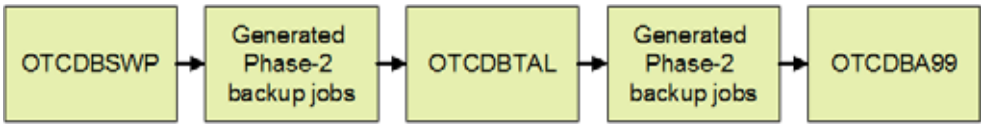

Figure 5-1 Example of User-Defined Job Submission Scheduling

Initializing Files for the Backup Process

The following section explains the steps required to initialize the backup process before DR/Xpert can begin scheduling backup jobs.

Warning The backup job stream is dependent on the *ANALYSIS* job stream (see Chapter 3, "Critical Dataset Identification"). The backup job stream cannot be initialized until at least one full collection and analysis cycle has completed (to include the weekly *ANALYSIS* job stream). Once the weekly *ANALYSIS* cycle has run once, then the backup process can be initialized.

Definition of Backup Management Files

The following VSAM files belong to DR/Xpert's Backup Component, both BATCH and ONLINE tracks, and are used for the following purposes:

- `@dsprefix.B.BKPDBASE` – batch backup database
- `@dsprefix.B.BKPQUEUE` – batch backup queue
- `@dsprefix.O.BKPDBASE` – online backup database
- `@dsprefix.O.BKPQUEUE` – online backup queue

Step 1 - Weekly Backup Maintenance Job Stream

The weekly backup maintenance job stream is performed by the *OTCDBIN1* job.

The *OTCDBIN1* job performs the functions listed below on the backup database and the backup queue. The BATCH and ONLINE versions of these files are processed by the same JOB and step, but the conditions (1 through 4) are tested independently.

1. If the backup database does not exist, then *OTCDBIN1*:
   - Defines the file
   - Initializes the file with control records
   - Formats 50 aggregate records (daily backup units)
   - Loads the backup database from the critical list created by the latest (or first) *ANALYSIS* job stream
2. If the backup database exists, then *OTCDBIN1* updates the backup database with the differences between the current critical dataset list and the critical dataset list from the previous instance of the *ANALYSIS* JOB.
3. If the backup queue does not exist, then *OTCDBIN1*:
   - Defines the file

- Initialize the file with control records.
- Formats the number of queue records contained in the *BATCH-INIT-BACKUP-REQUEST-QUEUE-SLOTS* parameter in USERSETS.
- Loads the backup database from the critical list created by the *ANALYSIS* job stream.

4 If the backup queue exists, *OTCDBIN1* takes no action.

Note @dsprefix is equal to the value specified for the *DYNAMIC-ALLOCATION-VSAM-DATASET-NAME-PREFIX* parameter in the *USERSETS* member of the DR/Xpert PARMLIB library.

Review the JCL comments in *OTCDBIN1* for any additional instructions and then submit the *OTCDBIN1* member JCL to create the backup databases and backup queue datasets.

Step 2 - Customize Backup and Recovery JCL Models

The control cards shown in Table 5-4 are members of the DR/Xpert PARMLIB library. These members contain JCL models that DR/Xpert's backup jobs will use to generate the backup JCL, as well as JCL for restoring data. The user should make sure that these default JCL models are customized to meet their needs for backup and recovery. Change the jobcard according to site standards for tape backup jobs.

Table 5-4 Backup and Recovery JCL Models

JCL Model (PARMLIB)	Description
DMPMODEL	Performs backup for all backup drivers
RESMODEL	Performs restores for all recovery drivers
CRYPTRUL	Used to perform encrypted backups (CopyCrypt users only)
DUMP	DFSMSdss control cards referenced by *DMPMODEL* and *SIMMODEL*
RESTORE	DFSMSdss control cards referenced by *RESMODEL*
OTCDBA01	Phase-1 job stream submitted by the started task when accumulated work reaches a job-trigger threshold

Step 3 - Customize Collocation Rules

DR/Xpert's collocation table is the mechanism to support different backup drivers. This member is the *COLOCTBL* member found in DR/Xpert's PARMLIB. This table contains a rules language containing an IF predicate followed by THEN and DEFAULT rules describing a collocation string.

The collocation string contains four tokens separated by a period. Each token can be up to eight characters. Every dataset is assigned a token. Datasets containing the same token are stored in the same aggregate backup; or, stated another way, every time DR/Xpert sees a different collocation string, a new backup is formed.

Note Refer to Chapter 11, "Collocation", for detailed information on defining collocation rules.

Step 4 - Customize Encryption Rules

DR/Xpert's mechanism for defining encryption rules is the *CRYPTRUL* member, found in DR/Xpert's PARMLIB. This table contains a rules language containing an IF predicate followed by THEN and DEFAULT rules describing an encryption string.

If you specify collocation strings with TAPECOPY and CRYPTDSS, then DR/Xpert will use CopyCrypt as the encryption tool for the backup; CopyCrypt must be installed using a valid product key.

If you plan to use DFSMSdss' native encryption, then DR/Xpert will insert the proper encryption keywords into DFSMSdss' control file, z/OS Encryption Services V1.1.0 must be installed. Alternatively, if you want to bypass the encryption rules table, you may specify the DFDSS encryption keywords in different control members and specify these control members in the collocation string.

Note Refer to Chapter 12, "Encryption", for detailed information on defining Encryption rules.

Step 5 - Customizing Application Names

DR/Xpert has two strategies for defining and assigning application names: by job and by dataset.

By Job

The first method DR/Xpert uses to assign application names is by job. In this method, a dataset's application is inherited. Every production job is assigned an application name by a list of attributes as described below; then, every dataset inherits its application name from an associated job.

Dataset inheritance of an application is from an associated job according to the following hierarchy based on availability of information (e.g., the creating job is not always known).

1. The creating job
2. The first job that opens the file for output or update
3. The first job that uses the dataset as input.

APPLRULE uses the following information to assign application names:

- Jobname
- User ID
- System ("batch" or "online")
- Accounting
- Scheduling Information

By Dataset

The second method DR/Xpert uses to assign application names is by dataset name. This method is actually an override to the first method. The member containing rules for this method is APPLDSNS.

One might use APPLDSNS with one of two approaches:

- Use APPLDSNS to change or override the application ownership of any dataset implicitly assigned by job identification (APPLRULE). In this case, APPLDSNS is used to fine tune application dataset assignment.
- Depend entirely on APPLDSNS to define and assign application names. In this case, APPLRULE would contain only a default assignment; whereas, every dataset would be overridden by APPLDSNS.

Daily Backup Processing

DR/Xpert's daily job stream consist of three execution tracks: a set of jobs for batch datasets, a set of jobs for online files, and another set of jobs supporting both batch and online files. Table 5-5, Table 5-6, and Table 5-7 show the jobs that can be used by each.

Warning The order and frequency of these jobs varies depending on the processing environment.

Table 5-5 Batch Track

Daily Job name	Description	Execution rules
OTCDBA01	Dynamic Aggregate backups. Submits phase-2 aggregates, the number of which varies based on BACKUP-TAPE-SIZE-OBJECTIVE.	Submitted by the Job Trigger Started task. Number of aggregate backup jobs and frequency varies. OTCDBA01 is shared between the online and batch tracks.
OTCDBSWP	Sweep jobs are run at end-of-day after the batch schedule is complete and new file activity or output file activity no longer occurs.	Number of aggregate backup jobs and frequency varies.
OTCDBTAL	Same as sweep jobs, but also tries to backup previously failed backups, and any job-triggered backups that have not been run. If this job is successful, the final aggregate will have no work to do.	Number of aggregate backup jobs and frequency varies.
OTCDBA99	This job marks the end-of-day for the critical batch dataset backup process.	All backup jobs must be complete before this job runs.
OTCDBXRF	Generate batch cross reference reports. Reports are generated to provide a cross-reference between critical batch datasets and the backup tapes they are located on. Error and alert reports are created to identify batch datasets that were not backed up.	Run OTCDBA99 and resulting backup jobs have completed.

Table 5-6 Online Track

Daily Job name	Description	Execution rules
OTCDBA01	Dynamic Aggregate backups. Submits phase-2 aggregates, the number of which varies based on BACKUP-TAPE-SIZE-OBJECTIVE	Submitted by the Job Trigger Started task. Number of aggregate backup jobs and frequency varies. OTCDBA01 is shared between the online and batch tracks.
OTCDBONL	Static sweep job used to backup online datasets that will not be updated by the online process.	Run after CICS regions are brought down.
OTCDOTAL	Same as sweep jobs, but also tries to backup previously failed backups, and any job-triggered backups that have not been run. If this job is successful, the final aggregate will have no work to do.	Number of aggregate backup jobs and frequency varies.
OTCDOA99	This job marks the end-of-day for the critical online dataset backup process.	All backup jobs must be complete before this job runs.
OTCDOXRF	Generate online cross reference reports. Reports are generated to provide a cross-reference between critical online datasets and the backup tapes they are located on. Error and alert reports are created to identify online datasets that were not backed up.	Run after OTCDOA99 and resulting backup jobs have completed.

Table 5-7 Combined Track

Daily Job name	Description	Execution rules
OTCDBSYN	Synchronize online and batch databases to make sure they are in the same cycle. This job should run before a new batch cycle begins.	Run after end of day reporting (OTCDBXRF and OTCDOXRF) have completed.
TRIGGERS	Load dynamic Job and Dataset Triggers (JDT)	Run after database synchronization
RESET	Restore the DR/Xpert's backup database (BKPDBASE) and scheduling queue (BKPQUEUE).	Run as needed.
OTCDZQUE	Clear DR/Xpert's scheduling queue (BKPQUEUE).	Run as needed.

Backup Job Considerations

The JCL for the aggregate backups contain parameters in the PGMSETS DD that the user needs to review and modify if needed:

JCL-MODEL-STATEMENTS-MEMBER . This parameter contains a member pair defining backup and restore JCL models. The first member is the name of the JCL model for creating backup files; the second member is the name of the JCL model for restoring JCL. The member names are separated by a period, dash, or comma. The default values are *DMPMODEL* and *RESMODEL* and they are members found in the PARMLIB library.

`JCL-MODEL-STATEMENTS-MEMBER:DMPMODEL.RESMODEL`

AGGREGATE-GROUP. This is a 4-character parameter that directs DR/Xpert to choose an aggregate from its pool or specify the final aggregate. The values are 'AUTO' or '9999'. '9999' is the aggregate identifier for the final aggregate. JCL members named *OTCDBA99* and *OTCDOA99* use AGGREGATE-IDENTIFIER 9999. All other backup streams use 'AUTO'. Other backup JCL members include *OTCDBA01*, *OTCDOA99*, *OTCDBSWP*, *OTCDBONL*, and *OTCDOTAL*.

BACKUP-IDENTIFIER . This parameter should be set to “B” for batch and “O” for the online backup jobs so that DR/Xpert can use the correct database.

Automatic Phase 2 Job Submission

The default JCL for the aggregates has been coded to allow immediate submission of any Phase 2 backup JCL created to perform the backups. If you do NOT want the Phase 1 job to automatically submit the Phase 2 job to the internal reader, then uncomment the SYSUT2 DD DUMMY statement as follows:

Change

```
//*SYSUT2 DD    DUMMY
```

to

```
//SYSUT2 DD    DUMMY
```

Backup Cross Reference Reports

The cross-reference jobs (*OTCDBXRF* for batch, *OTCDOXRF* for onlines) are used to generate the *Dataset Backup Cross Reference* reports after the final aggregate job of the day has completed. The report is generated to provide a cross-reference between critical online datasets and the backup tapes where they are located and produce error and alert reports to identify batch datasets that were not backed up.

Note Refer to Chapter 13, “Reports”, for more information about these reports.

Review the JCL comments in *OTCDBXRF* and *OTCDOXRF* for any additional instructions before submitting/scheduling the *OTCDBXRF* and *OTCDOXRF* member JCL.

Database Synchronization

The *OTCDBSYN* job is used to validate that the batch and online environments are synchronized with each other. The final daily aggregate must be completed before this job can be run.

Review the JCL comments in *OTCDBSYN* for any additional instructions before submitting/scheduling the *OTCDBSYN* JCL.

Load Job and Dataset Triggers

The *TRIGGERS* job is used to reset the trigger criteria for DR/Xpert's Trigger Task. The final daily aggregate must be completed before this job can be run.

Review the JCL comments in *TRIGGERS* for any additional instructions before submitting/scheduling the *TRIGGERS* JCL.

Example Daily Backup Job Stream

Table 5-8 gives an example of a typical application of the DR/Xpert backup process using batch, online, and combined processing tracks. Note that before the daily backup process can be submitted, the first weekly run of the analysis cycle must have completed and the backup queue and backup databases must be initialized following the instructions in *Initializing Files for the Backup Process*.

Table 5-8 Daily Backup Job Streams

Time	Batch backup	Online backup
18:00	Batch window starts Various job-triggered backups (using JCL model OTCDBA01 in PARMLIB) are initiated by the Job Trigger started task as daily production creates datasets that can be backed up early.	N/A
00:00	N/A	• Online regions brought down • Backup jobs for online static sweep datasets are submitted. • Run OTCDBONL. One or more phase-2 aggregates are submitted on behalf of OTCDBONL.
04:00	Batch processing window ends, begin backup sweep for batch files. Run OTCDBSWP. One or more phase-2 aggregates are submitted on behalf of OTCDBSWP.	• Batch processing window ends, finish online files for backup. • Run OTCDOTAL. One or more phase-2 aggregates are submitted on behalf of OTCDOTAL.
05:00	Online backups compete, begin forced batch sweep. Run OTCDBTAL. One or more phase-2 aggregates are submitted on behalf of OTCDBTAL.	• Run OTCDOA99. This is the final aggregate for the online track. Generally there are no additional backups required at this point. • Recovery JCL is created for Online Track.
06:00	• Run OTCDBA99. This is the final aggregate for the batch track. Generally, there are no additional backups required at this point. • Recovery JCL is created for the batch track.	• Submit OTCDOXRF to create the *Dataset Backup Cross Reference* report.

Table 5-8 Daily Backup Job Streams

Time	Batch backup	Online backup
07:00	• Submit OTCDBXRF to create the *Dataset Backup Cross Reference* report.	N/A
07:30	• When the final job submitted by OTCDBA99 has completed, run end of day reporting job OTCDBXRF • Review cross-reference and alerts reports.	N/A
07:45	• Run database synchronization job *OTCDBSYN* to synchronize the batch and online database (BKPDBASE)	

Weekly Backup Job Streams

There are two weekly backup jobs shown in Table 5-9 that must be run after the weekly analysis cycle has completed. These jobs perform weekly maintenance on the backup databases and reload the job trigger database.

Table 5-9 Weekly Backup JOb Streams

Weekly Job name	Description	Execution rules
OTCDBIN1	Perform maintenance on the backup databases.	Must run after the weekly *ANALYSIS* process has completed.
TRIGGERS	Shuts down the OTCDTASK, reloads the job trigger database and restarts OTCDTASK. (For new installations of DR/Xpert, the TRIGGERS job must run prior to the initial start of the OTCDTASK).	Runs as DR/Xpert's first job in each cycle. For the first run, it can be run after the *ANALYSIS* process has completed. Thereafter, the TRIGGERS job should be scheduled to run after *OTCDBSYN*.

Weekly Backup Process

The jobs to execute the weekly backup processes are listed in the subsections that follow.

Weekly Job 1 - Backup Database Maintenance

The first job in the weekly maintenance process is the *OTCDBIN1* job. This job performs maintenance against the batch and online backup databases to add/delete/update critical datasets based on the analysis results. Since this maintenance is dependent upon data from the analysis process, the weekly analysis cycle must be complete before the *OTCDBIN1* job runs.

Review the JCL comments in *OTCDBIN1* for any additional instructions and submit the *OTCDBIN1* member JCL to update the backup databases.

Weekly Job 2 - Reload Job Trigger Database

The second job in the weekly maintenance process is the *TRIGGERS* job. This job shuts down the OTCDTASK Job Trigger started task and reloads the job trigger table before restarting the OTCDTASK started task.

Note Refer to Chapter 6, "Job Trigger Started Task", for more information on the Job Trigger Started Task (OTCDTASK).

Review the JCL comments in *TRIGGERS* for any additional instructions and submit the *TRIGGERS* member JCL to update the backup databases.

Recovering BKPDBASE or BKPQUEUE

As stated earlier in this chapter (refer to *Key Files in Backup Processing*), DR/Xpert's backup database and scheduling queue files are repositories that track critical file backups and recoveries. The information contained within those files reflect statuses at points in time within a daily backup cycle. If this information is corrupted because of a error or if the data within these files becomes incorrect because one of DR/Xpert's backup job streams was run out of order, the *RESET* job located in the JCLLIB library can restore these VSAM files to a time that you know is stable.

The *RESET* member contains two steps: the first step recovers the BKPDBASE, and the second step recovers the BKPQUEUE file. Because recovery varies from situation to situation, either file can be restored or both. Restoring the BKPQUEUE is not critical, and it can be cleared. Doing so postpones the backup of datasets represented by lost entries to the final sweep (the last backup).

The backups for DR/Xpert's BKPDBASE and BKPQUEUE are made at the beginning of DR/Xpert sweeps; so the appropriate backup file to use to restore the BKPDBASE or BKPQUEUE is frequently from the DR/Xpert job that failed or that was run out of order. Examine the failed job to determine the correct recovery file.

Batch

The backup file names for BKPDBASE backup files, created at the beginning of Phase 1 batch aggregate job streams (OTCDBA01, OTCDBSWP, OTCDBTAL, and OTCDBA99), are listed below.

```
prefix.B.BKPACKUP.GnnnnV00      for BKPDBASE
prefix.B.BKQCOPY.GnnnnV00       for BKPQUEUE
```

The following file names are the backup files created before the BKPDBASE is upgraded after Identification analysis (*OTCDBIN1*). Note that the BKPQUEUE is unaffected by the job that upgrades the BKPDBASE.

```
prefix.B.BKPSAVE.GnnnnV00        for BKPDBASE
```

Online

The backup files names for BKPDBASE backup files, created at the beginning of Phase 1 online aggregate job streams (OTCDBA01, OTCDOTAL, and OTCDOA99).

```
prefix.O.BKPACKUP.GnnnnV00      for BKPDBASE
prefix.O.BKQCOPY.GnnnnV00       for BKPQUEUE
```

The following file names are the backup files created before the BKPDBASE is upgraded after Identification analysis (*OTCDBIN1*). Note that the BKPQUEUE is unaffected by the job that upgrades the BKPDBASE.

```
prefix.O.BKPSAVE.GnnnnV00       for BKPDBASE
```

The RESET job can restore only the BKPQUEUE, only the BKPDBASE, or both the BKPQUEUE and the BKPDBASE. The existence of key DD-statements, as described in *Chapter 5, DD Statements*, determines which files are recovered.

Table 5-10 DD Statements

DD name	Description	Input dataset
`//BKPCOPY DD`	Restore from a backup of DR/Xpert's backup scheduling queue	*@dsprefix.x*BKQCOPY.G*nnnn*V00 The '*x*' in x.BKQCOPY represents an "O" for a backup of the Online queue or a "B" for the Batch queue.
`//BKPQUEUE DD`	Restore DR/Xpert's backup scheduling queue	*@dsprefix.x*.BKPQUEUE Note: The *x* represents an "O" for the Online queue or a "B" for the Batch queue.
`//BKPACKUP DD`	Restore from a backup of DR/Xpert's backup database	*@dsprefix.x*.BKPACKUP.G*nnnn*V00 is appropriate for restoring the backup database before a Phase 1 aggregate ran. *@dsprefix.x*.BKPSAVE.G*nnnn*V00 is appropriate for restoring the backup database before upgrading the database after weekly analysis. Note: The *x* represents an "O" for a backup of the Online queue or a "B" for the Batch queue.
`//BKPDBASE DD`	Restore DR/Xpert's backup database	*@dsprefix.x*.BKPDBASE Note: The *x* represents an "O" for the Online queue or a "B" for the Batch queue.

Clearing DR/Xpert's Backup Scheduling Queue

In addition to database and scheduling queue restore functions described above, running job OTCDZQUE in the JCLLIB clears the BKPQUEUE. Clearing DR/Xpert's backup scheduling queue can be an appropriate way of dealing with problems with incorrect data in the queue. By design, the final sweep backs up any dataset that have not been serviced by a dynamic or end-of-day sweep, so entries for files lost by clearing the scheduling queue are simply backed up during the final sweep.

6 Job Trigger Started Task

TOPICS COVERED IN THIS CHAPTER

Overview (page 6-2)

Using the Job Trigger Started Task (OTCDTASK) (page 6-2)

Refreshing the Job Trigger File (page 6-3)

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Overview

As discussed in "Dataset "Trigger" Classification" in Chapter 5, the first datasets identified by DR/Xpert as available for backup are job-triggered datasets. Job-triggered datasets are datasets that can be backed up after a specific job (or set of jobs) has completed because the dataset will not be modified after that point. By using this job-triggering methodology, DR/Xpert is able to efficiently disperse backups throughout the cycle rather than waiting until the end of the day to process all backups.

DR/Xpert maintains a database of job/dataset relationships called the Job Trigger File, or JDTFILEX. When a job finish that has a "trigger relationship" with a dataset in the JDTFILEX, that dataset is considered available for backup. The Job Trigger Started Task checks the JDTFILEX file to see which datasets can be added to the backup database queue by detecting successful end of job status (using a customized scheduler interface).

If the Job Trigger Started Task finds datasets that have met their job trigger criteria and are available for backup, the task will submit the JCL in the *JDTMODEL* member of the DR/Xpert PARMLIB. The *JDTMODEL* job adds the job triggered datasets to the backup queue (BKPQUEUE) for inclusion in the next scheduled aggregate backup.

Job triggered datasets will continue to be added to the BKPQUEUE until a user defined threshold has been met. When this threshold has been met, the Job Trigger Started task will either create a dataset or issue a WTO that can be used to signify to your job scheduler or operations staff that a dynamic aggregate backup can be submitted to backup the job triggered datasets in the BKPQUEUE. Alternatively, DR/Xpert can be set up to automatically submit the dynamic aggregate backup job when the threshold is met.

Any datasets that are not serviced by a dynamic aggregate backup during DR/Xpert's backup cycle will be backed up when end-of-day backup sweeps are executed.

Using the Job Trigger Started Task (OTCDTASK)

The *OTCDTASK* member of the JCLLIB library contains the JCL for the Job Trigger Started Task. The started task may have already been customized during product installation. If not, edit the *OTCDTASK* JCL and perform any other modifications based on the information in this chapter.

Note The Job Trigger Control Task may be run either as a started task, or as a batch job. Running it as a started task is the preferred method.

This task can be started **after** the first execution of the weekly analysis cycle. After that, the OTCDTASK can run continuously. A copy of *OTCDTASK* should be added to a PROCLIB from which it can be started with other started tasks after IPL. Refer to *Console Commands* for the START command and other available commands.

The Job Trigger Started Task name may be changed according to your data center's standards. The *TRIGGER-CONTROL-TASK* parameter in USERSETS specifies the chosen name for the Job Trigger task. The default name is *OTCDTASK*.

Running OTCDTASK as a Batch Job

The Job Trigger task is intended to run as a started task, but it can also run as a batch job.

Refreshing the Job Trigger File

The Job Trigger File keeps track of jobs that update certain files. Whenever a job that updates a given dataset completes, a notation is made in the Job Trigger File. When all jobs that update a file complete, a backup is scheduled. When additional instances of an updating job are seen after the initial backup, additional backups are scheduled. This job execution notation must be refreshed every day.

The *TRIGGERS* job stream refreshes the JDTFILEX. This job should be the first DR/Xpert job in a cycle; therefore, plan to run this job immediately after a cycle is closed; that is, after *OTCDBSYN*.

WSNAMES and JDTMODEL Member Relationship

The *JDTMODEL* and *WSNAMES* members of PARMLIB are used in conjunction with one another in the process of maintaining the BKPQUEUE. This section discusses each member and how the two members are used together.

The *WSNAMES* member contains working system identification identifiers and corresponding *JDTMODEL* tags as follows:

- The working system identifier is associated with the system on which a completing job has run.
- The JDTMODEL tag is a section in the *JDTMODEL* member containing JCL or local Backup Component Dataset names (BKPDBASE and BKPQUEUE).

The *JDTMODEL* member of the DR/Xpert PARMLIB is used by DR/Xpert's started task (OTCDTASK) and is a prototype for DR/Xpert's queue maintenance program. This member identifies backup databases and queues at various Z/OS complexes.

The following are the definitions for WSNAMES and JDTMODEL:

- JDTMODEL tag is a four character ID found in*WSNAMES*.
- A JDTMODEL section is a row containing a JDTMODEL TAG. The tag is seen as a row containing two pound-signs (##), the JDTMODEL tag, and a backup ID, either B or O. The pound-signs begin in column 1. There are no intervening spaces between the pound-sign, the tag, and the backup ID.

Example 1: Using WSNAMES and JTDMODEL

Some scheduling products have an ID associated with the domain under which a job runs. Other scheduling products do not have their own ID; rather, they use the local machine's SMF ID. When a job ends, DR/Xpert will use the first ID it can successfully assign from the following:

- A scheduling product's ID for the system upon which a job completes
- The SMF id under which a job was running

Using this ID, the scheduling system will use *WSNAMES* to map the ID to a *JDTMODEL* tag. The *JDTMODEL* tag gives DR/Xpert routing information about the system where the job completed.

Figure 6-1 demonstrates the relationship between *JDTMODEL*, *WSNAMES*, and a scheduling product where:

- "MASTER" is an ID for a scheduling system
- "HERE" is a local environment
- "AWAY" is a remote environment
- "SYS2" and "ABCD" are subordinate regions

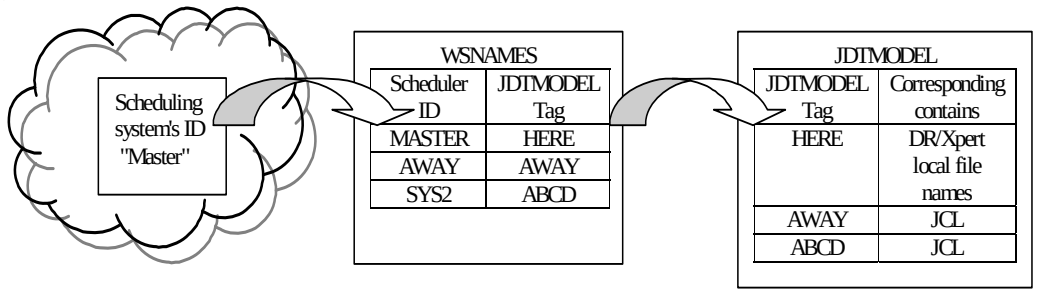

Figure 6-1 Example 1, WSNAMES and JDTMODEL

If a scheduled job runs HERE, the DR/Xpert's started task uses MASTER to find the *JDTMODEL* tag HERE. The corresponding two sections for this *JDTMODEL* tag contain the dataset names for a local BKPQUEUE and BKPDBASE.

Conversely, the MASTER scheduling region may be notified about a job running a system named AWAY. AWAY represents the SMF ID or Scheduler ID for a remote system. DR/Xpert finds that ID in *WSNAMES* and look for a *JDTMODEL* tags containing AWAY. The *JDTMODEL* tag contains JCL that will be submitted and directed to another LPAR or SYSTEM.

Note Consider whether DASD is shared or not before co-locating a local and remote environment in the same building.

In the example shown in Figure 6-1, the scheduling system has a master region and two subordinate scheduling regions on other LPARS where the other scheduling region notify the master regions when production jobs end. Then the following occurs:

- When jobs end on the LPAR where the master scheduling region runs, they are associated with master.
- When jobs end on another LPAR, the master scheduling region might inform DR/Xpert that the job finished on AWAY or SYS2.

Note You may have more than one token1 referring to the same ID specified by token2. In this way, you may combine multiple systems to be backed up by a single DR/Xpert started task. Conversely, you may have unique values for token2 across multiple statements. If your scheduler product centralizes job start and stop activity from multiple systems into a single monitor region, then correspondingly, DR/Xpert can initiate backups from a single started task to multiple systems.

In the preceding example, these statement coding rules would apply:

- Only 1 pair of tokens per statement
- There are two tokens per line
- The first token can be 1 to 8 characters in length
- The second token can be 1 to 4 characters in length
- The tokens may start in any column
- Anything beyond the second blank delimited field will be treated as comments
- An asterisk (*) in column 1 indicates a comment
- Wildcards are not allowed

Example 2: Using WSNAMES and JDTMODEL

Figure 6-2 demonstrates the use of *JDTMODEL* and *WSNAMES* for batch backup processing where:

- "MASTER" is an ID for a scheduling system
- "HERE" is a local environment with two supporting backup systems: BATCH (##HEREB) and ONLINE (##HEREO)
- "AWAY" is a remote environment
- "SYS2" and "ABCD" are subordinate regions

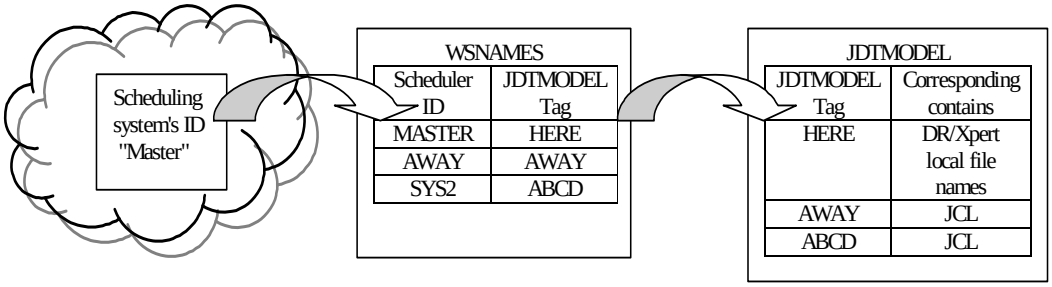

Figure 6-2 Example 2, WSNAME and JDTMODEL

As illustrated in Figure 6-2, the DR/Xpert started task (OTCDTASK) uses the contents of JDTMODEL to add items to DR/Xpert's local queue file or submit JCL to a remote location. For local work, DR/Xpert's started task allocates the backup queue and calls the queue maintenance program dynamically. For remote work, DR/Xpert submits the queue maintenance program for execution in batch.

In the preceding example, the following coding rules would apply:

- An asterisk (*) in column 1 indicates a comment
- A *JDTMODEL* tag is a four-character token referenced in the WSNAMES member.
- A section name contains a *JDTMODEL* tag and begins with two pound-signs (##); the pound-signs begin in column 1. The Section name ends with an B or an O indicating, batch or online, respectively.

Figure 6-3 and Figure 6-4 show example JTDMODEL contents.

```
* For local system (BATCH)
##HEREB
BKPDBASE DSN=YOUR.DRXPERT.B.BKPDBASE
BKPQUEUE DSN=YOUR.DRXPERT.B.BKPQUEUE
*
* For local system (ONLINE)
##HEREO
BKPDBASE DSN=YOUR.DRXPERT.O.BKPDBASE
BKPQUEUE DSN=YOUR.DRXPERT.O.BKPQUEUE
*
* For a remote system (BATCH)
##AWAYB
//BKPTRIGB JOB ('OTBTTASK'),'ICS-OTB',MSGCLASS=Z,
// NOTIFY=&SYSUID,
// MSGLEVEL=(1,1)
/*ROUTE XEQ FARAWAY
//BKPTRGXB EXEC PGM=OTCDB043,REGION=7M
//STEPLIB    DD DISP=SHR,DSN=OT.DRXPERT.LOADLIB
//OTPRMLIB   DD DISP=SHR,DSN=OT.DRXPERT.PARMLIB
//PGMSETS    DD *
BACKUP-IDENTIFIER: B
//INPUT      DD *
*
```

Figure 6-3 Example JTDMODEL Contents (1 of 2)

```
* For a remote system (ONLINE)
##AWAYO
//BKPTRIGO JOB ('OTBTTASK'),'ICS-OTB',MSGCLASS=Z,
// NOTIFY=&SYSUID,
// MSGLEVEL=(1,1)
/*ROUTE XEQ FARAWAY
//BKPTRGXB EXEC PGM=OTCDB043,REGION=7M
//STEPLIB    DD DISP=SHR,DSN=OT.DRXPERT.LOADLIB
//OTPRMLIB   DD DISP=SHR,DSN=OT.DRXPERT.PARMLIB
//PGMSETS    DD *
BACKUP-IDENTIFIER: O
//INPUT      DD *
* For a remote system (BATCH)
##ABCD B
//BKPTRIGB JOB ('OTBTTASK'),'ICS-OTB',MSGCLASS=Z,
// NOTIFY=&SYSUID,
// MSGLEVEL=(1,1)
/*ROUTE XEQ JES2SYSB
//BKPTRGXB EXEC PGM=OTCDB043,REGION=7M
//STEPLIB    DD DISP=SHR,DSN=OT.DRXPERT.LOADLIB
//OTPRMLIB   DD DISP=SHR,DSN=OT.DRXPERT.PARMLIB
//PGMSETS    DD *
BACKUP-IDENTIFIER: B
//INPUT      DD *
*
* For a remote system (ONLINE)
##ABCDO
//BKPTRIGO JOB ('OTBTTASK'),'ICS-OTB',MSGCLASS=Z,
// NOTIFY=&SYSUID,
// MSGLEVEL=(1,1)
/*ROUTE XEQ JES2SYSB
//BKPTRGXB EXEC PGM=OTCDB043,REGION=7M
//STEPLIB    DD DISP=SHR,DSN=OT.DRXPERT.LOADLIB
//OTPRMLIB   DD DISP=SHR,DSN=OT.DRXPERT.PARMLIB
//PGMSETS    DD *
BACKUP-IDENTIFIER: O
//INPUT      DD *
```

Figure 6-4 Example JTDMODEL Contents (2 of 2)

Controlling Job-Triggered Backups

Datasets controlled by job triggered backups are eligible for backup any time after the trigger is tripped. However, the Job Trigger Started Task will wait until the accumulated storage size for the aggregate reaches a threshold value controlled through the *TRIGGER-BACKUP-ON-FILE-SIZE* parameter so that resources can be used optimally.

The *TRIGGER-BACKUP-ON-FILE-SIZE* parameter value can be used to specify the aggregate backup size in units of megabytes (for example, 125MB), gigabytes (for example, 60GB), or by specifying a percentage of the output tape device's capacity (for example, 50%). If a percentage is used for *TRIGGER-BACKUP-ON-FILE-SIZE*, DR/Xpert uses the *BACKUP-TAPE-SIZE-OBJECTIVE* parameter to determine the device. The *TAPENAME* member in DR/Xpert's parameter library contains the tape device's size characteristics. The size is compared to the device's logical size (with compaction) as opposed to its physical size (without compaction) when accumulating file sizes and comparing the summary size to the threshold.

Note Setting *TRIGGER-BACKUP-ON-FILE-SIZE* to a small threshold increases the frequency in which backups run. A larger threshold reduces the number of backups and makes better use of the tape media.

When the threshold set by *TRIGGER-BACKUP-ON-FILE-SIZE* has been met, the Job Trigger Started Task performs one of the actions in Table 6-1 (as defined by the user). Select the option appropriate for your data center and specify the parameter in the *USERSETS* member of the DR/Xpert PARMLIB library.

Table 6-1 TRIGGER-BACKUP-ON-FILE-SIZE Parameters

Parameter	Description / Action
The CRYPTDSS driver will always recall migrated files because OpenTech Systems' encryption product does not interface with ABARS. The file must be recalled to effect software encryption.	This parameter directs the Job Trigger Started Task to create a dataset when the job trigger threshold is satisfied. Users that have a scheduling product that responds to the creation of a dataset as an event and trigger work from that event can use this option. If this parameter is set to NONE, no dataset is created.
AT-THRESHOLD-MESSAGE	This parameter directs the Job Trigger Started Task to issue a WTO when the job trigger threshold is satisfied. Users that have a scheduling product that responds to a WTO message as an event and can trigger work from that event can use this option. If this parameter is set to NONE, no WTO is issued.
AT-THRESHOLD-SUBMIT	This parameter directs DR/Xpert's started task to submit a job when a job trigger threshold is satisfied. If this parameter is set to NONE, no JCL is submitted.

Example 1: Create a Dataset

To cause DR/Xpert to create dataset OT.TEST.TRIGGGER when there is 125MB of data available for backup, set:

TRIGGER-BACKUP-ON-FILE-SIZE: 125MB

AT-THRESHOLD-CREATE: OT.TEST.TRIGGER

Note *The CRYPTDSS driver will always recall migrated files because OpenTech Systems' encryption product does not interface with ABARS. The file must be recalled to effect software encryption.*

Example 2: Issue a WTO

To cause DR/Xpert to issue a WTO that says “DYNAMIC TRIGGER READY” when there is enough data available for backup to fill an output tape 75% full, set:

TRIGGER-BACKUP-ON-FILE-SIZE: 75%

AT-THRESHOLD-MESSAGE: *WTOAGGOK*

Use ISPF to edit the WTOAGGOK member in DR/Xpert's PARMLIB dataset as shown in Figure 6-5. This member contains the text of a write-to-operator (WTO) issued when a threshold is reached.

```
 Menu  Utilities  Compilers  Help
 ------------------------------------------------------------------------------
-
 BROWSE    OT17.PREV.DRXPERT.PARMLIB(WTOAGGOK) - 11.10  Line 00000000 Col 001
080
 Command ===>                                                  Scroll ===> CSR
 ********************************** Top of Data
**********************************
 LEN=40,YOUR0004I - DYNAMIC TRIGGER READY
 ******************************** Bottom of Data
********************************
```

Figure 6-5 Edit WTOAGGOK Member

Example 3:Submit a JCL member

To cause DR/Xpert to submit a dynamic aggregate backup job when there is 40GB of data available for back up, set:

TRIGGER-BACKUP-ON-FILE-SIZE: 40GB

AT-THRESHOLD-SUBMIT: *OTCDBA01*

OTCDBA01 is a member in the DR/Xpert PARMLIB that contains JCL for a dynamic aggregate backup.

Console Commands

The console commands given in Table 6-2 can be used to control the execution of the Job Trigger started task.

Table 6-2 Console Commands, Job-Trigger Started Task

Command	Function
S OTCDTASK	Start the Job Trigger task
F OTCDTASK,STOP or P OTCDTASK	Stop the Job Trigger task
F OTCDTASK,DELETE	Stop the Job Trigger task and release JTT storage in CSA
F OTCDTASK,TRACE	Start activity tracking while Job Trigger task is running
F OTCDTASK,NOTRACE	Stop activity tracking while Job Trigger task is running
F OTCDTASK,PEEK	Generate formatted dump report of the OTCDTASK storage areas
F OTCDTASK,SNAP	Take a snap dump of OTCDTASK storage areas and get current status
F OTCDTASK,HELP or F OTCDTASK,HELP,V	Display available command format and/or command text.
F OTCDTASK,AT_THRESHOLD_MEM: nnnnnnnn	Specify an alternate PARMLIB member to be submitted when the job trigger threshold is met.
F OTCDTASK,RESET	Reset the WTO flag in the Job Trigger task.

Troubleshooting an S047 Abend

If OTCDTASK abends with an S047, verify the following:

- Verify that the linkage editor access code is 1 for the load module named OTCDB044. Browse the load library. Inspect the directory line for OTCDB044. If the column "AC" is not 1, link OTCDB044 again. Refer to the LINKOBJ member in DR/Xpert's INSTALL library. Single out the step that links OTCDB044 and resubmit that job.
- Verify that the CEE.SCEELIB and CEE.SCEELIB2 are APF authorized. If they are not, see if they are in the system LINKLIST; in this case, the libraries can be removed from the JCL.
- Verify that the library OTCDB044 runs from is APF authorized.
- Make sure that all libraries in OTCDTASK's //STEPLIB concatenation are APF authorized.

7 Restoring Critical Datasets

TOPICS COVERED IN THIS CHAPTER

Preparing for Recovery (page 7-2)

Recovery Model (page 7-3)

Recovery PDS Libraries (page 7-4)

Generation of Recovery JCL (page 7-4)

Defining RECOVERY Rules (page 7-5)

Recovery Process (page 7-11)

Critical Dataset Recovery Report (page 7-14)

Preparing for Recovery

DR/Xpert builds restore jobs using the recovery JCL model in the *RESMODEL* member and the control cards in the *RESTORE* member of the PARMLIB library. The MVS infrastructure must be restored before restoring the application data.

DR/Xpert requires the following for application recovery:

- Functional operating system with JES
- Restored ICF catalog
- Tape Management Catalog
- DR/Xpert product datasets (including BKPDBASEs for batch and online datasets and the RECJCL restore JCL described on the next page)

Warning It is important to have a current copy of the DR/Xpert product files and databases because these files will be referenced and the BKPDBASEs will be updated with the status/results of the restore process.

Recovery Job JCL

The Prototype Member

DR/Xpert generates recovery jobs streams using a prototype member in PARMLIB. The member is identified using the second token from the following USERSETS keyword, the default member name is RESMODEL. The

```
JCL-MODEL-STATEMENTS-MEMBER: RESMODEL.RESMODEL
```

Tailor this member with a jobname pattern that conforms to data center requirements and with STEPLIB information containing DR/Xpert, and possibly, tape management load libraries.

The Jobname Pattern

The jobname pattern in RESMODEL should conform to data center standards. The name can also include meta-characters in which DR/Xpert substitutes with scrolling characters, backup system identifiers, and device or driver identifiers.

The following is DR/Xpert's job card as distributed in RESMODEL by OpenTech Systems. Even though the distributed version should be modified for your company's purposes, the distributed version demonstrates all three meta-characters.

```
//RST>!??? JOB (ACCTA,ACCTB),'PROG.NAME',REGION=0M,
// CLASS=A,MSGCLASS=A,MSGLEVEL=(1,1),NOTIFY=&SYSUID
```

The Jobname's Scrolling Meta-Character

The scrolling meta-character provides jobname incrementing so that the backup jobs will be unique. This meta-character is a question mark (?). The question marks are replaced with a counter that is incremented each time a backup job is generated. Three question marks, as shown in the previous example, will be replaced with a three scrolling characters. The scrolling counter beginning value takes the right-most position; the remaining characters are replaced with zeros through the left-most question marks until arithmetic rollover occurs.

DR/Xpert has three keywords that control the scrolling characters in terms of being numeric or character and numeric. These keywords also describe when elementary arithmetic carry takes place. These keywords are described in detail in DR/Xpert's Parameter Guide.

```
JOB-NAME-SCROLLING-LIMIT:  10

JOB-NAME-CHARS:            0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ

SCROLL-JOB-NAMES-FROM:     1
```

Given the default value of 10 for JOB-NAME-SCROLLING-LIMIT, DR/Xpert will use the first ten characters of JOB-NAME-CHARS as scrolling substitution characters; thus, the default is numeric only. Specifying 36 allows the scrolling character to go from 0 to 9 and A to Z before elementary arithmetic carry occurs.

The Jobname's Driver Meta-Character

The driver meta-character is the greater than sign (>). Driver media types are controlled by the DEFAULTS keyword below. Refer to DR/Xpert's Parameter Guide for a description of DRIVER-CODES. This description defines which characters are mapped to which driver.

```
DRIVER-CODES: ABCDEFGHIJ
```

The Jobname's Media Type Meta-Character

The media type meta-character is the percent sign (%). Media substitution characters are "D" for disk and "T" for tape.

The Jobname's Backup System Meta-Character

DR/Xpert uses an exclamation mark (!) as the meta-character to represent the system for which given JCL is generate. There are two substitution characters: "B" for batch and "O" for online. The substitution characters originate from the BACKUP-IDENTIFIER keyword found in PGMSETS at the time the JCL is generated.

Recovery Model

DR/Xpert's recovery model is used to generate JCL on an as-needed basis. The recovery model is designed to focus on JCL built at the disaster recovery center because policies, business objectives, and missing resources may change your recovery strategy when you arrive at the disaster recovery site. The control language for generating recovery JCL should be flexible and allow for exceptions. The process of generating the recovery JCL should NOT include major manual updates to JCL in order to fix what the JCL generated under perfect conditions did not anticipate.

Alternatively, your data center may want disaster recovery JCL generated before the daily recovery tapes go to the offsite storage vault. In that case, this same program can generate recovery JCL on a scheduled basis. This job should be run at the end of DR/Xpert's end-of-day processing.

Recovery PDS Libraries

DR/Xpert generates recovery JCL based on the contents of DR/Xpert's backup database. The default recovery JCL is built reflecting DR/Xpert's most recent completed cycle. You can generate earlier recoveries by calendar date, and DR/Xpert will provide JCL and report the tapes for all backups on or before that date. Additionally, DR/Xpert will warn you when some datasets are not recoverable before a given date. Hypothetically, you could specify a recovery long enough ago that some datasets are too new to be recovered at the target date.

DR/Xpert stores its recovery JCL in partitioned datasets, and these datasets are referred to as DR/Xpert's recovery PDSs.

DR/Xpert generates recovery JCL according to a tiered recovery model. In order to simplify this tiered model, OpenTech Systems recommends that each tier is targeted to a different PDS. This segregates highest priority recoveries from those of normal and low priority, as the user may want to assign priority and distinction to the contents of one recovery PDS over another. There is no real limit on the number of target PDSs you use, but you should limit the number of tiers in order to manage the complexity of the recovery ahead of you. You can recover multiple tiers at the same time, but business requirements will naturally cause you to focus your attention to the recoveries of certain applications ahead of others.

Since there are batch and online tracks within each cycle, recovery JCL is generated for online and batch separately. This means you will have at least two recovery tiers: one for batch, one for online applications.

DR/Xpert retains ten cycles of backup information for each dataset. The oldest cycle "rolls off" when the next one is created. JCL can be generated from earlier backups, which are referenced by date.

Generation of Recovery JCL

DR/Xpert scans its backup database looking for backup instances for every dataset. DR/Xpert will recover datasets using the instances from the current cycle or instances closest to a specified date criteria.

Effective Date Information

The effective date of recovery is specified in USERSETS or PGMSETS. The *RECOVERY-CYCLE* keyword directs the recovery from the CURRENT recovery cycle or a date. The date is specified according to the *GREGORIAN-DATE-FORMAT* keyword's value.

Some examples of effective date specification are:

```
RECOVERY-CYCLE:          CURRENT        (Recommended)

_____________________________________

GREGORIAN-DATE-FORMAT: MM/DD/YYYY

RECOVERY-CYCLE:          01/05/2007

_____________________________________
```

```
GREGORIAN-DATE-FORMAT: YYYY/MM/DD
RECOVERY-CYCLE:        2007/04/08
```

Recovery Selection

DR/Xpert's recovery is controlled by rules described in a member named *RECOVERY* found in DR/Xpert's PARMLIB. The content of these rules describe the dataset selection for recovery. Controlling the recovery and its hierarchy is accomplished with the specification of IF-THEN-DEFAULT rule set(s). The DEFAULT statement ensures that all critical datasets are selected and recovered. The IF-THEN construct provides grouping and tiered recovery.

The object of the THEN and DEFAULT clauses are partitioned dataset names. Each partitioned dataset is potentially a different tier in the recovery. Some of the IF predicates can direct recovery to the same partitioned dataset name and some to different ones; thus the comparison rules inside the RECOVERY member controls grouping and the tiers for recovery.

NONE is a special object for the THEN and DEFAULT clauses. It means no recovery is generated for the given criteria. Code NONE for applications or groups for which you want no recovery performed; alternatively, you may specify a partitioned dataset name whose content you will ignore.

Defining RECOVERY Rules

The *RECOVERY* member of DR/Xpert's PARMLIB library is used to specify rules that separate or earmark datasets into different aggregates depending on the application string. This table uses a simple IF - AND - OR logic making them easy to define. Each line in the *RECOVERY* table may only specify one statement.

Each *RECOVERY* statement consists of:

- The **rule logic modifier** (IF, AND, OR, NEW) which may be sub-modified with the BY modifier, and **command verbs** (THEN, DEFAULT)
- The **compare field** to be compared against
- The **comparison operator** (EQ, NE, GT, etc.)
- The **comparison data or table name**. Comparison data can be specific character strings, character pattern strings, or a PARMLIB member table.
- The **application strings** are used with THEN and DEFAULT command verbs. This value is used to specify the type of application to be used when a true condition is set for the IF, AND, OR statement set.

A more detailed description of the Recovery Rules table options are discussed on the next several pages of this chapter. Figure 7-1 shows an example of a Recovery Rules Statement.

```
*      COMPARE      COMPARE
*RULE   FIELD   OP  DATA
*----+ +------+ -- +-----------------------------------------+
IF     APPLNAME EQ COMPANY1+CRITICAL/
THEN HLQ.RECOVERY.TIER1A.JCL
*
IF     APPLNAME EQ COMPANY2+CRITICAL/
THEN HLQ.RECOVERY.TIER1B.JCL
*
IF     APPLNAME EQ COMPANY*+IMPORTANT/
THEN HLQ.RECOVERY.TIER2.JCL
*
DEFAULT HLQ.RECOVERY.TIER3.JCL
*
```

Figure 7-1 Recovery Rules Statement

Rule Logic Modifier

The rule logic modifier is used to specify how the recovery statement is processed relative to the previous statement in the table.

IF, NEW, AND, OR Modifiers

If the rule logic modifier is **IF** or **NEW**, or not specified (blank), then the current statement becomes the first statement of a new recovery rule entry.

If the rule logic modifier is **AND**, this indicates that the previous statement and the current statement are part of the same rule and both statements must be “true” for a candidate to be assigned to this recovery rule entry.

If the rule logic modifier is **OR**, this indicates that the previous statement and the current statement are part of the same rule and either statement must be “true” for a candidate to be assigned to this recovery rule entry.

BY Sub-Modifier

The **BY** rule logic sub-modifier can be used with any of the rule logic modifiers or by itself (which is the same as when it is specified with **IF** or **NEW**). The **BY** sub-modifier is helpful in reducing the number of statements that must be coded in the rules table to create separate recovery groups because the user can provide a list of comparison criteria in the form of a table.

The **BY** sub-modifier requires that the comparison data is a table name (a member within the PARMLIB library) and it causes a different recovery group to be created for each entry in the table.

If the rule logic sub-modifier **BY** is specified, any statements that follow the **BY** statement must begin a new recovery rule group. Specifying a rule logic modifier of **OR** or **AND** on the statement following a **BY** statement will result in a warning messages and the **OR** or **AND** statement will be ignored.

THEN, DEFAULT Verbs

The THEN verb is used to specify the action that should be taken if the recovery rule is "true". If no THEN verb is specified or none of the recovery rules are true, then the value of the DEFAULT verb specifies the action that should be taken. In the case that there is no DEFAULT statement specified, DR/Xpert uses an assumed default of "NONE."

Several THEN and the DEFAULT verbs can have the same recovery string value. In fact, this is a good strategy.

Compare Field

Table 7-1contains comparison fields available for performing dataset recovery selection. The intent of this member is to recover by broadly controlled criteria, such as application names, and use comparison fields such as DSN for exceptions to the recovery.

Table 7-1 Comparison Fields

Compare field	Description
APPLNAME (or APPL)	This keyword is useful if you want to recover datasets by application name. This application name can contain wildcard characters to group application names together; or, it can point to a member containing application names, this providing another way of grouping applications.
COLOCATE	A collocation string as defined in DR/Xpert's *COLOCTBL* in PARMLIB. The first node of the collocation string is for customer use. You can use the first node as a grouping identifier, and it is useful for recovering many applications together.
DSNAME (or DSN)	The DSNAME keyword is for recovering a specific dataset.
BACKUP	The backup ID is a seven digit aggregate backup ID. The first three digits represent the cycle number and the last four represent the aggregate within the cycle.

Comparison Operators

Table 7-2 provides a list of the comparison operands supported for Recovery rules processing.

Table 7-2 Comparison Operants

Comparison Operator	Description
EQ	Equal
NE	Not equal
GT	Greater than
LT	Less than
GE	Greater than or equal
LE	Less than or equal

Comparison Data

The comparison data is the dataset or dataset name pattern defined by the user, which will be compared to dataset names, applications, or other fields described earlier in this chapter.

This field supports a fully qualified string, a string containing wildcard characters, or the member name of a DR/Xpert PARMLIB library member that contains a list of strings or strings with wildcards. If using a member name, it must be prefaced with a ">" character to identify the value as a member name. (Refer to "Using a Table as Comparison Data").

The content of the string depends on the comparison field to which the string is compared. For example, if the comparison field is DSNAME then the comparison data should be a consistent object in relation to its source. Dataset names should be coded as compare objects with the DSNAME field name. Application names should be coded as compare objects to the APPLNAME field name, and similarly with each field name and its comparison object.

Using a Table as Comparison Data

As stated in *Comparison Data, RECOVERY* processing will accept the name of a DR/Xpert PARMLIB member as the comparison data. The PARMLIB member should contain a table of application names or application name patterns. The PARMLIB member name should be prefixed by a ">" symbol to distinguish it from standard comparison data.

For example:

```
IF APPLNAME EQ >RCVY#1

THEN HLQ.RECOVERY.TIER1
```

In the preceding example, RCVY#1 would need to be a member in the DR/Xpert PARMLIB library and could contain a list of the applications needing the highest priority recoveries.

If used as the comparison data for an IF, AND or OR statement, then each entry in the PARMLIB member specified is compared to the value of the compare field and any string that matches any of the entries will be selected for that application rule group. The entries in a member used for comparison data for IF, AND or OR predicate should be in the form of a list with one entry per line. The example shown in Figure 7-2 uses application names, but the same concept is true for any other comparison field and data:

```
    Menu  Utilities  Compilers  Help
   ------------------------------------------------------------------------
---
   BROWSE    OT17.PREV.DRXPT.PARMLIB(RCVY#1) - 1.0       Line 00000001 Col 001
080
   Command ===>                                                Scroll ===> CSR
  ****** ***************************** Top of Data
******************************
  000001 SHIPPING
  000002 ORDER-SYSTEM
  000003 SALES
  ****** **************************** Bottom of Data
****************************
```

Figure 7-2 Application Name as Comparison Data

Note Each entry in the PARMLIB member table will be part of the same recovery rule (all will receive application, or all will be backed up without application).

If used as the comparison data for a BY statement, then each entry in the PARMLIB member specified is compared to the value of the compare field, and each entry in the member generates a separate application group. The entries in a member used for comparison data for BY sub-statements should be in the form of (comparison data1) THEN (value1).

Note The last entry, beginning with "/", is a catch-all entry that would apply if the comparison data did not match criteria specified by any of the previous entries. See Figure 7-3.

```
   Menu  Utilities  Compilers  Help
   ------------------------------------------------------------------------------
--
   BROWSE    OT17.PREV.DRXPT.PARMLIB(RCVYAPPL) - 1.3    Line 00000001 Col 001 080
   Command ===>                                                Scroll ===> CSR
  ****** ***************************** Top of Data
******************************
  000001 SHIPPING       THEN   HLQ.RECOVERY.TIER1
  000002 ORDER-SYSTEM   THEN   HLQ.RECOVERY.TIER1
  000004 SALES          THEN   HLQ.RECOVERY.TIER1
  000005 ACCOUNTING THEN HLQ.RECOVERY.TIER2
  000006 PAYROLL    THEN HLQ.RECOVERY.TIER2
  000007 INVENTORY  THEN HLQ.RECOVERY.TIER2
  000008 / THEN HLQ.RECOVERY.TIER3
  ****** **************************** Bottom of Data
****************************
```

Figure 7-3 Entries in PARMLIB Table

Note Each entry in the PARMLIB member table will be treated as a new recovery rule.

Daily Recovery JCL Creation

The previous section emphasized ad hoc JCL generation to illustrate the flexibility and configurability of recovery JCL creation, even if time is short.

Alternatively, it is recommended to have planned recovery JCL generated on a daily basis. This practice gives confidence that the JCL you create daily is similar to the JCL you can generate under adverse circumstances. For storage management purposes, DR/Xpert can place Recovery JCL in partitioned datasets that are also members of generation data groups.

For example, suppose two generation data groups exist for HLQ.RECOVERY.TIER1 and HLQ.RECOVERY.TIER2. In this case, the RECOVERY member can specify as the object of THEN and DEFAULT clauses the dataset names that are both PDS and generation data

group. DR/Xpert knows that the target partitioned dataset is a GDG by (+1) or (0) at the end of the target dataset name.

An example of RECOVERY member would be:

```
IF APPLNAME EQ >TIER1APP
THEN      HLQ.RECOVERY.TIER1(+1)
DEFAULT   HLQ.RECOVERY.TIER2(+1)
```

The JCL generated for the first day will be HLQ.RECOVERY.TIER1.G0001V00. There may be a member in this dataset named HLQ.RECOVERY.TIER1.G0001V00(J0010001). ISPF will browse and edit members in this dataset without any problem. The JCL generated in this partitioned dataset will contain references qualified by the discrete GnnnnV00 qualifier.

The benefit of this feature is that the file will have the same characteristics as any generation dataset. When the JCL from a new backup cycle is created, the oldest recovery partitioned dataset is no longer needed (based on the LIMIT parameter). The file is deleted and uncatalogued.

If you decide to have DR/Xpert generate recovery JCL daily, plan to execute *RECOVERY* member from DR/Xpert's JCLLIB dataset as the last JOB stream of DR/Xpert's end-of-day processing.

Recovery JCL Dataset Members

Each Recovery JCL library contains the members given in Table 7-3:

Table 7-3 Recovery JCL Dataset Members

RECJCL Member	Description
DELFILES	This JCL is optional and runs before recovery. It contains JCL and the control cards for deleting all the datasets that will be restored from the backups. Run this JCL *only* if a clean catalog is desired before recovery. Refer to *Step 2 - Delete Existing Datasets Prior to Restore* before submitting this member to see if submitting this member is appropriate for the data center's recovery situation.
D*cccaaaa*	All members beginning with “D” followed by seven numeric characters are input to the DELFILES member. The first three numerics represent a cycle number, the last four numerics represent an aggregate within that cycle. The DELFILES will have references to these members, concatenated as //SYSIN to an IDCAMS step.
RSTVaaaP	All members beginning with "RSTV", followed by three numeric characters are the restore JCL for one aggregate. The first three numerics represent the cycle number, and the last four represent an aggregate within that cycle.
RPTFILES	This member contains control statements to define output GDGs for the recovery step. DR/Xpert's recovery JCL assigns output to a GDG entry as a means to keep track of multiple attempts to recover an aggregate. Submit this member first. Otherwise, JCL errors will occur in the recovery job streams.

Table 7-3 Recovery JCL Dataset Members

RECJCL Member	Description
R*cccaaaa*	All members beginning with “R” followed by seven numeric characters contain the dataset selection list for the recovery driver. The content of this member varies depending on which recovery driver is invoked, either DFSMSdss or TAPECOPY. The first three numerics represent a cycle number, the last four numerics represent an aggregate within that cycle. Inside a recovery JCL member, i.e., one in the format of Jcccaaaa, there will be references to one of these members in the step executing ADRDSSU.
V*cccaaaa*	All members beginning with “V” followed by seven numeric characters contain the volume list for the recovery. This member is used by the tape-to-tape copy function within DR/Xpert.

Recovery Process

The subsections that follow outline the steps in the recovery process.

Step 1 - Building Recovery Log GDG Base

The first step in recovery is to build the GDG bases that contain print-image output from different recovery drivers. DR/Xpert uses these GDGs to provide an activity history of recovery. Each recovery job has its own GDG base and will create a generation for each submission of a recovery job. The GDG names provide an easy way to find the results of restoring specific aggregates and the different generations keep track of results if multiple iterations of running DFSMSdss to restore the same aggregate is required. Figure 7-4 contains a DFSMSdss example; however, the content could vary if another recovery driver is used.

```
0ADR780I (001)-TDDS (01), THE INPUT DUMP DATA SET BEING PROCESSED IS IN LOGICAL DATA SET FORMAT AND WAS CREATED BY DFSMSDSS VERSION
                          1 RELEASE 3 MODIFICATION LEVEL 0
0ADR442I (001)-FRLBO(01), DATA SET OT.TST.DRXPERT.B.BKPCOPY.G0033V00 PREALLOCATED, ON VOLUME(S): WORK45
0ADR489I (001)-TDLOG(01), DATA SET OT.TST.DRXPERT.B.BKPCOPY.G0033V00 WAS SELECTED
0ADR442I (001)-FRLBO(01), DATA SET OT.TST.DRXPERT.DFILTD PREALLOCATED, ON VOLUME(S): WORK4C
0ADR489I (001)-TDLOG(01), DATA SET OT.TST.DRXPERT.DFILTD WAS SELECTED
0ADR442I (001)-FRLBO(01), DATA SET OT.TST.DRXPERT.DFILTDI PREALLOCATED, ON VOLUME(S): WORK48
0ADR489I (001)-TDLOG(01), DATA SET OT.TST.DRXPERT.DFILTDI WAS SELECTED
0ADR489I (001)-TDLOG(01), DATA SET OT.TST.DRXPERT.INFOUPD.G0105V00 WAS SELECTED
0ADR442I (001)-FRLBO(01), DATA SET OT.TST.DRXPERT.JCLDELTA PREALLOCATED, ON VOLUME(S): WORK4A
0ADR489I (001)-TDLOG(01), DATA SET OT.TST.DRXPERT.JCLDELTA WAS SELECTED
0ADR442I (001)-FRLBO(01), DATA SET OT.TST.DRXPERT.JCLMAST.G0020V00 PREALLOCATED, ON VOLUME(S): WORK4A
0ADR489I (001)-TDLOG(01), DATA SET OT.TST.DRXPERT.JCLMAST.G0020V00 WAS SELECTED
```

Figure 7-4 SYSPRN Example

DR/Xpert uses the following dataset naming standard when generating the DFSMSdss historical log:

`@dsprefix.bkpid.SYSPRN.abbbcccc`

Table 7-4 describes the dataset name parts.

Table 7-4 Dataset Name Parts

Dataset name part	Description
@dsprefix	dataset name prefix as identified in the *DYNAMIC-ALLOCATION-DATASET-NAME-PREFIX* parameter of the USERSETS member in the PARMLIB library.
bkpid	either "B" for batch datasets or "O" for online datasets.
SYSPRN	Constant
a	identifies the backup identifier of "B" for batch datasets or "O" for online datasets.
bbb	Cycle number
cccc	Aggregate number

Review the JCL comments in each recovery member RPTFILES for any additional instructions, and then submit the RPTFILES member to build the SYSPRN GDG bases.

Note The RPTFILES job is an optional step. If you do not run this job, the recovery utility's report file will be viewable from SDSF.

Step 2 - Delete Existing Datasets Prior to Restore

The DELFILES job in the RECJCL library includes an IDCAMS step and control cards for each of the datasets that will be restored by DR/Xpert. This job will delete the dataset names from the catalog prior to restore job execution and give the restore jobs a “clean slate” to recover the datasets.

Consider the following recovery situations before submitting the DELFILES JCL.

- Deleting files before recovery is recommended when it is known that the catalog contained old entries that would not exist after recovery. An example of this would be a catalog that contains a full set of GDG entries, but after recovery, only the newest generations will exist.
- Deleting files before recovery is not recommended when the catalog and application volumes are restored from physical volume backups, and incremental recovery is performed using DR/Xpert’s restore process. DR/Xpert will restore the newest GDG entries, but older GDG entries would be restored from the physical backups. In this case, the older generations exist, and it would be undesirable to scratch them before recovery.

Review the JCL comments in DELFILES for any additional instructions and then submit the DELFILES member JCL to delete existing datasets prior to recovery.

Step 3 - Run Recovery Jobs

As stated previously in this chapter, DR/Xpert keeps ten cycles of recovery information in the backup database. The date of recovery depends on the RECOVERY-CYCLE keyword found in USERSETS or PGMSETS. To restore the most recent backups, specify CURRENT for this keyword. If earlier recoveries are desired, specify a date for this keyword. DR/Xpert selects, on a dataset by dataset basis, the backup instance that best fits the date at which to recover your data center.

Describe the recovery cycle and the recovery rules for your recovery. Submit the RECOVERY member in DR/Xpert's JCLLIB dataset to create one or more recovery partitioned datasets. The basic tools for controlling this step are described in *Generation of Recovery JCL*. Specifically, review the description of the RECOVERY-CYCLE keyword and the RECOVERY PARMLIB member.

The output from the RECOVERY job stream are members stored in one or more partitioned datasets beginning with "J" and ending with seven numeric characters. Each member in this form is the recovery JCL for one aggregate. Members beginning with "R" and having the same seven trailing numeric characters are the corresponding selection dataset list. Members that did not originate from the most recent backup cycle will contain an intentionally incomplete list; these members contain datasets whose backup is still valid from the perspective of the most recent backup cycle. If you would create recovery PDSs each day, a given member would contain fewer dataset names as time progresses from older to newer Recovery PDSs. This is because the backup for some or many of these datasets are invalidated by newer backups.

As datasets are successfully restored, DR/Xpert updates the backup database indicating that change in each dataset's status.

Note Technical Support recommends running the online restore job streams first so that online systems can be brought up while the batch recovery process is running. Also, for the fastest recovery, users should submit as many restore jobs as they have available tape drives to run.

STEP 4 – Prepare Backup Database for More Backups

The Recovery Complete Job, RCVYCOMP, prepares DR/Xpert's backup database at the new data center. Run this job if the new data center is to become your production data center and DR/Xpert is supposed to continue daily DR backups after the recovery is complete.

This job is optional and has limited value after a Disaster Recovery Test. Its purpose is to prepare the backup database after a real disaster recovery and at the newly recovered data center. Inside DR/Xpert's backup database, user files will be registered as "recovered"; these files are changed to "backed up" status. The Recovery JCL Generator does not generate recovery JCL for "recovered" files.

Critical Dataset Recovery Report

The Critical Dataset Recovery Report, shown in Figure 7-5, is generated by the DR/Xpert recovery jobs. The report contains four sections:

- Recovery Processing Log – Shows the updates made to the BKPDBASE records as the datasets are recovered.
- Recovery Recap – Summary of the action taken against the BKPDBASE.
- Aggregate Recap Report – Summary of the number of datasets recovered and number of datasets not recovered by the restore job.
- Aggregate Recovery Log – List of datasets processed and the status of the restore.

```
REL x.x.x  PTF x                                    D R / X P E R T                                    PROGRAM
OTCDB085

DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     CRITICAL DATASET RECOVERY REPORT  FOR OPENTECH_SYSTEMS,_INC.
PAGE     01
-------------------------------------------------------------------------------------------------------------
--------------
RECOVERY PROCESSING LOG
-------------------------------------------------------------------------------------------------------------
--------------
                   STATUS  DSNAME
       +----------------+ +----------------------------------------+
           RECORD UPDATED  B.DOTSCLM.ACCOUNT.FILE
           RECORD UPDATED  B.DOT15.TC262.PTF1.VOLCHAIN
           RECORD UPDATED  B.DOT.RELTEST.CA1R11.ZOS14.VOLCHAIN
           RECORD UPDATED                                   SUCCESS INDICATOR CHANGED FROM ' 'TO "R"
           RECORD UPDATED  B.DOT10.OTDBS011.LST
           RECORD UPDATED  B.DISF.HASPINDX
           RECORD UPDATED  B.DOT.RELTEST.CA1R11.ZOS14.CANDSEL.FORECAST
           RECORD UPDATED  B.DOT.TST.DRXPERT.DSXTRACT
           RECORD UPDATED                                   SUCCESS INDICATOR CHANGED FROM ' 'TO "R"
           RECORD UPDATED  B.DOT31.TEST.DRXPERT.SNEXTR
           RECORD UPDATED  B.DOT31.TEST.DRXPERT.TMPFIL
             RECORD UPDATED                                         SUCCESS INDICATOR CHANGED FROM ' 'TO "R"
             . . . . . . . .
             . . . . . . . .
-------------------------------------------------------------------------------------------------------------
--------------
RECOVERY RECAP
-------------------------------------------------------------------------------------------------------------
--------------
                    COUNT  DESCRIPTION
       +----------------+ +----------------------------------------+
                      160  INPUT RECORDS
                        1  RECORDS NOT FOUND
                        0  RECORDS NOT UPDATED
                      159  RECORDS UPDATED

-------------------------------------------------------------------------------------------------------------
--------------
AGGREGATE RECAP REPORT
-------------------------------------------------------------------------------------------------------------
--------------
   AGGREGATE     RESTORED   NOT RESTORED   PATTERNS       TOTAL
 +-----------+ +-----------+ +-----------+ +-----------+ +-----------+
     0000          159          035          000          194

-------------------------------------------------------------------------------------------------------------
--------------
AGGREGATE RECOVERY LOG
-------------------------------------------------------------------------------------------------------------
--------------
            DMS.ARCHPRIM.DMSN.S2006069.T143311          NOT RESTORED
             ISF.HASPINDX                              RESTORED
            OT.ADVR.R122.PTF1.XMITFILE                 NOT RESTORED
            OT.APPLA.SZ14.DATA0004.MFSV.FILE01          NOT RESTORED
            OT.APPLA.SZ14.DATA0004.MFSV.FILE02          NOT RESTORED
            OT.APPLA.SZ14.DATA0004.MFSV.FILE03          NOT RESTORED
            OT.APPLA.SZ14.DATA0009.SFSV.UNCATFIL        NOT RESTORED
            OT.TST.DRXPERT.B.BKPCOPY                   RESTORED
            OT.TST.DRXPERT.B.DSIREPRT                  RESTORED
            OT.TST.DRXPERT.B.DSISPSMF                  RESTORED
              OT.TST.DRXPERT.B.DSNALERT                     RESTORED
```

Figure 7-5 Critical Dataset Recovery Report

8 Backup Auditing and Scratch Process

TOPICS COVERED IN THIS CHAPTER

Overview (page 8-2)
Runtime Considerations (page 8-3)
Backup Audit Reports (page 8-3)
User Customized Messages on Inventory Reports (page 8-5)

Overview

DR/Xpert's Backup Audit Reporting shows the current status of all DR/Xpert's backup files and auxiliary files associated with each backup. When DR/Xpert's Backup Audit program is running, it can clean up backup datasets that are no longer in use.

DR/Xpert backup files are eligible for deletion under the following conditions:

- There are no registered datasets referencing a given backup in DR/Xpert's backup database. That is, an aggregate is comprised of dead file backups. In this case, aggregate age is not a consideration.
- There are no registered active datasets referencing a backup in DR/Xpert's backup database and a user-specified time period (age) has passed. That is, an aggregate is comprised of inactive and dead dataset backups. In this case, a time period has elapsed, and the data remaining in the aggregate is too old for a useful recovery. Refer to Table 8-1

Table 8-1 Data Eligible for Backup

Eligible	Active	Inactive	Age Passed
Yes	No	No	N/A
Yes	No	Yes	Yes
No	Yes	N/A	N/A
No	No	Ywa	No

In this document, the following terminology is used to describe backup files:

- **Active File** – An active backup file is the most recent backup instance of a dataset. For a dataset older than one day (assuming read-only), the active backup matches the current production dataset. DR/Xpert can recycle an active file.
- **Inactive File** – An inactive backup file is a backup instance that is recoverable, but DR/Xpert cannot recycle the file. The dataset is non-recyclable because the original dataset has changed since the most recent backup; or, the original file no longer exists. Because the dataset cannot be recycled (cannot move to a new aggregate), the aggregate is not deleted until a time period has elapsed.
- **Dead File** – A dead backup file is a backup instance that has rolled out of DR/Xpert's backup database. For example, suppose that DR/Xpert makes daily backups of a given dataset, a backup instance of that dataset older than ten days drops out DR/Xpert's database; it is effectively unavailable for DR/Xpert.

DR/Xpert uses the following methods to make a backup obsolete:

- The backup files, both primary and duplex, are uncataloged and their expiration dates for backup files are changed in the data center's Tape Management System. This action makes the backup tapes eligible for scratch in the Tape Management System's next scratch cycle.
- Auxiliary report files, which reside on disk, are deleted.
- If VDR was used to copy DR/Xpert backups to VDR controlled, stacked tapes, these files will become obsolete when the tape management system scratches the original backup. For more information, refer to VDR's dual copy expiration utility.

Runtime Considerations

The runtime JCL for DR/Xpert's Backup Audit Program is the *AUDIT* member in DR/Xpert's JCLLIB dataset. This program is able to report and cleanup, or simply report on the status of backups. If you want to limit the audit program report to reporting only, add PARM=SIM to the program's execution statement as follows:

```
//STEP1  EXEC PGM=OTCDB004,PARM=SIM
```

When DR/Xpert changes the expiration date for a backup tape, the following USERSETS/PGMSETS keyword is used to set the new expiration date.

```
MOVED-DATASET-RETENTION-PERIOD:  +ddd
```

This parameter will set the backup tape volume's expiration to a specified number of days into the future relative to today's date.

Warning For TLMS users, additional processing is required to scratch the obsolete tape volumes. Refer Chapter 5, "Additional TLMS Requirements", in the DR/Xpert Installation Guide for more information.

Backup Audit Reports

The Backup Audit Program produces two inventory reports found under ACTIVE and OBSOLETE DD names. As suggested by their names, ACTIVE contains the Active Backup Inventory, while OBSOLETE contains a list of backup files and auxiliary files that will be deleted. The MESSAGES column can be customized with text by the user (refer to *User Customized Messages on Inventory Reports*).

Active Backup Inventory Report

Figure 8-1 shows an example of an Active Backup Inventory Report.

```
REL 2.1.1  PTF 0                                        D R / X P E R T                                          PROGRAM OTCDB004

DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     ACTIVE BACKUP INVENTORY FOR OPENTECH_SYSTEMS                                    PAGE      2

BACKUP     FILETYPE DSNAME                                      VOLSER OUTCODE  SLOT     EXPIRES    MESSAGES
+--------+ +------+ +----------------------------------------+ +----+ +------+ +------+ +--------+ +---------------------------
-+
04/21/2007 PRIMARY  OT.DRXPERT.B.BKUP.B0010001.Y0711195         001103          00000000 PERMANENT  GOOD BACKUP
           REPORT   OT.DRXPERT.B.DSSPRN.B0010001.Y0711195       WORK45                              DATA SETS................4
           REPORT   OT.DRXPERT.B.HSMPRN.B0010001.Y0711195       WORK4F                              FILE SIZES...............4 KB
           REPORT   OT.DRXPERT.B.CREPORT.B0010001.Y0711195      WORK46

04/21/2007 PRIMARY  OT.DRXPERT.B.BKUP.B0010002.Y0711195         001104          00000000 PERMANENT  GOOD BACKUP
           REPORT   OT.DRXPERT.B.DSSPRN.B0010002.Y0711195       WORK4A                              DATA SETS................2
           REPORT   OT.DRXPERT.B.HSMPRN.B0010002.Y0711195       WORK4B                              FILE SIZES.............100 KB
           REPORT   OT.DRXPERT.B.CREPORT.B0010002.Y0711195      WORK4B

04/21/2007 PRIMARY  OT.DRXPERT.B.BKUP.B0010003.Y0711195         001105          00000000 PERMANENT  GOOD BACKUP
           REPORT   OT.DRXPERT.B.DSSPRN.B0010003.Y0711195       WORK4B                              DATA SETS............3,756
           REPORT   OT.DRXPERT.B.HSMPRN.B0010003.Y0711195       WORK4D                              FILE SIZES...........3,756 KB
           REPORT   OT.DRXPERT.B.CREPORT.B0010003.Y0711195      WORK45

04/21/2007 PRIMARY  OT.DRXPERT.B.BKUP.B0010004.Y0711195         001106          00000000 PERMANENT  GOOD BACKUP
           REPORT   OT.DRXPERT.B.DSSPRN.B0010004.Y0711195       WORK43                              DATA SETS...............276
           REPORT   OT.DRXPERT.B.HSMPRN.B0010004.Y0711195       WORK49                              FILE SIZES.............276 KB
           REPORT   OT.DRXPERT.B.CREPORT.B0010004.Y0711195      WORK46


                                                   END OF REPORT
```

Figure 8-1 Activ Backup Inventory Report

Obsolete Backup Inventory Report

Figure 8-2 shows an example of an Obsolete Backup Inventory Report.

```
REL 2.1.1  PTF 0                                        D R / X P E R T                                        PROGRAM OTCDB004

DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     OBSOLETE BACKUP INVENTORY FOR OPENTECH_SYSTEMS                                PAGE      2

 BACKUP     FILETYPE DSNAME                                        VOLSER OUTCODE  SLOT     EXPIRES    MESSAGES
 +--------+ +------+ +----------------------------------------+ +----+ +------+ +------+ +--------+ +---------------------------
-+
 05/10/2007 PRIMARY  OT18.DRX.NEW.B.BKUP.B0010001.Y0713041        000065 DC       00000000 06/14/2007 EXPIRING
            REPORT   OT18.DRX.NEW.B.DSSPRN.B0010001.Y0713041      WORK61
            REPORT   OT18.DRX.NEW.B.HSMPRN.B0010001.Y0713041      WORK61
            REPORT   OT18.DRX.NEW.B.CREPORT.B0010001.Y0713041     WORK61

 05/10/2007 PRIMARY  OT18.DRX.NEW.B.BKUP.B0010002.Y0713041        000066 DC       00000000 06/14/2007 EXPIRING
            REPORT   OT18.DRX.NEW.B.DSSPRN.B0010002.Y0713041      WORK61
            REPORT   OT18.DRX.NEW.B.HSMPRN.B0010002.Y0713041      WORK61
            REPORT   OT18.DRX.NEW.B.CREPORT.B0010002.Y0713041     WORK61

 05/15/2007 PRIMARY  OT18.DRX.NEW.B.BKUP.B0050001.X0713591        001068 DC       00000000 06/14/2007 EXPIRING
            REPORT   OT18.DRX.NEW.B.DSSPRN.B0050001.X0713591      WORK62
            REPORT   OT18.DRX.NEW.B.HSMPRN.B0050001.X0713591      WORK61
            REPORT   OT18.DRX.NEW.B.CREPORT.B0050001.X0713591     WORK61

 05/15/2007 REPORT   OT18.DRX.NEW.B.CREPORT.B0059999.X0713592     WORK61
 02/05/3705 GDG-O    OT18.VTAPE.GDG.G0002V00                                                          PURGED
 02/05/3705 GDG-O    OT18.VTAPE.GDG.G0001V00                                                          PURGED
 02/05/3705 GDG-O    OT18.VTAPX.GDG.G0002V00                                                          PURGED
 02/05/3705 GDG-O    OT18.VTAPX.GDG.G0001V00                                                          PURGED

                                                        END OF REPORT
```

Figure 8-2 Obsolete Backup Inventory Report

Include/Exclude Filter Tables Report

The Include/Exclude Filter Tables Report is provided to help both Technical Support and the user identify what inclusion and exclusion patterns/tables were in use when the DR/Xpert job ran. The report lists which inclusions and exclusions were in use by each phase of the job that uses that type of selection criteria. Figure 8-3 shows an example.

```
REL x.x.x  PTF x                                        D R / X P E R T                                        PROGRAM OTCDB004

DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     INCLUDE/EXCLUDE FILTER TABLES REPORT FOR OPENTECH_SYSTEMS                     PAGE      1


PROCESSING PHASE     TBL NAME LEN FILTER DATA
+----------------+ +------+ +-+ +-----------------------------------------------------------------------------------------+

DR/XPERT VAULT AUDIT CLEANUP    4 BKUP     PRIMARY
                                4 DPLX     DUPLEX
                                6 DSSPRN   REPORT
                                6 HSMPRN   REPORT
                                7 CREPORT  REPORT

                     FILTERS   37 OT18.DRX.NEW.B.BKUP.B%%%%%%%.%%%%%%%%
                               37 OT18.DRX.NEW.B.DPLX.B%%%%%%%.%%%%%%%%
                               39 OT18.DRX.NEW.B.DSSPRN.B%%%%%%%.%%%%%%%%
                               39 OT18.DRX.NEW.B.HSMPRN.B%%%%%%%.%%%%%%%%
                               40 OT18.DRX.NEW.B.CREPORT.B%%%%%%%.%%%%%%%%
```

Figure 8-3 Include/Exclude Filter Tables Report

Rules Processor Report

The Rules Processor Report serves as a cross reference between the user-defined rules table and the DR/Xpert generated Rule ID's. A section will be printed for each rules processing function that is in effect when the DR/Xpert job runs. Figure 8-4 shows the Rules Processor Report for the *OUTCODE* table.

The Rules Processor Report does not list the statement specified by a BY rule logic sub-modifier. It will list the rules that were generated based on the BY statement and the contents of the table it specified.

```
REL 2.1.1  PTF 0                                        D R / X P E R T                                                PROGRAM OTCDB004
 DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     RULES PROCESSOR REPORT FOR TABLE: OUTCODE FOR OPENTECH_SYSTEMS                  PAGE      1

 +  RULE   +          COMPARE
 +---ID----+          +FIELD+     +-----------------COMPARE DATA-----------------+

           1  IF      TYPE     EQ REPORT

              THEN    NONE

           2  IF      EXPDT    GE 9999000

              THEN    GOOD_BACKUP

              DEFAULT EXPIRING
```

Figure 8-4 Rules Processor Report (OUTCODE)

User Customized Messages on Inventory Reports

The reports produced by this program use a rule language to configure some of the information in the report's MESSAGES column. Users can define rules in the *OUTCODE* member of the DR/Xpert PARMLIB library that will allow them to include information on the reports (specifically the PRIMARY and DUPLEX detail lines) based on the values of certain fields in the tape management database.

For example, in Figure 8-5, the text in the MESSAGES column ("GOOD BACKUP") was included as the result of an *OUTCODE* member rule.

```
BACKUP     FILETYPE DSNAME                                      VOLSER OUTCODE  SLOT     EXPIRES    MESSAGES
+--------+ +------+ +----------------------------------------+ +----+ +------+ +------+ +--------+ +----------------------------+
04/21/2007 PRIMARY  OT.DRXPERT.B.BKUP.B0010001.Y0711195         001103          00000000 PERMANENT  GOOD BACKUP
```

Figure 8-5 OUTCODE Member Rule

The Backup Audit Program uses some Tape Management System fields along with a rule language in the *OUTCODE* member in DR/Xpert's PARMLIB dataset to include text data in DR/Xpert Backup Inventory Report. Many data centers use Tape Management System's OUTCODE field as a vault location.

The comparison fields available for adding text data to the Backup Audit Program's Inventory Report are OUTCODE, SLOT, EXPDT, TYPE, and STATUS.

When DR/Xpert's Backup Audit Program formats the print line for PRIMARY and DUPLEX backup files, it queries the *OUTCODE* member to format the report's MESSAGES column. When an IF predicate in the *OUTCODE* member is evaluated as true condition, the string in the corresponding THEN clause is reported in MESSAGES. If no IF predicate is resolved as true, the string associated with the DEFAULT statement is reported.

The string reported in the MESSAGES column can be up to 30 characters in length, and the string terminates with the first blank character. You should specify only printable characters. If the string contains an underscore, it will be converted to a (imbedded) blank.

Adding Message Text using Rules in OUTCODE

The *OUTCODE* member of DR/Xpert's PARMLIB library is used to specify rules to give additional, data center unique information in the ACTIVE and OBSOLETE Inventory Reports. This table uses a simple IF - AND - OR - THEN - DEFAULT logic making the rules easy to define. Each line in a *OUTCODE* table may only specify one statement. The results of this table is to supply message text for the MESSAGES report column.

Each *OUTCODE* rule consists of:

- The **rule logic modifier** (IF, AND, OR), which may be sub-modified with the BY modifier, and **command verbs** (THEN, DEFAULT)
- The **compare field** (one of the five listed tape management fields or field pattern) to be compared.
- The **comparison operator** (EQ, NE, GT, etc.)
- The **comparison data or table name**. Comparison data can be specific character strings, character pattern strings, or a PARMLIB member table.
- The **message text** used with THEN and DEFAULT command verbs

A more detailed description of the message text rules table options are discussed on the next several pages of this chapter. Figure 8-6 shows an example of an OUTCODE table message.

```
   Menu  Utilities  Compilers  Help
 ------------------------------------------------------------------------------
 BROWSE    OT17.PREV.DRXPT.PARMLIB(OUTCODE) - 11.10  Line 00000073 Col 001 080
 Command ===>                                                  Scroll ===> CSR
*********************************************************************
*
*      COMPARE     COMPARE
*RULE   FIELD   OP  DATA
*----+ +------+ -- +-----------------------------------------+
IF     OUTCODE  EQ VAULT1
AND    TYPE     EQ PRIMARY
AND    STATUS   EQ ACTIVE
THEN   GOOD_BACKUP
IF     OUTCODE  EQ LOCAL
AND    TYPE     EQ DUPLEX
AND    STATUS   EQ ACTIVE
THEN   GOOD_BACKUP
IF     STATUS   EQ OBSOLETE
THEN   OBSOLETE
DEFAULT WRONG_LOCATION
*
```

Figure 8-6 OUTCODE Table Message

Rule Logic Modifiers

The rule logic modifier is used to specify how the message text rule statement is processed relative to the previous statement in the table.

IF, NEW, AND, OR Modifiers

If the rule logic modifier is **IF**, **NEW**, or not specified (blank), then the current statement becomes the first statement of a new message text rule entry.

If the rule logic modifier is **AND**, this indicates that the previous statement and the current statement are part of the same rule and both statements must be "true" for a candidate to be assigned to this message text rule entry.

If the rule logic modifier is **OR**, this indicates that the previous statement and the current statement are part of the same rule and either statement must be "true" for a candidate to be assigned to this message text rule entry.

BY Sub-Modifier

The **BY** rule logic sub-modifier can be used with any of the rule logic modifiers or by itself (which is the same as when it is specified with **IF** or **NEW**). The **BY** sub-modifier is helpful in reducing the number of statements that must be coded in the Rules table to create separate application groups because the user can provide a list of comparison criteria in the form of a table.

The **BY** sub-modifier requires that the comparison data is a table name (a member within the PARMLIB library) and it causes a different application group to be created for each entry in the table.

If the rule logic sub-modifier of **BY** is specified, any statements that follow the BY statement must begin a new message text rule group. Specifying a rule logic modifier of **OR** or **AND** on the statement following a **BY** statement will result in a warning messages and the **OR** or **AND** statement will be ignored.

THEN, DEFAULT Verbs

The **THEN** verb is used to specify the action that should be taken if the message text rule is “true”. If no **THEN** verb is specified, or if none of the message text rules are “true”, then the value of the **DEFAULT** verb specifies the action that should be taken. In the case that there is no **DEFAULT** statement specified, DR/Xpert uses an assumed default of “NONE” (no application).

Several **THEN** and the **DEFAULT** verbs can have the same application string value.

Compare Fields

Table 8-2contains comparison fields available for adding text data to the Backup Audit Program's Inventory Report.

Table 8-2 Comparison Fields and Descriptions

Compare Field	Description
OUTCODE	Contains the data that might appear in a Tape Management System's OUTCODE field.
SLOT	This field is depicted as an eight-digit, right-justified number with leading zeros for all Tape Management Systems except for TLMS. TLMS is represented by a four character left-justified string.
EXPDT	This field is either a seven character Julian date or a special value representing a permanently held tape volume. DR/Xpert uses a seven character string with all nines (9999999) to represent a permanent tape volume.
TYPE	Contains either "PRIMARY" or "DUPLEX".
STATUS	Contains one of the strings "ACTIVE" or "OBSOLETE".

Comparison Operators

Table 8-3provides a list of the comparison operands supported for message text rule processing.

Table 8-3 Comparison Operators

Comparison	Operator Description
EQ	Equal
NE	Not equal
GT	Greater than
LT	Less than
GE	Greater than or equal
LE	Less than or equal

Comparison Data

The comparison data is the patterns defined by the user, which will be compared to corresponding tape management fields described earlier in *Compare Fields*.

This field supports a fully qualified string that contains wildcard characters, or the member name of a DR/Xpert PARMLIB library member that contains a list of strings or strings with wildcards. If using a member name, it must be prefaced with a ">" character to identify the value as a member name. (Refer to *Using a Table as Comparison Data*). The content of the string depends on the comparison field to which the string is compared; for example, if the comparison field is DSNAME then the comparison data it should be a consistent object in relation to its source. Dataset names should be coded as compare

objects with the DSNAME field name. Outcodes should be coded as compare objects to the OUTCODE field name, and similarly with each field name and its comparison object.

Using a Table as Comparison Data

As stated in "*Comparison Data*", OUTCODE processing will accept the name of a DR/Xpert PARMLIB member as the comparison data. The PARMLIB member should contain a table of dataset names or dataset name patterns. The PARMLIB member name should be prefixed by a '>' symbol to distinguish it from standard comparison data.

For example:

```
>OUTDATA
```

OUTDATA would need to be a member in the DR/Xpert PARMLIB library.

If used as the comparison data for an IF, AND or OR statement, then each entry in the PARMLIB member specified will be compared to the value of the compare field, and any specified string that matches any of the entries will be selected for that message text rule group. The entries in a member used for comparison data for IF, AND or OR predicates should be in the form of a list with one entry per line. The example in Figure 8-7 uses dataset names, but the same concept is true for any other comparison field and data:

```
  ****** ****************************** Top of Data
******************************
  000001 JOBNAMEA
  000002 JOBNAMEB
  000003 JOBNAMEC
  ****** ***************************** Bottom of Data
****************************
```

Figure 8-7 Example Comparison List – IF, AND, OR

Each entry in the PARMLIB member table will be part of the same message text rule (all will receive application, or all will be backed up without application).

If used as the comparison data for a BY statement, then each entry in the PARMLIB member specified will be compared to the value of the specified compare field, and each entry in the member will generate a separate application group. The entries in a member used for comparison data for BY sub-statements should be in the form of "comparison data1 THEN value1", as illustrated in Figure 8-8.

```
  ****** ****************************** Top of Data
******************************
  000001 JOBNAMEA THEN COMPANYB+GENERAL-LEDGER
  000002 JOBNAMEB THEN COMPANYA+ACCOUNTING
  000003 JOBNAMEC THEN COMPANYA+GENERAL.LEDGER
  ****** ***************************** Bottom of Data
****************************
```

Figure 8-8 Example BY Comparison

Each entry in the PARMLIB member table will create a new rule ID (each will receive the individually specified application settings).

9 Backup Recycle and Reporting

TOPICS COVERED IN THIS CHAPTER

Overview (page 9-2)

How It Works (page 9-3)

Overview

DR/Xpert's Backup Recycle program recopies datasets residing in older aggregates, putting them in newer aggregates so that the older one can become eligible for deletion by the audit process. The process looks for active backup instances in the older aggregate and reschedules those datasets for another backup.

A byproduct of DR/Xpert's Backup Recycle program is the reporting of current status of all aggregates and datasets managed inside the backup database. The recycle program provides five report files reflecting these statuses along with the planned activities of the recycle and audit programs. The report datasets are:

- **FILELIST** – contains a simple list of critical datasets as recorded in the backup database.
- **DATASETS** – contains a dataset to aggregate cross reference giving status, size, age, and backup location for managed datasets.
- **AGGREGAT** – contains an aggregate backup to dataset cross reference giving status, size, and age for files within an aggregate.
- **SUMMARY** – contains a summary of aggregates with accumulated file counts and sizes in categories of TOTAL, ACTIVE, INACTIVE, and RECYCLE. In addition, this report contains a status column that predicts what actions are performed on the aggregate by the next end-of-day sweep (recycle) or audit (expire).
- **ERASEGDS** – is a minor report tracking maintenance of generation data set instances that are no longer required by DR/Xpert.

DR/Xpert's terminology describing “active,” “inactive,” and “recyclable” follows. This terminology is important for understanding the criteria that the Recycle and Audit programs use for the action performed on files and aggregates. These definitions should be considered with an element of age; for example, the following definition of an active file is questionable for a daily file that is continuously updated, but that point is moot in regard to both of these programs. They do not act on either aggregate nor file until an age is criterion.

- **Active Files** – A file in active backup status is the most recent backup instance of a dataset. For a dataset older than one day (assuming read-only); the contents of an active backup matches the immediate contents of the production dataset. DR/Xpert can recycle an active file.
- **Inactive File** – An inactive backup file is a backup instance that is recoverable, but the Recycle program cannot recycle the file. The dataset is non-recyclable because the original dataset has changed since the most recent backup; or, the original file no longer exists. Because the dataset cannot be recycled (cannot move to a new aggregate), the aggregate is not deleted until a time period has elapsed.
- **Recycle File** – A recycle backup file is a dataset that is currently active, but the recycle program plans to schedule it for another backup. Once the recycle is complete, the file's backup instance becomes inactive and the active instance will reside in another aggregate.

DR/Xpert Recycle Program performs the following actions:

- If an aggregate is older than the specified recycle age, active datasets belonging to that aggregate are rescheduled for backup. When the backup completes, the active version will be on a new aggregate and the backup instance belonging to the original aggregate becomes inactive.

- Generation datasets older than a specified expiration date are removed from the backup database

How It Works

Runtime Considerations

The runtime JCL for DR/Xpert's Recycle Program is found in two members in DR/Xpert's JCLLIB dataset: RECYCLE1 and RECYCLE2. Use one or the other member.

Use the RECYCLE1 member with PARM=SIM on the execute card to report current status of the backup database. The PARM=SIM option will prevent the Recycle Program from scheduling any datasets for backup.

Use RECYCLE1 without PARM=SIM on the execute card to schedule recyclable datasets for backup. These recyclable datasets will be assigned to an aggregate next time any phase-1 backup program runs (e.g. OTCDBTAL Job stream). Expect recyclable datasets to be intermingled with normal backup activity.

Consider these two JCL statement differences.

```
//STEP1  EXEC PGM=OTCDB091,PARM=SIM
```

Versus

```
//STEP1  EXEC PGM=OTCDB091
```

Use RECYCLE2 to schedule recyclable datasets for backup and immediately assign them to an aggregate. RECYCLE2 contains two steps where the second step is DR/Xpert's phase-1 backup program. RECYCLE2 is useful to segregate newly recycled datasets from DR/Xpert's regular backup processing.

Warning Do not use PARM=SIM with RECYCLE2.

As mentioned earlier, active backup instances are eligible for recycle when period has elapsed. The following USERSETS keyword specifies the time period after which DR/Xpert considers active backup instances for recycle.

READ-ONLY-AGEING-DAYS: ddd

The Recycle program predicts when aggregates will be deleted by the Audit program. As mentioned earlier, aggregates are eligible by the Audit program for deletion under two conditions. First, aggregates populated entirely by inactive backup instances are eligible for deletion when a time period has elapsed; and when an aggregate contains no dataset backup instance, in this case, the time period is not applicable. Because of the first criterion, the Recycle program must know the Audit program's age requirements. The following USERSETS keyword specifies the time period after which DR/Xpert considers aggregates for deletion.

EXPIRE-INACTIVE-AGGREGATE-AGE: ddd

Specify whether the Recycle program should be allowed to process archived files.

AGE-MIGRATED-READ-ONLY-FILE: Yes or No

Specify the threshold under which the sum of an aggregate's recyclable files sizes can be in order for the aggregate to be a candidate for recycle. The purpose of this parameter is to retain older backups that satisfy a size requirement, that is, the Recycle program recognizes size overriding age in terms of the recycle decision.

READ-ONLY-SIZE-THRESHOLD: nnnG, nnnM, or nn%

Reporting

The Recycle Program produces five reports.

The figure below contains a sample report of datasets registered as critical files in DR/Xpert's backup database. This report is produced under the DDNAME FILELIST.

Field names are

- Dataset name
- Dataset Organization: PS (physical sequential), VS (VSAM)
- Type: GDG, Non-GDG, or GDG Family
- GEN: Recovery Generations for GDG-type datasets

```
REL X.X.X  PTF X   ***SIMULATE***          D R / X P E R T               ***SIMULATE***  PROGRAM OTCDB091
DATE:  mm/dd/yyyy   TIME:  13:35:07     CRITICAL FILE REGISTRY FOR OPENTECH_SYST               PAGE     1
BACKUP-ID: BATCH

DSNAME                                        DSORG TYPE      GEN APPLICATION NAME
+-----------------------------------------+ +---+ +------+ +--+ +-----------------------------------+
OT.APPL1.DAILY.GDGFILE.ONE                     PS   GFAMILY       APPLICATION-ONE
OT.APPL1.DAILY.GDGFILE.TWO                     PS   GDG         1 APPLICATION-ONE
OT.APPL1.DAILY.GDGTAPE                         PS   GFAMILY       APPLICATION-ONE
OT.APPL1.DAILY.MASTER                          VS   NONGDG        APPLICATION-ONE
OT.APPL1.WEEKLY.GDGFILE.ONE                    PS   GFAMILY       APPLICATION-ONE
OT.APPL1.WEEKLY.GDGFILE.TWO                    PS   GDG         1 APPLICATION-ONE
OT.APPL1.WEEKLY.GDGTAPE.ONE                    PS   GDG         1 APPLICATION-ONE
OT.APPL1.WEEKLY.GDGTAPE.TWO                    PS   GDG         1 APPLICATION-ONE
OT.APPL1.WEEKLY.MASTER                         VS   NONGDG        APPLICATION-ONE
OT.APPL2.DAILY.SEQFILE                         PS   NONGDG        APPLICATION-TWO
OT.APPL2.DAILY.SEQFILE.ONE                     PS   NONGDG        APPLICATION-TWO
OT.APPL2.WEEKLY.SEQFILE.ONE                    PS   NONGDG        APPLICATION-TWO
OT.APPL2.WEEKLY.SEQFILE.TWO                    PS   NONGDG        APPLICATION-TWO
OT.APPL3.DAILY.GDGFILE                         PS   GDG         1 APPLICATION-THREE
OT.APPL3.DAILY.GDGTAPE                         PS   GDG         1 APPLICATION-THREE
OT.APPL3.DAILY.GDG.MASTER                      PS   GDG         1 APPLICATION-THREE
OT.APPL3.DAILY.MASTER1                         PS   GFAMILY       APPLICATION-THREE
OT.APPL3.DAILY.MASTER2                         PS   GDG         1 APPLICATION-THREE
OT.APPL3.DAILY.VSAM.MASTER1                    VS   NONGDG        APPLICATION-THREE
OT.APPL3.DAILY.VSAM.MASTER2                    VS   NONGDG        APPLICATION-THREE
OT.APPL3.DAILY.MASTERPA                        PS   GDG         1 APPLICATION-THREE
OT.APPL3.DAILY.MASTER1                         VS   NONGDG        APPLICATION-THREE
OT.APPL3.DAILY.MASTER2                         PS   GDG         1 APPLICATION-THREE
OT.APPL3.DAILY.MASTER3                         PS   GDG         1 APPLICATION-THREE
OT.APPL3.WEEKLY.GDGFILE                        PS   GDG         1 APPLICATION-THREE
OT.APPL3.WEEKLY.GDGTAPE                        PS   GDG         1 APPLICATION-THREE
OT.APPL3.WEEKLY.MASTER                         PS   GDG         1 APPLICATION-THREE
OT.APPL3.WEEKLY.MASTER1                        VS   NONGDG        APPLICATION-THREE
OT.APPL3.WEEKLY.MASTER2                        VS   NONGDG        APPLICATION-THREE
```

The figure below contains a sample cross-reference report of mapping datasets to aggregates. This report is produced under the DDNAME DATASETS.

The report is in dataset name sequence, with GDG numbers in descending sequence.

- The ACT column signifies that the dataset is in the active position.
- The AGGREGATE NAME column matches the last 17 characters of the aggregate's backup file. FILE AGE is the number of days since the dataset was initially backed up.

- The BKUP AGE is blank unless the dataset has been recycled in which case the dataset has been backed up in its current aggregate.

```
REL X.X.X  PTF X   ***SIMULATE***                    D R / X P E R T                                  ***SIMULATE***    PROGRAM OTCDB091
DATE:  mm/dd/yyyy   TIME:  13:35:41     FILE CROSS REFERENCE TO AGGREGATE FOR OPENTECH_SYSTEMS                                 PAGE     00
                                                                                                  FILE BKUP
DSNAME                                          ACT AGGREGATE NAME            FILE SIZE  AGE  AGE STATUS
+----------------------------------------+ +-+ +---------------+ +---------------+ +--+ +--+ +-----------------------------------+
OT.APPL1.DAILY.GDGFILE.ONE.G1318V00             Y  B0860003.Y0734201             50 KB    3
OT.APPL1.DAILY.GDGFILE.ONE.G1317V00             Y  B0850003.Y0734103             50 KB    4
OT.APPL1.DAILY.GDGFILE.ONE.G1316V00             Y  B0840006.Y0734002             50 KB    5
OT.APPL1.DAILY.GDGFILE.ONE.G1315V00             Y  B0830005.Y0733903             50 KB    6
OT.APPL1.DAILY.GDGFILE.ONE.G1314V00             Y  B0820004.Y0733802             50 KB    7
OT.APPL1.DAILY.GDGFILE.ONE.G1313V00             Y  B0790005.Y0733511             50 KB   10
OT.APPL1.DAILY.GDGFILE.ONE.G1312V00             Y  B0780003.Y0733402             50 KB   11
OT.APPL1.DAILY.GDGFILE.ONE.G1311V00             Y  B0770003.Y0733302             50 KB   12
OT.APPL1.DAILY.GDGFILE.ONE.G1310V00             Y  B0760003.Y0733202             50 KB   13
OT.APPL1.DAILY.GDGFILE.ONE.G1309V00             Y  B0750004.Y0733102             50 KB   14
OT.APPL1.DAILY.GDGFILE.ONE.G1308V00             Y  B0710004.Y0732601             50 KB   15
OT.APPL1.DAILY.GDGFILE.ONE.G1300V00             Y  B0590004.Y0731401             50 KB   16      GDG ENTRY CLEANUP/ENOUGH FOR RECOVERY
OT.APPL1.DAILY.GDGFILE.ONE.G1299V00             Y  B0580004.Y0731314             50 KB   17      GDG ENTRY CLEANUP/ENOUGH FOR RECOVERY
OT.APPL1.DAILY.GDGFILE.ONE.G1298V00             Y  B0570004.Y0731231             50 KB   18      GDG ENTRY CLEANUP/ENOUGH FOR RECOVERY
OT.APPL1.DAILY.GDGFILE.ONE.G1297V00             Y  B0560004.Y0731102             50 KB   19      GDG ENTRY CLEANUP/ENOUGH FOR RECOVERY
OT.APPL1.DAILY.GDGFILE.ONE.G1296V00             Y  B0550005.Y0731001             50 KB   20      GDG ENTRY CLEANUP/ENOUGH FOR RECOVERY
OT.APPL1.WEEKY.GDGFILE.ONE.G0064V00             Y  B0790005.Y0733511            100 KB   10
OT.APPL1.WEEKY.GDGFILE.ONE.G0063V00             Y  B0500004.Y0730523            100 KB   40      GDG ENTRY CLEANUP/ENOUGH FOR RECOVERY
OT.APPL1.WEEKY.GDGFILE.TWO.G0005V00             Y  B0850004.Y0734103        476,691 KB   45      GDG ENTRY CLEANUP/NOT CATALOGUED
OT.APPL1.DAILY.GDGTAPE.G0005V00                 Y  B0850004.Y0734103      1,106,939 KB   45      GDG ENTRY CLEANUP/NOT CATALOGUED
```

The figure below contains a sample cross reference report listing the contents of aggregates. The report is in aggregate name order which puts the oldest aggregate first. The aggregate contents are dataset name sequence. This report is produced under the DDNAME AGGREGAT.

Important information includes:

- DRIVER is the name of the driver used to recover the file.
- FILENAME is the name of the primary backup file.
- DSNAME is the dataset name
- ACT is the active position indicator.
- FILE SIZE is the file size reported by the DRIVER at backup time.
- FILE AGE is the number of days since the initial backup was made.
- BKUP AGE is normally blank, but if it is non-blank, the file has been recycled and this column reports the number of days since the recycle backup.

```
REL X.X.X  PTF X   ***SIMULATE***                        D R / X P E R T                        ***SIMULATE***    PROGRAM OTCDB091
DATE:  mm/dd/yyyy   TIME:  hh:mm:ss     AGGREGATE CONTENT REPORT FOR OPENTECH_SYSTEMS                                   PAGE     01

-----------------------------------------------------------------------------------------------------------------------------------
BACKUP: B0360002.Y0729101   DRIVER: TAPECOPY   FILENAME: DRXPN.DRXPERT.B.BKUP.B0360002.Y0729101
-----------------------------------------------------------------------------------------------------------------------------------

                                                                                                  FILE BKUP
 AGGREGATE NAME   DSNAME                                                ACT         FILE SIZE  AGE  AGE STATUS
+---------------+ +----------------------------------------+ +-+ +---------------+ +--+ +--+ +-----------------------------------
B0360002.Y0729101 OT.APPL2.DAILY.MASTER1.G0212V00                        Y       5,235,647 KB   54
                  OT.APPL2.WEEKLY.MASTER1.G0196V00                       Y      48,913,232 KB   54
                  OT.APPL3.DAILY.GDGTAPE.ONE.G0060V00                    Y      48,917,201 KB   54
                  OT.APPL3.DAILY.GDGTAPE.ONE.G0059V00                    Y       6,439,241 KB   54
                  OT.APPL3.DAILY.MASTER1.G0217V00                        Y       1,811,104 KB   54
                  OT.APPL3.DAILY.MASTER1.G0216V00                        Y       1,922,592 KB   54
                  OT.APPL3.WEEKLY.GDGTAPE.ONE.G0398V00                   Y       3,776,504 KB   54
                  OT.APPL3.WEEKLY.GDGTAPE.ONE.G0397V00                   Y      41,536,085 KB   54      GDG ENTRY CLEANUP/NOT CATALOGUED

REL X.X.X  PTF X   ***SIMULATE***                        D R / X P E R T                        ***SIMULATE***    PROGRAM OTCDB091
DATE:  mm/dd/yyyy   TIME:  hh:mm:ss     AGGREGATE CONTENT REPORT FOR OPENTECH_SYSTEMS                                   PAGE     02

-----------------------------------------------------------------------------------------------------------------------------------
BACKUP: B0500004.Y0730523   DRIVER: DFDSS      FILENAME: DRXPN.DRXPERT.B.BKUP.B0500004.Y0730523
-----------------------------------------------------------------------------------------------------------------------------------

                                                                                                  FILE BKUP
 AGGREGATE NAME   DSNAME                                                ACT         FILE SIZE  AGE  AGE STATUS
+---------------+ +----------------------------------------+ +-+ +---------------+ +--+ +--+ +-----------------------------------
B0500004.Y0730523 OT.APPL1.DAILY.GDGFILE.ONE.G0063V00                    Y             100 KB   40
                  OT.APPL1.DAILY.GDGFILE.TWO.G0063V00                    Y             500 KB   40
                  OT.APPL3.DAILY.MASTER1                                -1          23,235 KB   40
                  OT.APPL3.DAILY.MASTER2.G0008V00                       -1             300 KB   40
                  OT.APPL3.DAILY.MASTER3.G0008V00                       -1             999 KB   40
                  OT.APPL4.DAILY.WORK.G0010V00                           Y              50 KB   40
                  OT.APPL4.DAILY.WORK.G0009V00                           Y              50 KB   40
                  OT.APPL4.DAILY.WORK.G0008V00                           Y              50 KB   40
```

The figure below contains a sample Aggregate Summary report. This report is produced under the DDNAME SUMMARY.

The significant columns reported are:

- Aggregate name
- The backup aggregate names, the primary backup is reported first and the duplex backup is next.
- VOLSER is the first volume of the backup. If the aggregate contains multiple volumes, these are not reported.
- DRIVER is the name of the program that did the backup and will be used for restoring the aggregate's contents.
- Multiple Line Columns are
  - TYPE are categories TOTAL, ACTIVE, INACTIVE, and RECYCLE (described earlier in this chapter)
  - COUNT is the number of files in each of these categories.
  - SIZE is the summed size of each dataset per category in kilobytes.

```
REL X.X.X  PTF X   ***SIMULATE***                        D R / X P E R T                        ***SIMULATE***    PROGRAM OTCDB091
DATE:  mm/dd/yyyy   TIME:  hh:mm:ss     AGGREGATE SUMMARY REPORT FOR OPENTECH_SYSTEMS                                   PAGE     01

+-------------------------------------------------------------------------------------------------------------------+
|                                                                                                                   |
| RUNTIME SPECIFICATIONS:                                                                                           |
|   READ-ONLY-AGEING-DAYS:                          30                                                              |
|   EXPIRE-INACTIVE-AGGREGATE-AGE:                  30                                                              |
|   READ-ONLY-SIZE-THRESHOLD:                       60%                                                             |
|   BACKUP-TAPE-DEVICE-TYPE:                        3590E                                                           |
|                                                                                                                   |
| ACTIVE DATASETS OLDER THAN 30 DAYS ARE CANDIDATES FOR RECYCLE. HOWEVER, THEY MUST RESIDE ON A                     |
| BACKUP AGGREGATE LESS THAN 60% OF A 3590E; ABOUT 36,000MB.                                                        |
|                                                                                                                   |
| AGGREGATES OLDER THAN 30 DAYS ARE CANDIDATES TO EXPIRE WHEN THE AGGREGATE NO LONGER HAS ACTIVE                    |
| DATASETS OR RECYCLE DATASETS.                                                                                     |
|                                                                                                                   |
| RECYCLE DATASETS MAY BECOME INACTIVE DATASETS AFTER THE NEXT BACKUP. AGGREGATES WITHOUT ANY                       |
| ACTIVE OR RECYCLE DATASETS ARE ELIGIBLE FOR EXPIRATION AFTER THE NEXT AUDIT JOB RUNS.                             |
|                                                                                                                   |
+ ------------------------------------------------------------------------------------------------------------------+

REL X.X.X  PTF X   ***SIMULATE***                        D R / X P E R T                        ***SIMULATE***    PROGRAM OTCDB091
DATE:  mm/dd/yyyy   TIME:  hh:mm:ss     AGGREGATE SUMMARY REPORT FOR OPENTECH_SYSTEMS                                   PAGE     02

AGGREGATE NAME    BACKUP FILE NAME                                VOLSER DRIVER      AGE     TYPE  COUNT      SIZE (KB) STATUS
+--------------+ +----------------------------------------+ +----+ +------+ +----+ +------+ +----+ +------------+ +-------------+
B0360002.Y0729101 DRXPN.DRXPERT.B.BKUP.B0360002.Y0729101       100207 TAPECOPY     54    TOTAL      8    158,551,606 AGGREGATE
                  DRXPN.DRXPERT.B.DPLX.B0360002.Y0729101       100282                    ACTIVE      0              0 EXPIRES AT NEXT
                                                                                       INACTIVE      8    158,551,606 AUDIT
                                                                                        RECYCLE      0              0

B0500004.Y0730523 DRXPN.DRXPERT.B.BKUP.B0500004.Y0730523       100898 DFDSS        40    TOTAL    113      1,065,550 AGGREGATE
                  DRXPN.DRXPERT.B.DPLX.B0500004.Y0730523       100900                    ACTIVE      0              0 EXPIRES AT NEXT
                                                                                       INACTIVE    113      1,065,550 AUDIT
                                                                                        RECYCLE      0              0

B0530002.Y0730801 DRXPN.DRXPERT.B.BKUP.B0530002.Y0730801       100424 DFDSS        36    TOTAL     42        146,868 AGGREGATE WILL
                  DRXPN.DRXPERT.B.DPLX.B0530002.Y0730801       100534                    ACTIVE      0              0 BE RECYCLED
                                                                                       INACTIVE     18         93,130
                                                                                        RECYCLE     24         53,738
```

The figure below contains a sample report of datasets registered as critical files in DR/Xpert's backup database. This report is produced under the DDNAME ERASEGDS.

This report reflects GDG records deleted from the Backup Database usually because the dataset was no longer needed for recovery purposes or because the dataset is no longer catalogued in the system catalog.

Significant column data is

- Full qualified generation dataset name
- CYCLE is the cycle the particular dataset belongs
- AGGR is the particular aggregate the dataset belongs
- VSAM Feedback is any non-zero VSAM return code when attempting to erase the backup record. (SIM) means the action was bypassed due to simulated execution.
- BACKUP is the name of the primary backup to which the dataset belonged

```
REL X.X.X  PTF X   ***SIMULATE***                        D R / X P E R T                        ***SIMULATE***    PROGRAM OTCDB091
DATE:  MM/DD/YYYY   TIME:  HH:MM:SS     CLEANUP BKPDBASE GDG ENTRIES FOR OPENTECH_SYSTEMS                               PAGE     01

                                          BKUP
DSNAME                                     ID   CYCLE  AGGR VSAM FEEDBACK      BACKUP
+---------------------------------------+ +---+ +---+ +---+ +----------------+ +----------------------------------------+
OT.APPL1.DAILY.GDGFILE.G0001V00             B     036  0002 (SIM)              DRXPN.DRXPERT.B.BKUP.B0360002.Y0729101
OT.APPL1.DAILY.GDGTAPE.G0001V00             B     036  0002 (SIM)              DRXPN.DRXPERT.B.BKUP.B0360002.Y0729101
```

10 Applications and Groups

TOPICS COVERED IN THIS CHAPTER

Overview (page 10-2)

Defining Application Rules in APPLRULE (page 10-3)

Defining Application Rules in APPLDSNS (page 10-7)

Overview

OpenTech Systems uses the term “application” because it is a natural grouping when a group is assigned to a set of JOB streams or datasets; however, DR/Xpert is not limited to a single-tiered group such as “application.” DR/Xpert can group by any scheme the user chooses to place on the group name.

In this chapter, whenever the document says "application", think application, company, division, or whatever grouping within which you would like critical data to be organized.

DR/Xpert's groups are multi-tiered. They are constructed from one to sixty-six printable character strings. Imbedded blanks are not allowed. DR/Xpert uses a plus-sign to distinguish different tiered levels within a grouping; for example, you might consider three strings separated by plus-signs as meaning:

```
Company+division+application
```

The number of tiers is limited to the size of the group name and there are practical limitations as far as using some of DR/Xpert's filter techniques.

Other rules within DR/Xpert frequently use group names. In fact, the application name is probably the most important comparison field in other rules. The group name is referenced as APPLNAME or APPL in these rules. When you use APPLNAME in another rule, specify the group name as it is defined in the APPLRULE member with or without wildcard characters.

Note See the sections on Encryption, Collocation, and Reporting for more information.

Assigning JOBS to Applications

When DR/Xpert is collecting information about production jobs in SMF data, it applies the rule set in APPLRULE to assign the JOB to an application name. During dataset identification, the dataset is assigned an owning application based on a few rules of access. Rules can be created based on jobname, accounting field extracted from SMF data, and user id.

Every JOB will be assigned an application name, but you should avoid using an application name of "NONE". NONE will have a special purpose in the APPLDSNS member (see next section).

From a DR/Xpert identification perspective, an application assignment stays in effect indefinitely, but new assignments occur each time the *ANALYSIS* JOB is run. Rule changes that alter the JOB assignment is reflected in the reporting database and the job assumes its new application ID. Additionally, new owning applications are reflected from the DR/Xpert Identification Component's point of view.

From a DR/Xpert backup perspective, the owning application is applied to any new backups; however, older backups retain the application under which they were backed up. This means that an older generation of a dataset's backup can belong to an application group that is different from a newer one.

DR/Xpert stores application names in a member named *APPLNAME*. This member is created and maintained by the *COLLECT* JOB stream. DR/Xpert is limited to 999,998 different application names.

APPLRULE assigns applications to job streams. Datasets inherit application names from those job streams according to this hierarchy:

1. Datasets inherit the application of its creating job; but if that is not available,
2. Datasets inherit the application of the first job that opens the dataset for update or output.
3. Datasets inherit the application of the first job that opens the dataset for input.

Assigning DSNS to Applications

DR/Xpert provides the APPLDSNS rule member to override the application names assigned in APPLRULE. During DR/Xpert's Identification Phase, dataset names are tested with the rules in APPLDSNS. Datasets fitting any rule in this member are assigned application names from APPLDSNS instead of inheriting their application from APPLRULE.

NONE is a special string in APPLDSNS. Normally, APPLDSNS returns values to assign application names to datasets; whenever DR/Xpert encounters NONE as the returned value, the dataset retains the application name inherited from its creating job. Thus, NONE is the suggested value for APPLDSNS's DEFAULT statement.

APPLDSNS can be used with three strategies in mind.

Certain users will have a small number of datasets for which they want to override job inheritance rules. They will specify an application by a specific dataset name or using wildcard characters, but mostly, they will depend on APPLRULE. APPLDSNS's DEFAULT statement should have NONE specified for its value.

Other users prefer assigning all of their applications based on all dataset names. These customers have a strong file naming and know a file's application based on its name. In this case, APPLRULE should contain a single application name (DEFAULT statement); and the customer will use APPLDSNS to assign all applications names. Furthermore, a true default application name should be coded as APPLDSNS's DEFAULT statement.

Other uses will rely solely on the application names assigned through APPLRULE. In this case, APPLDSNS will contain a single statement.

```
DEFAULT NONE
```

Defining Application Rules in APPLRULE

The *APPLRULE* member of DR/Xpert's PARMLIB library is used to specify an application name for datasets depending on the application string. This table uses a simple IF - AND - OR - THEN - DEFAULT logic making the rules easy to define. Each line in a APPLRULE table may only specify one statement.

Each APPLRULE rule consists of:

- The **rule logic modifier** (IF, AND, OR), which may be sub-modified with the BY modifier, and **command verbs** (THEN, DEFAULT)
- The **compare field** (dataset name or dataset name pattern) to be compared against
- The **comparison operator** (EQ, NE, GT, etc.).

- The **comparison data or table name**. Comparison data can be specific character strings, character pattern strings, or a PARMLIB member table.
- The **application strings** are used with THEN and DEFAULT command verbs. This value is used to specify the type of application to be used when a true condition is set for the IF, AND, OR statement set

A more detailed description of the application rules table options are discussed on the next several pages of this chapter.

Figure 10-1 shows an example of an APPLRULE table.

```
  Menu  Utilities  Compilers  Help
 ------------------------------------------------------------------------------
 BROWSE    OT17.PREV.DRX.PARMLIB(APPLRULE) - 11.10    Line 00000073 Col 001 080
 Command ===>                                                Scroll ===> CSR
*********************************************************************
*      COMPARE    COMPARE
*RULE   FIELD  OP  DATA
*----+ +-----+ -- +-----------------------------------------+
IF     JOBNAME EQ GL/
THEN GENERAL-LEDGER
*
IF     JOBNAME EQ INV/
THEN DISTRIBUTION+WAREHOUSE
*
IF     JOBNAME EQ ORDER/
THEN SALES
*
DEFAULT MISCELLANEOUS
*
******************************** Bottom of Data ********************************
```

Figure 10-1 APPLRULE Table

Rule Logic Modifiers

The rule logic modifier is used to specify how the application rule statement is processed relative to the previous statement in the table.

IF, NEW, AND, OR Modifiers

If the rule logic modifier is **IF**, **NEW**, or not specified (blank), then the current statement becomes the first statement of a new application rule entry.

If the rule logic modifier is **AND**, this indicates that the previous statement and the current statement are part of the same rule and both statements must be "true" for a candidate to be assigned to this application rule entry.

If the rule logic modifier is **OR**, this indicates that the previous statement and the current statement are part of the same rule and either statement must be "true" for a candidate to be assigned to this application rule entry.

BY Sub-Modifier

The **BY** rule logic sub-modifier can be used with any of the rule logic modifiers or by itself (which is the same as when it is specified with **IF** or **NEW**). The **BY** sub-modifier is helpful in reducing the number of statements that must be coded in the DR/Xpert Rules table to create separate application groups because the user can provide a list of comparison criteria in the form of a table.

The **BY** sub-modifier requires that the comparison data is a table name (a member within the DR/Xpert PARMLIB library) and it causes a different application group to be created for each entry in the table.

If the rule logic sub-modifier of **BY** is specified, any statements that follow the **BY** statement must begin a new application rule group. Specifying a rule logic modifier of **OR** or **AND** on the statement following a **BY** statement will result in a warning messages and the **OR** or **AND** statement will be ignored.

THEN, DEFAULT Verbs

The **THEN** verb is used to specify the action that should be taken if the application rule is "true". If no **THEN** verb is specified or none of the application rules are "true", then the value of the **DEFAULT** verb specifies the action that DR/Xpert should take. In the case that there is no **DEFAULT** statement specified, DR/Xpert uses an assumed default of "NONE" (no application).

Several **THEN** and the **DEFAULT** verbs can have the same application string value. In fact, this is a good strategy.

Compare Field

Table 10-1contains comparison fields available for assigning an application name.

Table 10-1 Comparison Fields

JOBNAME	The jobname or jobname string with wildcards.
ACCTx	Accounting fields 1 through 5 extracted from SMF data according to SMF's definition of an accounting field. Each field is compared as individual 50-character accounting fields before applying the rules in APPLRULE. Accounting fields shorter than 50 characters are blank filled to the right. Accounting fields greater than 50 characters are truncated.
USERID	A one to eight character USERID, also known as a RACFID or security ID.
SYSTEM	Identifies ONLINE and BATCH jobs; this field matches DR/Xpert's logic for splitting backup work into the BATCH and ONLINE databases. This field is useful for customers who have configured to use one backup database instead of two.

Comparison Operators

Table 10-2 provides a list of the comparison operands supported for application rule processing.

Table 10-2 Comparison Operators

Comparison	Operator Description
EQ	Equal
NE	Not equal
GT	Greater than
LT	Less than

Table 10-2 Comparison Operators

Comparison	Operator Description
GE	Greater than or equal
LE	Less than or equal

Comparison Data

The comparison data is the job name, accounting information, or USER ID (or any pattern of each of these field types) defined by the user, which will be compared to corresponding job names or other fields described earlier in this chapter.

This field supports a fully qualified string, a string containing wildcard characters, or the member name of a DR/Xpert PARMLIB library member that contains a list of strings or strings with wildcards. If using a member name, it must be prefaced with a “>” character to identify the value as a member name. (Refer to *Using a Table as Comparison Data*). The content of the string depends on the comparison field to which the string is compared; for example, if the comparison field is JOBNAME then the comparison data should be a consistent object in relation to its source. Job names should be coded as compare objects with the JOBNAME field name; accounting fields should be coded as compare objects to one of the ACCTx field names; and similarly with each field name and its comparison object.

Using a Table as Comparison Data

As stated in the section *Comparison Data, APPLRULE* processing will accept the name of a DR/Xpert PARMLIB member as the comparison data. The PARMLIB member should contain a table of dataset names or dataset name patterns. The PARMLIB member name should be prefixed by a '>' symbol to distinguish it from standard comparison data.

For example:

```
>APPLDATA
```

APPLDATA would need to be a member in the DR/Xpert PARMLIB library.

If used as the comparison data for an IF, AND or OR statement, then each entry in the PARMLIB member specified will be compared to the value of the compare field and any string that match any of the entries will be selected for that application rule group. The entries in a member used for comparison data for IF, AND or OR predicate should be in the form of a list; one entry per line. Figure 10-2 uses application names, but the same concept is true for any other comparison field and data.

```
  ****** ***************************** Top of Data
******************************
  000001 JOBNAMEA
  000002 JOBNAMEB
  000003 JOBNAMEC
  ****** **************************** Bottom of Data
****************************
```

Figure 10-2 Example of Dataset Name Comparison

Each entry in the PARMLIB member table will be part of the same application rule.

If used as the comparison data for a BY statement, then each entry in the PARMLIB member specified will be compared to the value of the compare field and each entry in the member will generate a separate application group. The entries in a member used for comparison data for BY sub-statements should be in the form of “comparison data1 THEN value1”, as shown in Figure 10-3.

```
  ****** ***************************** Top of Data
******************************
  000001 JOBNAMEA THEN COMPANYB+GENERAL-LEDGER
  000002 JOBNAMEB THEN COMPANYA+ACCOUNTING
  000003 JOBNAMEC THEN COMPANYA+GENERAL.LEDGER
  ****** ***************************** Bottom of Data
****************************
```

Figure 10-3 BY Statement Comparison

Each entry in the PARMLIB member table will create a new rule ID (each will receive the individually specified application setting).

Defining Application Rules in APPLDSNS

The APPLDSNS member of DR/Xpert’s PARMLIB library is used to override application names for datasets previously assigned to an application by APPLRULE logic. This table uses a simple **IF - AND - OR - THEN - DEFAULT** logic making the rules easy to define. Each line in an APPLDSNS table may only specify one statement.

Each APPLDSNS rule consists of:

- The **rule logic modifier** (IF, AND, OR), which may be sub-modified with the BY modifier, and **command verbs** (THEN, DEFAULT)
- The **compare field** (dataset name or dataset name pattern) to be compared against
- The comparison operator (EQ, NE, GT, etc.)
- The comparison **data or table name**. Comparison data can be specific character strings, character pattern strings, or a PARMLIB member table.
- The **application strings** are used with THEN and DEFAULT command verbs. This value is used to specify the type of application to be used when a true condition is set for the IF, AND, OR statement set.

A more detailed description of the application rules table options are discussed on the following pages.

Figure 10-4 shows an example of an APPLDSNS table.

```
Menu Utilities Compilers Help
--------------------------------------------------------------------------------
BROWSE OT17.PREV.DRX.PARMLIB(APPLDSNS) - 11.10 Line 00000073 Col 001 080
Command ===> Scroll ===> CSR
******************************** Top of Data ********************************
* COMPARE COMPARE
*RULE FIELD OP DATA
*----+ +-----+ -- +-----------------------------------------+
IF DSNAME EQ AR./
OR DSNAME EQ AP./
THEN GENERAL-LEDGER
*
IF DSNAME EQ WWW./
THEN SALES
*
DEFAULT NONE
*
******************************* Bottom of Data ******************************
```

Figure 10-4 APPLDSNS Table

Rule Logic Modifiers

The rule logic modifier is used to specify how the application rule statement is processed relative to the previous statement in the table.

IF, NEW, AND, OR Modifiers

If the rule logic modifier is **IF**, **NEW**, or not specified (blank), then the current statement becomes the first statement of a new application rule entry.

When the rule logic modifier is an **AND**, the previous and current statements are part of the same rule. Both statements must be "true" for a candidate to be assigned to this application rule entry.

When the rule logic modifier is an **OR**, the previous and current statements are part of the same rule. Either statement must be "true" for a candidate to be assigned to this application rule entry.

BY Sub-Modifier

The **BY** rule logic sub-modifier can be used with any of the rule logic modifiers or by itself (which is the same as when it is specified with **IF** or **NEW**). The **BY** sub-modifier is helpful in reducing the number of statements that must be coded in the DR/Xpert Rules table to create separate application groups. With this, the user can provide a list of comparison criteria in the form of a table.

The **BY** sub-modifier requires that the comparison data is a table name (a member within the DR/Xpert PARMLIB library) and it causes a different application entry to be created for each entry in the table.

If the rule logic sub-modifier of **BY** is specified, any statements that follow the **BY** statement must begin a new application rule group. Specifying a rule logic modifier of **OR** or **AND** on the statement, following a **BY** statement will result in a warning message and the **OR** or **AND** statement will be ignored.

THEN, DEFAULT Verbs

The **THEN** verb is used to specify the action that should be taken if the application rule is "true". If no **THEN** verb is specified or none of the application rules are "true", then the value of the **DEFAULT** verb specifies the action that DR/Xpert should take. In the case that there is no **DEFAULT** statement specified, DR/Xpert uses an assumed default of "NONE" (no application).

Several **THEN** and the DEFAULT verbs can have the same application string value. In fact, this is a good strategy.

Compare Field

The comparison field available for assigning an application name is DSNAME. DSN is a synonym for DSNAME. Currently, that is the only compare field supported by APPLDSNS.

Comparison Operators

Table 10-3 provides a list of the comparison operands supported for application rule processing.

Table 10-3 Comparison Operators

Comparison	Operator Description
EQ	Equal
NE	Not equal
GT	Greater than
LT	Less than
GE	Greater than or equal
LE	Less than or equal

Comparison Data

The comparison data is the dataset name information defined by the user, which will be compared to corresponding job names or other fields described earlier in this chapter.

This field supports a fully qualified string, a string containing wildcard characters, or the member name of a DR/Xpert PARMLIB library member that contains a list of strings or strings with wildcards. If using a member name, it must be prefaced with a ">" character to identify the value as a member name. (Refer to Using a Table as Comparison Data). The content of the string depends on the comparison field to which the string is compared, and must be DSNAME or DSN. Therefore, the comparison data should be consistent with dataset name.

Using a Table as Comparison Data

As stated in the section "Comparison Data", APPLDSNS processing will accept the name of a DR/Xpert PARMLIB member as the comparison data. The PARMLIB member should contain a table of dataset names or dataset name patterns. The PARMLIB member name should be prefixed by a '>' symbol to distinguish it from standard comparison data.

For example:

```
>APPLDATA
```

APPLDATA would need to be a member in the DR/Xpert PARMLIB library.

If used as the comparison data for an IF, AND or OR statement, then each entry in the PARMLIB member specified will be compared to the value of the compare field and any string that match any of the entries will be selected for that application rule group. The entries in a member used for comparison data for IF, AND or OR predicate should be in the form of a list; one entry per line. Figure 10-4 uses application names, but the same concept is true for any other comparison field and data. Figure 10-4 is an example of Dataset Name Comparison.

Each entry in the PARMLIB member table will be part of the same application rule.

If used as the comparison data for a BY statement, then each entry in the PARMLIB member specified will be compared to the value of the compare field and each entry in the member will generate a separate application group. The entries in a member used for comparison data for BY sub-statements should be in the form of "comparison data1 THEN value1", as shown in Figure 10-5.

```
****** ***************************** Top of Data ******************************
000001 B.AP.PAYMENTS.MASTER  THEN COMPANYB+GENERAL-LEDGER
000002 A.ACCTG.VENDOR.LIST   THEN COMPANYA+ACCOUNTING
000003 A.AP.ACCOUNTS.MASTER  THEN COMPANYA+GENERAL.LEDGER
****** **************************** Bottom of Data ****************************
```

Figure 10-5 BY Statement Comparison

Each entry in the PARMLIB member table will create a new rule ID (each will receive the individually specified application setting).

11 Collocation

TOPICS COVERED IN THIS CHAPTER

Overview (page 11-2)

How Collocation Works (page 11-4)

Defining Collocation Rules in COLOCTBL (page 11-5)

Varying DFDSS Control Members (page 11-9)

Overview

Collocation, as used in this chapter, refers to the arrangement of datasets and applications into collections for backup.

DR/Xpert uses collocation strings as a tool to organize datasets and applications into collections for backup. The *COLOCTBL* in DR/Xpert's PARMLIB dataset contains the rule set that assigns a collocation string to datasets specifically by DSNAME, by media, or by application.

Collocation String's Construction

The collocation string is constructed from four, eight-character tokens separated by periods.

OpenTech Systems originally developed the concept of collocation strings as a mechanism to associate a backup utility to a group of datasets and to tell DR/Xpert's backup driver which utility to invoke for any dataset. The first two backup utilities were DFSMSdss for disk files and TAPECOPY for tape-to-tape backups. This token is the second token represented in the example by (2).

The string's content was expanded to include the dump-side (3) and restore-side (4) control member for DFDSS. This benefited DR/Xpert by keeping DFDSS control member names out of the JCL.

Finally, a user group name (1) was added to the collocation string as an additional grouping, as illustrated in the following example:

```
 (1)     (2)     (3)    (4)

group.driver.member.member
```

An example collocation string might look like this:

```
GROUPA.DFDSS.DUMP.RESTORE
```

The table below explains the contents of the collocation string example.

Table 11-1 Collocation String

GROUPA	is the grouping string for your use.
DFDSS	is the name of the driver to be used for a given dataset.
DUMP	is the name of the member in DR/Xpert's PARMLIB dataset containing DFDSS DUMP control statements
RESTORE	is the name of the member in DR/Xpert's PARMLIB dataset containing DFDSS RESTORE control statements that will be used when this dataset is restored.

Warning The user should group the most datasets within the fewest collocation strings possible. For example, to separate individual applications into many unique collocation strings will result in wasteful use of tape resources.

Alternatively, consider which applications you may recover first in a real disaster and group them into the same collocation string. You could consider grouping datasets into first and second tier groupings from a recovery time perspective.

Important Rules Regarding Collocation Strings

This section describes important rules and values for the second, third and fourth tokens.

Since the second parameter controls the backup utility associated with a file, these are the requirements for the second parameter:

1 The second token may use the drivers shown in Table 11-2.

Table 11-2 Drivers for Second Token

Driver Name	Description
DFDSS	DR/Xpert will use ADRDSSU to back up files. This driver is intended for files residing on disk and the resulting backup file is a tape file.
DSSDISK	DR/Xpert will use ADRDSSU to back up files. This driver is similar to the DFDSS driver, except the output backup file is stored on disk.
CRYPTDSS	DR/Xpert will use DFDSS with OpenTech Systems' CopyCrypt software to produce a secured DFDSS backup.
TAPECOPY	DR/Xpert will use its intrinsic tape-to-tape copy program to copy user critical tape files to a stacked backup tape.
TAPEASIS	DR/Xpert will use its intrinsic tape-to-tape copy program to copy critical tape files. This driver is similar to TAPECOPY except that it creates a new aggregate whenever the source volume set changes. If there is only one dataset in the source volume set, the effect will be an unstacked tape.
VDR	DR/Xpert will select critical tape files to be processed separately by VDR, a tape stacking product produced by OpenTech Systems.
ABARS	DR/Xpert will manage and optimize data backed up by IBM's ABARS Component of DFSMShsm.
DMS	DR/Xpert will use DMS to back up files. This driver is intended for files residing on disk
FAVER	DR/Xpert will use FAVER to back up files. This driver is intended for VSAM files only

2 Use TAPECOPY or VDR to backup tape files, and use DFDSS or CRYPTDSS to backup disk files. Keep the rules and collocation string consistent with their media types; for example, you do not want TAPECOPY to backup disk files.

Warning VDR can only be used as the second token value if the user is licensed to use the VDR product. CRYPTDSS can only be used as the second token value is the user is licensed to use DR/Xpert with the CopyCrypt product.

The third parameter will always be the member name in DR/Xpert's PARMLIB that DR/Xpert supplies for the backup utility's SYSIN file.

1. OpenTech Systems distributes DUMP for DFDSS and CRYPTDSS SYSIN control statements when performing a backup.
2. The third parameter may be omitted for TAPECOPY, TAPEASIS and VDR because these utilities do not use a SYSIN file.

The fourth parameter will always be the member name in DR/Xpert's PARMLIB that DR/Xpert supplies for the recovery utility's SYSIN file.

1. OpenTech Systems distributes RESTORE for DFDSS and CRYPTDSS SYSIN control statements when restoring datasets.
2. The fourth parameter may be omitted for TAPECOPY, TAPEASIS and VDR because these utilities do not use a SYSIN file.

Relation to Encryption

Encryption rules and collocation rules are closely associated with one another. Encryption rules and collocation rules are evaluated one after another, but encryption rules are always evaluated first.

Note See Chapter 12 for a description of Encryption Strings and the *CRYPTRUL* member.

How Collocation Works

When DR/Xpert inspects the content of its scheduling queue (BKPQUEUE), it arranges datasets ready for backup into groups. Whenever the collocation and the encryption string change, DR/Xpert creates a new aggregate. For DR/Xpert's purposes, an aggregate is a collection of work that can be thought of as one DFDSS output file or one TAPECOPY volume set.

Critical files identified by DR/Xpert are filtered through the collocation rules member where attributes associated with the dataset arrange it within the related group. The collocation rules are kept in a member name is *COLOCTBL*.

The rules are not limited to collocating only by dataset name. The rules allow for collocating all of the datasets within an application, storage class, or certain media depending on the rule's specification. Refer to *Compare Fields* for a list of the available comparison fields.

For example, a practical and simple collocation rule is to specify a rule based on MEDIA, directing tape files to TAPECOPY and disk files to DFDSS, as shown in Figure 11-1.

```
     BROWSE    OT17.PREV.DRXPT.PARMLIB(COLOCTBL) - 11.10  Line 00000073 Col 001
080
   Command ===>                                                Scroll ===> CSR
  ************************************************************************
  * *      COMPARE    COMPARE
  *RULE   FIELD  OP  DATA
  *----+ +-----+ -- +----------------------------------------+
  IF     MEDIA   EQ DISK
  THEN DISK.DFDSS
  DEFAULT TAPE.TAPECOPY
  ******************************** Bottom of Data
*********************************
```

Figure 11-1 Collocation based on MEDIA

Collocation Rule Considerations

Consider the following when using the collocation rule (COLOCTBL):

- OpenTech Systems recommends using comparison fields such as MEDIA or APPLNAME rather than using comparison fields like DSNAME. DSNAME is useful for granular control of backups to specific datasets.
- Several THEN verbs can specify the same collocation string. This might be a desirable practice.
- The CRYPTDSS utility with an encryption string of ASIS produces the same backup as running DFDSS without encryption.

Defining Collocation Rules in *COLOCTBL*

The *COLOCTBL* member DR/Xpert's PARMLIB library is used to specify rules that separate or earmark datasets into different aggregates depending on the collocation string. This table uses a simple IF - AND - OR - THEN - DEFAULT logic, making the rules easy to define. Each line in a *COLOCTBL* table may only specify one statement.

Each *COLOCTBL* rule consists of:

- The **rule logic modifier** (IF, AND, OR), which may be sub-modified with the BY modifier and **command verbs** (THEN, DEFAULT)
- The **compare field** (dataset name or dataset name pattern) to be compared against
- The **comparison operator** (EQ, NE, GT, etc.).
- The **comparison data or table name**. Comparison data can be specific character strings, character pattern strings, or a PARMLIB member table.
- The **collocation strings** are used with THEN and DEFAULT command verbs. This value is used to specify the type of collocation to be used when a true condition is set for the IF, AND, OR statement set

Figure 11-2 shows an example of a COLOCTBL.

```
 *      COMPARE    COMPARE
*RULE   FIELD  OP  DATA
*----+ +-----+ -- +----------------------------------------+
IF     APPL    EQ MAJOR-APPS+/
AND    MEDIA   EQ DISK
THEN TIER1.DFDSS.DUMP.RESTORE
*
IF     APPL    EQ MAJOR-APPS+/
AND    MEDIA   EQ TAPE
THEN TIER1.TAPECOPY.NONE.NONE
*
IF     APPL    EQ MINOR-APPS+/
AND    MEDIA   EQ DISK
THEN TIER2.DFDSS.DUMP.RESTORE
*
IF     APPL    EQ MINOR-APPS+/
AND    MEDIA   EQ TAPE
THEN TIER2.TAPECOPY.NONE.NONE
*
* CATCH ALL RULE
IF     MEDIA   EQ DISK
THEN TIER2.DFDSS.DUMP.RESTORE
DEFAULT TIER2.TAPECOPY.NONE.NONE
```

Figure 11-2 COLOCTBL Rules

Rule Logic Modifiers

The rule logic modifier is used to specify how the collocation rule statement is processed relative to the previous statement in the table.

IF, NEW, AND, OR Modifiers

If the rule logic modifier is **IF**, **NEW**, or not specified (blank), then the current statement becomes the first statement of a new collocation rule entry.

If the rule logic modifier is **AND**, this indicates that the previous statement and the current statement are part of the same rule and both statements must be "true" for a candidate to be assigned to this collocation rule entry.

If the rule logic modifier is **OR**, this indicates that the previous statement and the current statement are part of the same rule and either statement must be "true" for a candidate to be assigned to this collocation rule entry.

BY Sub-Modifier

The **BY** rule logic sub-modifier can be used with any of the rule logic modifiers or by itself (which is the same as when it is specified with **IF** or **NEW**). The **BY** sub-modifier is helpful in reducing the number of statements that must be coded in the DR/Xpert Rules table to create separate collocation groups because the user can provide a list of comparison criteria in the form of a table.

The **BY** sub-modifier requires that the comparison data is a table name (a member within the DR/Xpert PARMLIB library) and it causes a different collocation group to be created for each entry in the table.

If the rule logic sub-modifier of **BY** is specified, any statements that follow the **BY** statement must begin a new collocation rule group. Specifying a rule logic modifier of **OR** or **AND** on the statement following a **BY** statement will result in a warning messages and the **OR** or **AND** statement will be ignored.

THEN, DEFAULT Verbs

The **THEN** verb is used to specify the action that should be taken if the collocation rule is "true". If no **THEN** verb is specified or none of the collocation rules are "true", then the value of the **DEFAULT** verb specifies the action that DR/Xpert should take. In the case that there is no **DEFAULT** statement specified, DR/Xpert uses an assumed default of "NONE" (no collocation).

Several **THEN** and the **DEFAULT** verbs can have the same collocation string value. In fact, this is a good strategy.

Compare Fields

The compare field should be set to one the following comparison fields shown in Table 11-3 as attributes for collocation.

Table 11-3 COLOCTBL Comparison Fields

Compare Fields	Description
MEDIA	Media has two values: 'DISK' or 'TAPE'
APPLNAME (or APPL)	APPLNAME is an application name or pattern defined by the APPLRULE member.
DSNAME (or DSN)	This is the specific DSNAME or DSNAME specified using wildcard characters.
ATLNAME (or ATL)	ATLNAME is an eight-character name containing one of your Automatic Tape Libraries, 'VTS', or 'NONE'; 'NONE' is the value when dataset resides on disk.
MIGRATED	'YES' or 'NO'
ENCRYPTD	The object of this compare field is either 'YES' or 'NO'; if the encryption string was ASIS or NONE, ENCRYPTD will be 'NO'; otherwise, any other value will cause ENCRYPTD to be 'YES'.
MIGLEVEL	The object of this compare field is either 'ML1', 'ML2, or 'NONE'. If a dataset is migrated by HSM, this value for this compare field is either 'ML1' (MIGRAT1) or 'ML2' (MIGRAT2). Otherwise, the value for this compare field is 'NONE' for non-migrated disk or tape files.

Comparison Operators

Table 11-4 provides a list of the comparison operands supported for collocation rule processing.

Table 11-4 Collocation Rule Operands

Comparison	Operator Description
EQ	Equal
NE	Not equal
GT	Greater than
LT	Less than
GE	Greater than or equal
LE	Less than or equal

Comparison Data

The comparison data is the user-specified dataset or dataset name pattern that will be compared to dataset names, applications, or other fields described earlier in this chapter.

This field supports a fully qualified string that contains wildcard characters, or the member name of a DR/Xpert PARMLIB library member that contains a list of strings or strings with wildcards. If using a member name, it must be prefaced with a “>” character to identify the value as a member name. (Refer to *Using a Table as Comparison Data*). The content of the string depends on the comparison field to which the string is compared; for example, if the comparison field is DSNAME, then the comparison data should be a consistent object in relation to its source. Dataset names should be coded as compare objects with the DSNAME field name; application names should be coded as compare objects to the APPLNAME field name; and similarly with each field name and its comparison object.

Using a Table as Comparison Data

As stated in *Comparison Data*, *COLOCTBL* processing will accept the name of a DR/Xpert PARMLIB member as the comparison data. The PARMLIB member should contain a table of dataset names or dataset name patterns. The PARMLIB member name should be prefixed by a '>' symbol to distinguish it from standard comparison data.

For example:

```
>COLOCDAT
```

COLOCDAT would need to be a member in the DR/Xpert PARMLIB library.

If used as the comparison data for an IF, AND or OR statement, then each entry in the PARMLIB member specified will be compared to the value of the compare field and any string that match any of the entries will be selected for that collocation rule group. The entries in a member used for comparison data for IF, AND or OR predicate should be in the form of a list with one entry per line. The example in Figure 11-3 uses dataset names, but the same concept is true for any other comparison field and data:

```
  ****** ****************************** Top of Data
******************************
  000001 FILEA.PROD.LIST
  000002 FILEB.PROD.LIST
  000003 FILE*.WORK.LIST
  ****** ***************************** Bottom of Data
****************************
```

Figure 11-3 Dataset Names Comparison

Each entry in the PARMLIB member table will be part of the same collocation rule (all will receive collocation, or all will be backed up without collocation).

If used as the comparison data for a BY statement, then each entry in the PARMLIB member specified will be compared to the value of the compare field and each entry in the member will generate a separate collocation group. The entries in a member used for comparison data for BY sub-statements should be in the form of “comparison data1 THEN value1”, such as the example shown in Figure 11-4.

```
  ****** ****************************** Top of Data
******************************
  000001 FILEA.PROD.LIST THEN FILEA.DFDSS.DUMPA.RESTOREA
  000002 FILEB.PROD.LIST THEN FILEB.DFDSS.DUMPB.RESTOREB
  000003 FILE*.WORK.LIST THEN WORK.DFDSS.DUMPW.RESTOREW
  ****** ***************************** Bottom of Data
****************************
```

Figure 11-4 Comparison Sub-Statement

Each entry in the PARMLIB member table will create a new rule ID (each will receive the individually specified collocation settings).

Varying DFDSS Control Members

This section describes how to specify DFDSS DUMP or RESTORE statements when special options are needed for a select group of datasets. There are many possible ways in which you can use a DFDSS SYSIN control member for a subset of your disk datasets. For example, you can specify a different SYSIN member based on the collocation rule where most of your disk datasets will use the DUMP member and a few will use a member named DUMPA.

The third and fourth tokens in the collocation string can vary by rule. However, there are some constraints for these two tokens if you provide values other than DUMP and RESTORE:

1. These tokens must refer to members in DR/Xpert's PARMLIB.
2. The third token must refer to a member with a DUMP statement. The fourth token must refer to a member with a RESTORE statement.
3. The OUTDDNAME and INDDNAME keywords with TAPE1 as their values must exist for the dump and restore members, respectively.

4. Given the two tokens, their respective members Both must have DATASET(FILTERDD (FILTER)) coded within them.

One example for varying DFDSS control cards may be to specify DFDSS encryption keywords instead of allowing DR/Xpert to insert the keywords in DFDSS control statements. This method would employ encryption without DR/Xpert's knowledge or management of DFDSS encryption keywords.

12 Encryption

TOPICS COVERED IN THIS CHAPTER

Introduction (page 12-2)

Supported Drivers (page 12-3)

CopyCrypt (page 12-3)

Usage Considerations (page 12-4)

CopyCrypt Planning (page 12-4)

CopyCrypt Key Management (page 12-9)

CopyCrypt Key Database (KEYDB) (page 12-9)

Supported Encryption Algorithms (page 12-29)

Defining Encryption Rules in CRYPTRUL (page 12-30)

Non-CopyCrypt Encryption Keys (page 12-34)

Reports Generated by CopyCrypt Processing (page 12-35)

Introduction

The Encryption option is available only to users that are authorized for both DR/Xpert and the CopyCrypt product.

Regulatory requirements make it necessary for many data centers to protect the critical data that is sent to offsite vaulting locations, while other data centers do so because they believe it is desireable. Protecting this data through the use of encryption is a cost-effective and secure method of ensuring that unauthorized users cannot access your sensitive data.

DR/Xpert provides encryption through two configuration tools: collocations strings and encryption strings. These strings are developed through two rules table members: *COLOCTBL* and *CRYPTRUL*. The development of the two strings results in four different ways encryption can work under DR/Xpert:

1. You can use DR/Xpert's CRYPTDSS driver in which DFDSS output is encrypted using CopyCrypt.
2. You can use IBM's Encryption Facility by allowing DR/Xpert to insert the appropriate encryption directives into DFDSS's SYSIN file.
3. You can use IBM's Encryption Facility where DR/Xpert is unaware that encryption is being performed. In this case, encryption directives are coded inside DFDSS control members used for backup.
4. You can use CopyCrypt encryption through DR/Xpert's tape-to-tape copy driver (TAPECOPY).

The collocation string controls the invocation of different backup drivers. CRYPTDSS is DR/Xpert's internal encryption tool for DFDSS. This form of DFDSS encryption uses CopyCrypt as the encryption engine.

If the collocation string is DFDSS and an encryption string is in effect, DR/Xpert will insert control statements into the DFDSS control parameters (IBM’s Encryption Facility for z/OS must be installed). This is the only case where DR/Xpert software does not perform the actual encryption.

Supported Drivers

Table 12-1 lists each backup product's supported driver for encryption. Encryption can be native (that is, belonging to driver's backup product), or it can be provided by OpenTech Systems' CopyCrypt software.

Table 12-1 Supported Drivers

Backup Driver	Encryption Support
DFDSS	DR/Xpert will insert control cards supporting DFDSS's intrinsic encryption facility based on rules inside DR/Xpert's CRYPTRUL member.
CRYPTDSS	DR/Xpert will encrypt data using OpenTech Systems' CopyCrypt product. The encryption rule is ASIS, results in a traditional, non-encrypted DFDSS backup file.
TAPECOPY	DR/Xpert will encrypt data using OpenTech Systems' CopyCrypt product
ABARS	Does not support encryption.
FAVER	Does not support encryption.
DMS	Does not support encryption.

CopyCrypt

CopyCrypt is able to request encryption for any backup dataset made by DR/Xpert (both with DFSMSdss and tape-to-tape backups), and users have full control over which datasets are encrypted through the use of encryption rules defined by the user in PARMLIB. Users can select to only encrypt the data that is most sensitive and can also select the level of encryption. Less sensitive data can be backed up "as is," i.e., non-encrypted.

CopyCrypt allows the user to encrypt data using either hardware encryption or software encryption. When using hardware encryption, CopyCrypt interfaces with IBM's Cryptographic Co-processor available in most IBM mainframes. Using the IBM cryptographic facilities CopyCrypt can encrypt and decrypt data efficiently by directing the cryptographic work to a specialized processor and reducing CPU overhead. In some cases, software encryption is desired or necessary due to lack of encryption hardware. CopyCrypt allows users that do not have IBM's cryptographic hardware on their mainframe to protect their data with secure encryption. For management of encryption keys, CopyCrypt is able to use IBM's Integrated Cryptographic Service Facility (ICSF), the integrated CopyCrypt Key Database, or a combination of both.

Usage Considerations

Note Before implementing CopyCrypt for tape data encryption processing, please read this entire chapter of the DR/Xpert User Guide.

CopyCrypt Planning

The following topics are intended to help the user identify the options that will be used with CopyCrypt. There may be issues specific to the user's environment that are not addressed here. However, review of these topics will help begin the planning process for implementing CopyCrypt.

- *Hardware vs. Software Encryption*
- *Key Management Options*
- *Encryption Algorithms (Strength of Encryption)*
- *Selecting Data to Encrypt*
- *Effects of Compression with Encryption*
- *Performance Effects of Encryption*
- *Disaster Recovery Preparation*

Hardware vs. Software Encryption

CopyCrypt supports both hardware encryption (using IBM's Cryptographic Co-processor) and integrated software encryption (using CopyCrypt encryption software, licensed from RSA Security, Inc.).

The decision to use IBM ICSF hardware or CopyCrypt software encryption (or neither method, depending on site requirements) is one of the first decisions that should be made during CopyCrypt implementation planning.

Table 12-2 shows a comparison of these two encryption methods. Choose the method that is the best fit for your environment.

Table 12-2 Encryption Method Comparison

IBM Cryptographic Hardware Encryption	CopyCryptSoftware Encryption
IBM Cryptographic hardware required	No additional hardware required
Must use IBM ICSF key management (if IBM ICSF secure hardware-based key management is required)	Supports ICSF key management and CopyCrypt key management
Uses a separate co-processor, and less system processor resources	Uses system processor resources to do the encryption

Key Management Options

Key management is an important part of encryption processing. Without availability of the encryption keys, the encrypted data is unreadable; but, on the other hand, the keys must also be adequately protected from unauthorized use. CopyCrypt has an integrated key management system that can be used with both hardware and software encryption. CopyCrypt also supports the use of IBM's Integrated Cryptographic Service Facility (ICSF) when using hardware encryption.

Table 12-3 shows which encryption method supports the type of key management.

Table 12-3 Key Management Support

Encryption method	Supported Key Mgmt	
	ICSF	CopyCrypt Key DB
IBM Hardware	Yes	Yes
CopyCrypt Software	No	Yes

Note More information about the CopyCrypt Key Database is available in *KEYDB Components and Logging Structure*.

For users that choose to use hardware encryption and use ICSF key management, the following additional set-up items must be completed before CopyCrypt is used:

- The started task for ICSF must be running and have a master password.
- The processors must be defined to ICSF.
- The ICSF load library must be in the System LINKLST.
- The user will need to define key labels or key encryption keys (KEKs) to ICSF so they can supply the desired key labels or KEKs to CopyCrypt on a per dataset basis.
- CopyCrypt users will need to be given proper authority through RACF (or other security facility) to access ICSF. (More information on granting security access is listed below.)

Note For more information on the use of ICSF, refer to documentation provided by IBM.

Security Authorization to Access ICSF

For RACF, READ access is required for RACF class CSFSERV (which is used to control access to ICSF services). The in-storage RACF profiles will need to be refreshed after the user or group is given the READ permission for CLASS(CSFSERV). If not properly authorized, the CopyCrypt job will receive an ICSF ERROR followed by RACF messages indicating "INSUFFICIENT ACCESS AUTHORITY".

For security facilities other than RACF, check with the security administrator to make sure the user ID for performing CopyCrypt functions is properly authorized.

Encryption Algorithms (Strength of Encryption)

CopyCrypt supports encryption using the following industry-standard encryption algorithms.

- DES
- DES1
- DES2
- DES3
- AES

CopyCrypt can assign different levels of encryption strength to different volumes, even when stacking backups together on the same backup tape. The level of security required for sensitive information being sent off site, as well as corporate or government requirements, should dictate the encryption algorithm used.

Selecting Data to Encrypt

CopyCrypt allows the user to specify simple "IF-THEN-ELSE" rules that determine which data should be encrypted during the DR/Xpert backup process (and which data to decrypt during DR/Xpert restore). The user can choose to encrypt only certain applications, and as stated previously, can apply different encryption algorithms to different applications. The result is the desired levels of data security with the lowest possible impact to system resources (you do not encrypt more data than is necessary).

Effects of Compression with Encryption

Because encrypted data has been randomized, encrypted data does not compact well if compressed by tape hardware as it is written to the output tape during the copy operation. In order to get the benefits of both encryption and compression, CopyCrypt can compress the data before the encryption process. This offers the following advantages:

- Compressing the data prior to encryption reduces the number of bytes to be encrypted, thereby reducing the CPU time and elapsed time for the encryption operation
- Compressed output data uses less space on the output tape

To use pre-encryption compression with CopyCrypt, set the *COMPRESS-OUTPUT-DATA-BEFORE-ENCRYPTING* to YES (default setting). Setting *COMPRESS-OUTPUT-DATA-BEFORE-ENCRYPTING* to NO turns off the pre-encryption compression.

The *USE-TRTCH=NOCOMP-FOR-ENCRYPTED-FILES* parameter controls whether the files that have been selected for encryption processing will be created with TRTCH=NOCOMP or if they will use TRTCH=COMP. If the *USE-TRTCH=NOCOMP-FOR-ENCRYPTED-FILES* parameter is set to YES, the backup volume sets that contain more bytes of data that will be encrypted than unencrypted bytes will be created with TRTCH=NOCOMP. If the *USE-TRTCH=NOCOMP-FOR-ENCRYPTED-FILES* parameter is set to NO (the default), the backup volume sets will be created with TRTCH=COMP.

Note If two copies of the backup tape are being created, TRTCH=COMP will be used for the second copy.

Performance Effects of Encryption

Encrypting and decrypting data during conversion requires additional processing and more time than copying data without encryption processing. As such, using CopyCrypt during DR/Xpert operations will slow down the rate at which data is copied. The rate of this decrease is dependent on many factors, including:

- Whether the encrypted data was compressed prior to encryption
- Encryption algorithm or key strength used (DES, 3DES, AES128, AES256)
- Processing speed and workload of the cryptographic hardware, if used
- Number of cryptographic hardware co-processors available, if used
- Number of concurrent backup/recovery jobs

The *EXCP Performance Report* shows both elapsed time and megabytes per second during compression, encryption, decryption, and expansion of data processed by CopyCrypt.

Disaster Recovery Preparation

Note The keys used to encrypt the data must be available at the DR site or the data cannot be decrypted.

Users that have implemented CopyCrypt using the CopyCrypt Key Database for key management can use either the backup and restore utilities provided for the key database, or IDCAMS Repro to copy the database to the DR system. For specific backup/restore information using the CopyCrypt utilities, refer to *Backing up the CopyCrypt Key Database* and *Restoring the CopyCrypt Key Database*.

For those using ICSF for key management, exporting the ICSF CKDS dataset to the DR site is recommended. Refer to your IBM ICSF documentation for the proper procedure to ensure the key database is available at the DR site.

If passwords (rather than encryption keys) were used to encrypt the data, then no keys are needed at the DR site. However, the password used to encrypt the file must be supplied when the file is decrypted.

CopyCrypt Parameter Summary

The table that follows provides a summary of the DR/Xpert user parameters that are specific to CopyCrypt functionality. Consider these parameters when planning your CopyCrypt implementation.

Note More detail on these options/functions are provided through the remainder of this chapter, and in the DR/Xpert Parameter Reference Guide.

Table 12-4 CopyCrypt User Parameters (Part 1 of 2)

Parameter	Description
COMPRESS-OUTPUT-DATA-BEFORE-ENCRYPTING	Determines whether data that is encrypted by CopyCrypt will be compressed before encryption.
ENCRYPTION-AUTO-GENERATED-KEY-STRENGTH	Determines the encryption strength of the key to be generated during encryption when the CopyCrypt Key Database is being used. (If the ICSF CKDS is being used, DES3 is used.)
ENCRYPTION-FACILITY	Specifies whether CopyCrypt should use IBM's Cryptographic hardware, or CopyCrypt's software encryption algorithms for encryption/ decryption functions.
ENCRYPTION-KEY-DATABASE	Determines whether ICSF or CopyCrypt's key database will be used to retrieve labeled key values.
ENCRYPTION-RULE	Determines if CopyCrypt will be used, and if so, whether the process is an encryption or a decryption operation.
KEYDB-DATASET-NAME	Specifies the name of the CopyCrypt Key database, if using the CopyCrypt Key Database for key management.
KEYDB-LOG-GDG-BASE	Specifies the name of the GDG base for the CopyCrypt Key database log (the "active" log), if using the CopyCrypt Key Database for key management.
KEYDB-NUMBER-OF-RECORDS	Specifies the maximum number of keys that are expected to be in the CopyCrypt Key Database in order to determine the size of the database upon initialization, if using the CopyCrypt Key Database for key management.
SIMULATE-ENCRYPTION	Determines whether CopyCrypt will perform encryption in "live" mode or in "simulate" mode.

Table 12-4 CopyCrypt User Parameters (Part 2 of 2)

Parameter	Description
SUPPRESS-ENCRYPTION-KEY-LABELS	Controls whether encryption key labels and passwords are printed on the DR/Xpert Reports pertaining to encryption.
USE-TRTCH=NOCOMP-FOR-ENCRYPTED-FILES	Controls whether files that have been selected for encryption processing will be created with TRTCH=NOCOMP.

CopyCrypt Key Management

The user specifies whether to use IBM's ICSF or CopyCrypt's Key Database using the *ENCRYPTION-KEY-DATABASE* parameter. (Specify *ENCRYPTION-KEY-DATABASE*: ICSF or *ENCRYPTION-KEY-DATABASE*: CPYCRYPT).

This section discusses the setup requirements and usage of the CopyCrypt Key Database.

Note If using IBM's ICSF key management, refer to documentation provided by IBM for key management information, and then proceed to "*Defining Encryption Rules in CRYPTRUL*".

CopyCrypt Key Database (KEYDB)

The CopyCrypt Key Database (KEYDB) is a repository (VSAM KSDS file) that holds all encryption keys and control information used by CopyCrypt encryption and decryption processes. Because use of the CopyCrypt Key Database is optional (as some users will chose ICSF key management exclusively), the key database is not initialized during product installation and must be created after DR/Xpert has been installed. The setup process for the CopyCrypt Key Database is included in this chapter.

Note While it is possible to create and use different CopyCrypt key databases, with different keys in each database, OpenTech Systems does not recommend using multiple key databases. If multiple databases are used, extreme care must be taken to manage their use. The different databases should not have keys with the same label name. This note does not apply to copies of the same key database, with the same keys in them, at different locations.

The following is a list of main topics discussed in this chapter that pertain to the CopyCrypt Key Database:

- *Creating the CopyCrypt Key Database*
- *Adding Keys/Modifying the CopyCrypt KEYDB*
- *KEYDB Components and Logging Structure*
- *Backing up the CopyCrypt Key Database*
- *Restoring the CopyCrypt Key Database*
- *Securing the Key Database*

Creating the CopyCrypt Key Database

To use the CopyCrypt Key Database, the database file must first be created and initialized using the *KEYDBINI* JCL in the JCLLIB. The *KEYDBINI* job uses IDCAMS to define a VSAM KSDS file and then populates the database with necessary control records. The database name is defined using the value of the *KEYDB-DATASET-NAME* parameter, and the size of the defined database is determined by the *KEYDB-NUMBER-OF-RECORDS* parameter value (which indicates the maximum number of keys/records expected to be used in the database). The default is 12,000 user keys (which is 12,000 records; each record holds one key).

Note The number of keys a site will choose to put into the Key database varies greatly between companies depending on their policies and intended use. After the Key database is created, the number of keys can be increased by running an IDCAMS backup/restore with the Define of the new Key DB, specifying a greater number of records, or using the CopyCrypt Backup/Restore with *KEYDB-NUMBER-OF-RECORDS* set to the larger value.

Edit the *KEYDBINI* member in the DR/Xpert JCLLIB and update the JCL according to the instructions in the JCL comments, and submit the job to create and initialize the CopyCrypt KEYDB. Upon successful completion of this job, you can now supply CopyCrypt with a Master Key.

```
REL x.x.x  PTF x                          D R / X P E R T
PROGRAM xxxxxxxx

DATE:  xx/xx/xxxx   TIME:  xx:xx:xx   INIT DATABASE REPORT FOR
OPENTECH_SYSTEMS,INC.       PAGE  1

 KEY DATABASE: OT08.KEY.APRIL9.OT.KEY.DB                    SUCCESSFULLY DEFINED
 KEY DATABASE INITIALIZATION WAS SUCCESSFUL

NOTE: A MASTER KEY MUST STILL BE CREATED BEFORE THE DATABASE CAN BE USED
```

Figure 12-1 INIT Database Report

Creating a Master Key

When the CopyCrypt Key Database has been created and initialized, the next step is to create a master key. The master key is used to encrypt all of the other keys in the CopyCrypt Key Database to keep those individual keys secure. Creating the Master Key is a three step process:

- *Step 1. Generate three 16-byte random numbers*
- *Step 2. Supply KEYDB with random numbers*
- *Step 3. Create Initial Master key*

Step 1. Generate three 16-byte random numbers

The master key generation process uses three 16-byte random numbers. The third random number (designated as “RANDOM3”) can be all zeros, which means that effectively the key is generated from only the first two random numbers. The master key is formed by exclusive ORing the random numbers together. This allows the master key to be recreated if it becomes lost or corrupt, by re-supplying the same numbers used to create the master key initially.

Using multiple random numbers can be considered an additional security feature. It allows the three separate numbers to be given to three separate people, or kept in three separate locations, so that all three numbers (which can be used to recreate the master key) are not known to one single person or housed in one single location.

The *KEYDBRAN* member of the JCLLIB contains a job that can be used to generate three 16-byte random numbers at a time, in the format needed to supply the numbers to the CopyCrypt KEYDB. These numbers are generated by calls to RSA Security, Inc., software licensed by OpenTech Systems, Inc., for use in the CopyCrypt software. The KEYDBRAN program can be run multiple times, with one or more numbers used from each run to allow separation of knowledge of the random numbers by one or more people.

Note The use of the *KEYDBRAN* job is recommended, but not mandatory. CopyCrypt users can use other methods for generating these three 16-byte numbers if they choose.

If the KEYDBRAN job is not used, edit the *KEYDBRAN* member of the JCLLIB library and update the JCL according to the instructions in the JCL comments, and submit the job to generate three random numbers. An example is shown in Figure 12-2.

```
 REL x.x.x  PTF x                          D R / X P E R T
PROGRAM xxxxxxxx

 DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     RANDOM NUMBER REPORT FOR
OPENTECH_SYSTEMS,INC.                                  PAGE      1

 RANDOM1(EF5939189883D20DE26DC70783C6B628)  CHKSUM1(EE118856)
 RANDOM2(4C1A9D71F3CC64A1CAC9DCDF0D277089)  CHKSUM2(17D84F7C)
 RANDOM3(DD6E18F0DE30658F9ECB8C5555F34555)  CHKSUM3(B05D502B)
```

Figure 12-2 Random Number Report

Step 2. Supply KEYDB with random numbers

The next step is to provide the CopyCrypt Key Database with the three random numbers that were generated by the *KEYDBRAN* job in Step 1, or were obtained using alternate means. The third random number (and only random number 3) can be set to all zeros, in which case only the first two random numbers will be used to form the key.

In order to detect accidental keystroke errors when typing in the 16-byte (32 printable hex characters) random numbers, a 4-byte (8 character) checksum is required with each number for verification. If the *KEYDBRAN* job in Step 1 was used, the required checksum is listed in the Random Number Report along with the three numbers. Both the number and its checksum can be copied (cut and paste) from the Random Number Report and entered into the control cards used by *KEYDBMS1*.

If *KEYDBRAN* **was not** used to generate the random numbers, the user will be responsible for creating valid checksums for their chosen numbers. **The checksum must be created using the IBM z/Series CKSM instruction.** Checksums derived any other way might have a different value and will then be rejected.

An example of assembler code that can be used to create the checksum is given in Figure 12-3.

```
                    XR     R1,R1              ZERO CKSM ACCUM REG
                    LA    R2,RANDOM_          NUMBER  ADDR OF NUM TO CKSM
                    LA    R3,16               SET NUMBER OF BYTES TO CKSM
          DO_CKSM   CKSM  R1,R2               GET CHECKSUM
                    BNZ   DO_CKSM             LOOP IF MORE BYTES
                    ST    R1,SAVED_CKSM       SAVE CKSM
```

Figure 12-3 CheckSum assembler code

Note If the checksum does not match when the *KEYDBMS1* job is run, the random numbers will not be supplied to the key database.

If your site does not wish one person to have access to all three random numbers for security reasons, the *KEYDBMS1* job may be run multiple times to add each random number separately.

Edit the *KEYDBMS1* member of the JCLLIB library and update the JCL and control cards according to the instructions in the JCL comments, and submit the job to pass the random numbers to the key database. Repeat if necessary (for multiple runs).

```
REL x.x.x  PTF x                          D R / X P E R T
PROGRAM xxxxxxxx

DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     MASTER KEY REPORT FOR
OPENTECH_SYSTEMS,INC.                                    PAGE      1

 RANDOM NUMBER1 CHKSUM: F51F9703  ADDED
 RANDOM NUMBER2 CHKSUM: 7218C3E2  ADDED
 RANDOM NUMBER3 CHKSUM: CDE17C2F  ADDED

      **** STATUS OF THE 3 RANDOM NUMBERS REQUIRED TO CREATE/CHANGE MASTER KEY

 RANDOM NUMBER1: ENTERED  03/19/2007
 RANDOM NUMBER2: ENTERED  03/19/2007
 RANDOM NUMBER3: ENTERED  03/19/2007

  ALL THREE RANDOM NUMBERS ARE PRESENT. A MASTER KEY CAN BE CREATED/CHANGED
```

Figure 12-4 Master Key Report (CheckSum)

Step 3. Create Initial Master key

When all three random numbers have been supplied using the *KEYDBMS1* job, job *KEYDBMAS* can be used to create the master key.

Note that as shipped, the *KEYDBMAS* job has control cards in place for both creating and changing master keys. For the initial creation of the master key, only the MASTER CREATE control card should be used. An asterisk can be placed in column one to comment out the MASTER CHANGE control card, as shown in Figure 12-5.

```
//SYSIN    DD *
*****************************************************************
*  CREATE A NEW MASTER KEY  (FIRST TIME ONLY)
*****************************************************************
   MASTER    CREATE
*****************************************************************
*  CHANGE THE EXISTING MASTER KEY  (ANY TIME AFTER CREATE OF 1ST)
*****************************************************************
*  MASTER    CHANGE           <---commented out
//*
```

Figure 12-5 MASTER CHANGE Control Card

Edit the *KEYDBMAS* member of the JCLLIB library and update the JCL and control cards according to the instructions in the JCL comments, and submit the job to create the initial master key. See Figure 12-6.

Note It is recommended that a backup of the Key database be taken immediately after the master key is created. See *Backing up the CopyCrypt Key Database*.

```
REL x.x.x  PTF x                          D R / X P E R T
PROGRAM xxxxxxxx

DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     MASTER KEY REPORT FOR
OPENTECH_SYSTEMS,INC.                                  PAGE      1

THE MASTER KEY HAS BEEN SUCCESSFULLY CREATED

  THE RANDOM NUMBERS USED TO CREATE THE NEW MASTER KEY WERE:

RANDOM NUMBER1: ENTERED  03/05/2007

RANDOM NUMBER2: ENTERED  03/05/2007

RANDOM NUMBER3: ENTERED  03/05/2007
```

Figure 12-6 Master Key Report (Create Key)

Changing the Master Key

Some industries and regulations mandate how often a master key must be changed. After the master key has been created the first time, it can be changed as needed following the same process as used for creating the initial key with the following exception: the *KEYDBMAS* job should use the "MASTER CHANGE" control card rather than the "MASTER CREATE" control card that was used when the initial master key was created, as shown in Figure 12-7.

```
//SYSIN    DD *
*****************************************************************
*  CREATE A NEW MASTER KEY  (FIRST TIME ONLY)
*****************************************************************
*  MASTER    CREATE         <---commented out
*****************************************************************
*  CHANGE THE EXISTING MASTER KEY  (ANY TIME AFTER CREATE OF 1ST)
*****************************************************************
   MASTER    CHANGE
//*
```

Figure 12-7 Create New Master Key (First Time)

After a new set of random numbers are supplied as in Step 1 and Step 2, edit the *KEYDBMAS* member of the JCLLIB library and update the JCL and control cards according to the instructions in the JCL comments, and submit the job to change the master key (see Figure 12-8). The last phase of the master key process automatically takes a backup of the key database.

Note OpenTech Systems recommends that users check the status of the CopyCrypt key database before changing the master key. See "*Validate and Report on the KEYDB*" for more information.

```
REL x.x.x  PTF x                          D R / X P E R T
PROGRAM xxxxxxxx

DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     MASTER KEY REPORT FOR
OPENTECH_SYSTEMS,INC.

 FIRST PART OF MASTER KEY CHANGE WAS SUCCESSFUL. LAST PHASE ABOUT TO BEGIN

  THE RANDOM NUMBERS USED TO CREATE THE NEW MASTER KEY WERE:

RANDOM NUMBER1: ENTERED  04/09/2007

RANDOM NUMBER2: ENTERED  04/09/2007

RANDOM NUMBER3: ENTERED  04/09/2007

 ABOUT TO CALL OTUL3035 TO TAKE BACKUP OF THE KEY DATABASE

 OTUL3035 BACKUP OF KEY DATABASE COMPLETED SUCCESSFULLY

 LAST PHASE OF MASTER KEY CHANGE WAS SUCCESSFUL. MASTER KEY HAS BEEN CHANGED.

 THE NEW MASTER KEY VERSION NUMBER IS NOW:       8
```

Figure 12-8 Master Key Report (Change Master Key)

Adding Keys / Modifying the CopyCrypt KEYDB

After the master key has been created, user keys can be added, renamed, deleted, or expired. The *KEYDBUPD* member of the DR/Xpert JCLLIB is used to add, delete, rename and expire keys. The job can contain multiple functions (can add and rename keys within the same job). Review this section for information about these functions and their required control card parameters.

There are three different kinds of user keys:

1. **Data encrypting/decrypting key** used to encrypt user data (datasets). The valid types of data encrypting keys are: DES1, DES2, DES3, AES128, AES192, AES256.
2. **Key encrypting key** used to encrypt another key so that it can be transported. To add a key encrypting key specify "KEK". The strength of the key will be DES2.
3. **Password**—The CopyCrypt Key Database can also be used to hold 32-byte passwords that are retrieved using the key label. Passwords are converted into keys at the time of their use for encryption or decryption, using the SHA-1 algorithm. Passwords can be DES3, AES128 or AES256.

Note Passwords can also be supplied directly to the encryption/decryption processes, without storing them into the KEYDB.

Key Labels

Each key in the KEYDB is identified by a key label which is assigned by the user. This is a "user friendly" label for the key that is used to retrieve a key from the database when needed. The key label can be up to 64 characters in length. The valid characters for a key label are shown in the table below.

Table 12-5 Valid Key Label Characters

Alphabetic A - Z	$
Numeric 0-9	@
"Pound" sign #	. Period

Adding a Key

To add a new key to the CopyCrypt Key Database, edit the *KEYDBUPD* member of the JCLLIB library and update the JCL and ADD control cards according to the instructions in the JCL comments. Then, submit the job to add the new key(s).

Table 12-6 shows a list of the control cards and their descriptions.

Table 12-6 Control Card Parameters for Adding a Key

Control card parameter	Description
ADD	Add a new key
KEYLAB (or KL)	User label assigned to the key (up to 64 characters, left-justified)
KEYALG	Key algorithm (strength)—DES1, DES2, DES3, AES128, AES192, AES256, or KEK (for key encryption key)
VAL	****Not used if the encryption key is to be generated by CopyCrypt.*** This parameter is used only if an encryption key is being supplied in the clear or encrypted form. If supplying an encryption key, this parameter is entered as follows: First byte is a "C" for clear keys, "E" for encrypted keys Second byte is a "," (comma) Next is the full clear or encrypted key in HEX format
KEKLAB (or EL)	Label of an existing key encryption key already in the key database that is to be used to decrypt the key if the key is passed in encrypted form.
PASSWORD	Actual password up to 32 characters in length.

Note All new keys added to the CopyCrypt key database (whether generated by CopyCrypt or supplied by the user using the VAL statement) are tested during the ADD process to make sure they are not weak. A key that is weak does not offer sufficient encryption protection and, further, cannot be used by the RSA Security, Inc. software licensed by CopyCrypt.

Figure 12-9 shows an example of three control card keys being added to the CopyCrypt Key Database.

```
    ADD KEYLAB(KEY11111)  KEYALG(DES1)
    ADD KEYLAB(KEYAES128) KEYALG(AES128)
    ADD KEYLAB(KEYPASS1)  KEYALG(AES128) PASSWORD(PASSWORDKEY)
    ADD KL(ACCOUTING#KEY)  KEYALG(AES128)    +
    VAL(C,A539B13D726A4B9D1763C54282E313B8)   <-- PASS KEY VALUE IN THE CLEAR
    ADD KL(DR2KEY)  KEYALG(AES128)      KEKLAB(KEK#FOR#ENCRYPTED)  +
    VAL(E,A539B13D726A4B9D1763C54282E313B8)   <-- PASS KEY VALUE IN  ENCRYPTED
 FORMAT
```

Figure 12-9 Add Three New Keys

Renaming a Key

The key rename function is used to change the key label name assigned to a key. To rename a key label in the CopyCrypt Key Database, edit the *KEYDBUPD* member of the JCLLIB library and update the JCL and RENAME control cards according to the instructions in the JCL comments. Then, submit the job. See Table 12-7.

Table 12-7 Control Card Parameters for Renaming a Key

Control card parameter	Description
RENAME	Change the label name of an existing key
KEYLAB (or KL)	Existing user label assigned to the key (up to 64 characters, left-justified)
NEWLAB (of NL)	New user label to assign to the key (up to 64 characters, left-justified)

Figure 12-10 shows an example of renaming a key in the CopyCrypt Key Database.

```
       RENAME  KL(KEY55555555)   +
               NL(KEY66666666)
```

Figure 12-10 Rename a key

Expiring a Key

To expire a key in the CopyCrypt Key Database, edit the *KEYDBUPD* member of the JCLLIB library and update the JCL and EXPIRE control cards according to the instructions in the JCL comments. Then, submit the job.

Note When a key is expired it can no longer be used for further encryption processing. However, the key will still be available for decryption processing.

Table 12-8 Control Card Parameters for Expiring a Key

Control card parameter	Description
EXPIRE	Expire an existing key label
KEYLAB (or KL)	Existing key label assigned to the key. Up to 64 characters, left-justified

```
        EXPIRE KL(KEYAES192)
```

Figure 12-11 Expire a key

Deleting a Key

To delete a key in the CopyCrypt Key Database, edit the *KEYDBUPD* member of the JCLLIB library and update the JCL and DELETE control cards according to the instructions in the JCL comments. Then, submit the job.

Note Deleting a key must be done as a two-step process for safety purposes. The first DELETE process places the key in delete-pending status. If a second DELETE process is performed, the key is actually deleted. The two delete statements can be placed in the same job, or in separate jobs with the second job being run at any later time.

Note Once a key is deleted from the key database, it can no longer be used to encrypt OR decrypt data. Use caution when deleting keys.

Table 12-9 Control Card Parameters for Deleting a Key

Control card parameter	Description
DELETE	Delete a key from the key database
KEYLAB (or KL)	Existing key label assigned to the key to be deleted (up to 64 characters, left-justified)

```
DELETE KEYLAB(KEYAES256)   first time marks "delete pending"
DELETE KEYLAB(KEYAES256)   second time performs the actual delete
```

Figure 12-12 Control card example - Delete a key

Printing Password Values

To print the actual value of a password that resides in the key database, edit the *KEYDBUPD* member of the JCLLIB library, and update the JCL and PRTPSW control cards according to the instructions in the JCL comments. Then, submit the job.

Table 12-10 Control Card Parameters for Printing Password Values

Control card parameter	Description
PRTPSW	Print a password from the key database
KEYLAB (or KL)	Existing key label assigned to the password (up to 64 characters, left-justified)

```
PRTPSW KEYLAB(KEYAES256)
```

Figure 12-13 Print Password Value

Job Summary Report

The Job Summary Report is produced by the *KEYDBUPD* job to show the results of any additions or changes to the CopyCrypt KEYDB. See Figure 12-14.

```
REL x.x.x  PTF x                          D R / X P E R T
PROGRAM xxxxxxxx

DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     JOB SUMMARY REPORT FOR
OPENTECH_SYSTEMS,INC.                                  PAGE        1

KEY ADDED   SUCCESSFULLY: KEY11111

KEY ADDED   SUCCESSFULLY: KEYAES128

KEY ADDED   SUCCESSFULLY: KEYPASS1

*********************************************************************

 KEYDB HEADER RECORD RE-WRITTEN AS PART OF SHUTDOWN PROCESSING

*********************************************************************
ADD     STATEMENTS SUCCESSFULLY PROCESSED:        3

EXPIRE  STATEMENTS SUCCESSFULLY PROCESSED:        0

DELETE  STATEMENTS SUCCESSFULLY PROCESSED:        0

RENAME  STATEMENTS SUCCESSFULLY PROCESSED:        0

RANDOM  STATEMENTS SUCCESSFULLY PROCESSED:        0

MASTER  STATEMENTS SUCCESSFULLY PROCESSED:        0

*************************************************************

     USER  STATEMENTS:        3
```

Figure 12-14 KEYDBUPD Job Summary Report

Validate and Report on the KEYDB

The *KEYDBVAL* member of the DR/Xpert JCLLIB contains JCL for a job that will read the CopyCrypt key database, verify that all CopyCrypt control records are present, and check the validity of the control records and the user keys. Any errors are reported. The *KEYDBVAL* job also lists all of the user keys in the KEYDB, including the type of key, the date it was created, the last date it was used, and other historical information.

While it is not necessary to schedule *KEYDBVAL* to run regularly, the job can be run as needed to check the status and correctness of the KEYDB or to list all of the keys (no clear key values are displayed in the report). It is recommended that the *KEYDBVAL* job be run before making changes to the master key to make sure that there are no errors in the key database.

To run the key database validation and reporting job, edit the *KEYDBVAL* member of the JCLLIB library and update the JCL according to the instructions in the JCL comments. Then, submit the job.

The CopyCrypt Key Database Validation Report is shown in Figure 12-15.

The CopyCrypt Key Database Listing Report is shown in Figure 12-16.

```
REL x.x.x  PTF x                              D R / X P E R T
PROGRAM xxxxxxxx

DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     COPYCRYPT KEY DATABASE REPORT FOR
OPENTECH_SYSTEMS,INC.                         PAGE      1

  A VALID KEY DATABASE HEADER RECORD IS PRESENT
  HEADER RECORD LAST UPDATED: 04/12/07  10:04:01

  KEY DB LAST BACKED UP USING OT OTUL3035: 04/09/07  13:56:50
  KEY DB LAST BACKUP DATASET NAME: CPYCRYPT.KEY.DB.BKUP.G0003V00

  KEY DB LAST RESTORED OT OTUL3036: 04/09/07  11:21:57
  KEY DB LAST RESTORE DATASET NAME: OT08.KEYDB.BKUP.G0022V00

  THE MASTER KEY RECORD DOES NOT APPEAR TO HAVE ERRORS
  THE MASTER KEY VERSION NUMBER IS:       8
  MASTER KEY LAST UPDATED: 04/09/07  13:55:40

ALL KEY DATABASE CONTROL RECORDS WERE PRESENT
```

Figure 12-15 CopyCrypt Key Database Report (Validation Report)

```
 REL x.x.x  PTF x                                    D R / X P E R T                                    PROGRAM
xxxxxxxx

DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     COPYCRYPT KEY DATABASE REPORT FOR OPENTECH_SYSTEMS,INC.
PAGE      1
 ***********************************************************************************************************
 *  "ERR"      - "ERR" : ERROR WITH THIS USER KEY
 *               SEE MESSAGES IN DBREPORT
 *  "PW"       - "P" IF KEY IS A PASSWORD
 *  "EX"       - "EX" IF KEY IS EXPIRED
 *  "DP"       - "DP" IF KEY IS DELETE PENDING
 *  "CR DATE"  - DATE KEY CREATED
 *  "LST DATE" - DATE KEY LAST USED
 *  "USE-E"    - TIMES KEY USED FOR ENCRYPTION
 *  "USE-D"    - TIMES KEY USED FOR DECRYPTION
 ***********************************************************************************************************
 ERR KEY LABEL ----------------------------------------------------+  TYPE  PW  EX  DP  CR DATE   LST DATE USE-E  USE-D

     EEEKEY                                                          DES1           DP  03/05/07  00/00/00     0     0
     KEK5                                                            KEK                03/05/07  04/12/07    11     5
     KEYAA                                                           AES128             03/05/07  04/12/07     2     1
     KEYAAA1                                                         DES3               03/27/07  04/10/07     1     0
     KEYAAA2                                                         DES3               03/27/07  00/00/00     0     0
     KEYAAA4                                                         DES3               03/27/07  04/10/07     1     1
     KEYBBA2                                                         DES3               04/02/07  00/00/00     0     0
     KEYBBA4                                                         DES3       EX      04/02/07  00/00/00     0     0
     KEYBBA5                                                         DES3               04/02/07  00/00/00     0     0
     KEYBBA6                                                         DES3               04/02/07  00/00/00     0     0
     KEYBBA7                                                         DES3               04/02/07  00/00/00     0     0
     KEYCC                                                           AES256         DP  03/05/07  04/12/07     1     1

LAST ADDED USERKEY: 12345678901234567890123456789012345678901234567 8
 ***********************************************************************************************************
             USER KEY TOTALS
         USER KEYS:        100
 ***********************************************************************************************************
         DES1 KEYS:          2
         DES2 KEYS:          1
         DES3 KEYS:         82
       AES128 KEYS:          6
       AES192 KEYS:          3
       AES256 KEYS:          5
         USER KEKS:          1
 ***********************************************************************************************************
     PASSWORD KEYS:          5
      EXPIRED KEYS:         14
  DELETE PEND KEYS:          6
      RENAMED KEYS:          7
 ***********************************************************************************************************
     OTUL3026 JOBS:         65
```

Figure 12-16 CopyCrypt Key Database Report (Key Listing Report)

KEYDB Components and Logging Structure

In order to provide high availability of the Key database, all updates to the database are logged to a separate log file before being written to the database. In the event that it becomes necessary to restore the CopyCrypt Key Database from a backup, the key database log records can be applied to the backup in a "forward recovery" mode to restore the contents of the database.

There are four dataset components of the KEYDB and its logging structure:

- *KEY Database (KEYDB)*
- *KEYDB Log (Active Log)*
- KEYDB Backup
- KEYDB Backup Log

KEY Database (KEYDB)

The KEYDB is the repository for all encryption key information. Generally, all encryption/decryption jobs use the same KEYDB. The database was created in "*Creating the CopyCrypt Key Database*" earlier in this chapter and is identified by the *KEYDB-DATASET-NAME* parameter.

Note The integrity of the CopyCrypt Key Database is critical! Without access to the Key database, keys needed to decrypt already encrypted data may not be available - making the encrypted data unreadable and also preventing any new data from being encrypted. Read and understand this section so that proper steps are taken to ensure the availability of the key database.

KEYDB Log (Active Log)

The KEYDB Log is used to record all updates to the KEYDB. The KEYDB Log contains entries for all updates to the KEYDB that were made since the previous backup of the KEYDB. At any point in time, the KEYDB Backup, the KEYDB Log backup, and the KEYDB Active log can be used to restore or recover the KEYDB. The KEYDB Log is referred to as the "Active log" to distinguish it from the backup log.

Immediately before each KEYDB update, CopyCrypt writes a log record of the update to the KEYDB log. The KEYDB Log is a GDG with a maximum of 255 generation data group datasets. When the first log record is written, the log is started at generation 1 (G0001V00) of the active log. Each time a log record is written, the new log record is appended to the end of the log. When a log dataset expands to its maximum number of extents, and the last extent fills, the log will typically receive either a D37 or E37 abend. CopyCrypt typically recovers from this abend, creates a new generation of the log, and proceeds using the new log file.

The KEYDB log is sized so that each generation of the log can hold the log records from at least one backup cycle. Each time a new log dataset is created, an informational WTO message is issued. If the new generation number is greater than 0010, a warning message is issued to remind the user to backup the KEYDB and KEYDB log using the *KEYDBBK* job in the DR/Xpert JCLLIB as described in *KEYDB Backup Log*. The job will end with a condition code of four (cc=04).

The record format of the KEYDB Log is sequential with fixed length records. The record format is a "log" format which consists of the raw KEYDB record with a 16-byte log prefix or header. The log header contains the date and time that the log record was written and an indicator of whether the KEYDB update was an add, a delete, or an update.

The log name is specified using the *KEYDB-LOG-GDG-BASE* parameter. The KEYDB Log is a GDG with a maximum of 255 generations. If this GDG expands to more than 255 generations, CopyCrypt will fail, as it will no longer be able to update the key database. Warning WTO messages are issued before this occurrence to alert the user that a backup is required.

Note It is imperative that the KEYDB and KEYDB Log are backed up regularly as described in the "*KEYDB Backup Log*" section.

KEYDB Backup

The KEYDB Backup is a backup copy of the KEYDB. The format of the Database Backup is sequential, with fixed length records. The record format is an unload format which consist of the raw KEYDB record with a 16-byte log prefix or header. The log header contains the date and time of the backup and an indicator that the record was created by an unload activity.

The KEYDB backup name is specified using the *KEYDB-BACKUP-FILE-GDG-BASE* parameter. The KEYDB Backup is a GDG with a maximum of 10 generations.

KEYDB Backup Log

The KEYDB Backup Log is a copy of the active log. The KEYDB Log is backed up along with the KEYDB when the *KEYDBBK* job is executed (see "*Backing up the CopyCrypt Key Database*"). The *KEYDBBK* backup job does not need to be executed twice to back up both files.

The log name is specified using the *KEYDB-BACKUP-LOG-GDG-BASE* parameter. The KEYDB Backup Log is a GDG with a maximum of 10 generations.

Backing up the CopyCrypt Key Database

Warning The *KEYDBBK* job should be scheduled to run on a regular basis. We recommend at least once per week.

To back up the CopyCrypt Key Database to the KEYDB Backup and the Active Log to the Backup Log, edit the *KEYDBBK* member of the JCLLIB library, update the JCL according to the instructions in the JCL comments, and submit the job.

The following DD statements are dynamically allocated by the *KEYDBBK* backup job:

- KEYDB—The Database (KEYDB)
- KEYDBLOG—The Database Log (Active Log)
- KEYDBBKD—The Database Backup
- KEYDBBKL—The Database Log Backup

Note Do not override these allocations unless directed by Technical Support.

```
 REL x.x.x  PTF x                          D R / X P E R T
PROGRAM xxxxxxxx

 DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     KEYDB BACKUP REPORT FOR
OPENTECH_SYSTEMS,INC.                                 PAGE      1

  KEY DATABASE WILL BE BACKED UP TO: OT02.OTSCLM.KEYDB.BK.G0001V00
  BEGINNING BACKUP OF KEYDB TO THE KEYDB BACKUP FILE
  THE BACKUP OF THE KEYDB WAS SUCCESSFUL
   NUMBER OF KEYDB RECORDS COPIED TO BACKUP:         11

  ACTIVE LOG(S) WILL BE BACKED UP TO: OT02.OTSCLM.KEYDB.LOG.BK.G0001V00
  BEGINNING BACKUP OF ACTIVE LOG DATASET(S) TO THE BACKUP LOG FILE
  THE BACKUP OF THE ACTIVE LOG WAS SUCCESSFUL
   NUMBER OF ACTIVE LOG RECORDS COPIED TO BACKUP:          5

  BEGINNING DELETE OF ALL ACTIVE LOG GENERATIONS
  THE DELETE OF THE ACTIVE LOG WAS SUCCESSFUL


  BACKUP OF KEY DATABASE WAS SUCCESSFUL
```

Figure 12-17 KEYDB Backup Report

Restoring the CopyCrypt Key Database

To restore the CopyCrypt Key Database from the KEYDB Backup and the Active Log from the Backup Log, edit the *KEYDBRST* member of the JCLLIB library, update the JCL according to the instructions in the JCL comments, and submit the job.

The JCL in the *KEYDBRST* member of JCLLIB can be used to restore the KEYDB. By default, job *KEYDBRST* will use the most recent Database Backup File generation and all Active Log File generations to restore the KEYDB to its current state. If the KEYDB exists at the time that job
KEYDBRST is executed, job *KEYDBRST* will delete the KEYDB and completely rebuild it.

To restore a generation of the Database Backup File that was made earlier than the most recent backup, add a KEYDBBKD DD statement to the *KEYDBRST* JCL to specify an earlier generation of the KEYDB Backup, as shown in the DD statement below:

```
//KEYDBBKD DD DSN=OT.XXX.KEYDBBKD(-9),DISP=SHR
```

The above example will restore the -9 generation of the KEYDB Backup. Job *KEYDBRST* will also reapply all updates that were made to the KEYDB since the -9 generation of the KEYDB Backup was made. When a KEYDBBKD DD statement is added to the *KEYDBRST* JCL, the *KEYDBRST* job searches all generations of the KEYDB Log Backup and the Active KEYDB Log to find all key database updates that were made after the KEYDB Backup that is being restored and applies all of those updates to the restored key database. The *KEYDBRST* job can be run at any time to delete and reload the KEYDB.

Note Job *KEYDBRST* cannot be executed while any other CopyCrypt jobs are accessing the KEYDB.

To restore the CopyCrypt Key Database from a KEYDB Backup, edit the *KEYDBRST* member of the JCLLIB library, update the JCL according to the instructions in the JCL comments, and submit the job.

The following DD statements are dynamically allocated by the *KEYDBRST* restore job:

- KEYDB—The Key Database (KEYDB)
- KEYDBLOG—The Database Log
- KEYDBBKD—The Database Backup
- KEYDBBKL—The Database Log Backup
- KEYDBWRK—A work file that exists for the life of the KEYDBRST job.

Note With the exception of KEYDBBKD as documented above, do not override these allocations unless directed by Technical Support.

```
 REL x.x.x  PTF x                          D R / X P E R T
PROGRAM xxxxxxxx

 DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     KEYDB RESTORE REPORT FOR
OPENTECH_SYSTEMS,INC.                                    PAGE      1

  WORKFILE DATASET NAME: OT08.KEYDB.KEYDBWRK
  KEY DATABASE BACKUP FILE USED: OT08.KEYDB.BKUP.G0012V00
  BEGINNING COPY OF KEYDB BACKUP FILE TO THE WORK FILE
  KEYDB BACKUP SUCCESSFULLY COPIED TO WORK FILE
   KEYDB BACKUP: RECORDS COPIED TO WORK FILE:         65

 THE MOST CURRENT VERSION OF THE KEYDB BACKUP WAS USED, SO THE BACKUP LOG WILL NOT
BE USED

  BEGINNING COPY OF ACTIVE LOG DATASET(S) TO THE WORK FILE
  ACTIVE LOG FILE(S) USED: OT08.KEYDB.LOG.G0001V00
  ACTIVE LOG RECORDS IN THIS GDG GENERATION:         18

  ACTIVE LOG SUCCESSFULLY COPIED TO WORK FILE
  TOTAL ACTIVE LOG RECORDS COPIED TO BACKUP:         18
  BEGINNING SORT OF KEYDB WORKFILE
  THE SORT OF THE WORK FILE WAS SUCCESSFUL

  BEGINNING DELETE REDEFINE OF KEY DATABASE
  KEY DATABASE DATASET NAME: OT08.KEY.MARCHY.OT.KEY.DB                    DID NOT
EXIST, SO WAS NOT DELETED
  THE DELETE AND REDEFINE OF THE KEY DATABASE WAS SUCCESSFUL

  BEGINNING RELOADING RECORDS TO KEY DATABASE
  KEY DATABASE DATASET NAME: OT08.KEY.MARCHY.OT.KEY.DB
  THE KEY DATABASE WAS SUCCESSFULLY RESTORED FROM THE BACKUPS

      RELOAD PHASE TOTAL RECORDS READ:         83

  RELOAD PHASE DELETE RECORDS SKIPPED:          1
   RELOAD PHASE OLDER RECORDS SKIPPED:          6

     RELOAD PHASE ADD RECORDS WRITTEN:          9
  RELOAD PHASE UPDATE RECORDS WRITTEN:          3
  RELOAD PHASE UNLOAD RECORDS WRITTEN:         64

   RELOAD PHASE TOTAL RECORDS WRITTEN:         76

  BEGINNING UPDATE OF HEADER RECORD
  UPDATE OF THE HEADER RECORD WAS SUCCESSFUL

RESTORE OF KEY DATABASE WAS SUCCESSFUL
```

Figure 12-18 KEYDB Restore Report

Testing the Restore/Recovery of the KEYDB

CopyCrypt allows users to test the recovery process for the KEYDB by using the JCL in the *KEYDBCMP* member of the JCLLIB to compare the original KEYDB with the recovered KEYDB. This process will verify that two CopyCrypt key databases are the same, except for header dates and other items that are expected to change.

To test recovery of the CopyCrypt Key Database and compare two key databases, edit the KEYDBCMP member of the JCLLIB library, update the JCL according to the instructions in the JCL comments, and submit the job.

```
 REL x.x.x  PTF x                          D R / X P E R T
PROGRAM xxxxxxxx

 DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     COPYCRYPT COMPARE KEY DATABASES REPORT
FOR OPENTECH_SYSTEMS,INC.              PAGE      1

  KEY DATABASE1 DATASET NAME: OT08.KEY.MARCHX.OT.KEY.DB

  KEY DATABASE2 DATASET NAME: OT08.KEY.MARCHY.OT.KEY.DB

 THE RECORDS IN THE 2 DATABASES ALL MATCH. THE DATABASES ARE IDENTICAL
  DATABASE 1 HAS:         76  RECORDS
  DATABASE 2 HAS:         76  RECORDS
```

Figure 12-19 CopyCrypt Compare Key Databases Report

Securing the Key Database

As stated previously, the integrity and availability of the CopyCrypt Key Database is critical so that the keys needed to decrypt the encrypted data be available and the data be usable. For this reason, it is also important to restrict access to the key database to prevent unintentional or intentional corruption.

Note OpenTech Systems recommends creating security rules using your Security Management Software (such as RACF) to protect the key database and associated CopyCrypt programs.

This section provides sample RACF commands that can be used to protect the CopyCrypt Key Database and the programs that manage the Key Database.

Warning These functions should be performed by your RACF administrator or other authorized personnel only.

Security Control of the Key Database

Add Group CopyCrypt as a group under SYS1 to grant access to the Database and Programs. CPYCRYPT is used as the RACF Group profile name in the following example. You can choose to use another name if desired.

```
ADDGROUP CPYCRYPT …… OWNER(SYS1) …… SUPGROUP(SYS1)
```

The CopyCrypt Key Database should be defined to your security system with a generic dataset profile and should be given a UACC of NONE.

```
ADDSD 'OT.DRX..KEY.DB*' …… UACC(NONE) …… OWNER(CPYCRYPT) ……
DATA('CopyCrypt Key DB')
```

The CopyCrypt Key Database should only grant ALTER Access to the users that are given the authority to Create/Update/Manage the Master and User Keys.

PERMIT 'OT.DRX..KEY.DB*' …… ID(*uuuuuu*) …… ACCESS(ALTER)

(where *uuuuuu* is the explicit userids or group(s) that will Control the CopyCrypt Key Database)

The CopyCrypt Key Database should only grant CONTROL Access to the user or group that will be executing CopyCrypt Encryption/Decryption Jobs.

PERMIT 'OT.DRX..KEY.DB*' …… ID(uuuuuu) …… ACCESS(CONTROL)

(where *uuuuuu* is the explicit userids or group(s) that will Access the CopyCrypt Key Database and should include the userid that the production jobs run with)

Security Control of the Key Database Management Programs

The CopyCrypt Utility Programs OTUL* should be defined to your security system (RACF) with the PROGRAM profile and should be given a UACC of NONE.

RDEFINE PROGRAM OTUL* ADDMEM('OT.DRX.LOADLIB'//NOPADCHK) …… UACC(NONE) …… OWNER(CPYCRYPT)

The CopyCrypt Utility Programs OTUL* ALTER Access should be granted to the Users or Groups that have authority to Execute the CopyCrypt Management Programs.

PERMIT CLASS(PROGRAM) 'OTUL*' …… ID(uuuuuu) …… ACCESS(ALTER)

(where *uuuuuu* is the explicit userids or group(s) that will Control the CopyCrypt key database)

The CopyCrypt Utility Programs OTUL* UPDATE Access should be granted to the Production Job Userid(s) that have authority to Execute the CopyCrypt Management Programs.

PERMIT CLASS(PROGRAM) 'OTUL*' ……. ID(uuuuuu) …. . ACCESS(UPDATE)

(where *uuuuuu* is the explicit userids or group(s) that will Control the CopyCrypt Key Database and should include the userid that the production jobs run with)

Note Refer to the z/OS V1R4.0 or higher Security Server RACF Security Administrator's Guide for more detailed information.

Supported Encryption Algorithms

Supported Encryption AlgorithmsSupported Encryption Algorithms Table 12-11 is a list of the encryption algorithms supported by CopyCrypt. CopyCrypt is OpenTech Systems' encryption component and is available for licensed DR/Xpert customers.

Any one of the algorithms in Table 12-11 can be specified as an encryption string that DR/Xpert will use.

OpenTech Systems recommends that the encryption algorithms in the <keylabel> format are used with DR/Xpert backups because those that use a password are better suited for business-to-business file copies.

Table 12-11 Supported Encryption Algorithms

A-<keylabel>	The selected files will be encrypted using the AES encryption algorithm and the key specified by the <keylabel> value
U-<keylabel>	The selected file will be encrypted using the DES encryption algorithm and the key specified by the KEYLABEL value. The specified key will also control whether DES or 3DES is used.
K-<keylabel>	The selected file will be encrypted using an automatically generated key that is encrypted using the key encryption key specified by KEYLABEL.
P-3DES-<password>	The selected file will be encrypted using the 3DES encryption algorithm and the specified password. The password can be up to 32 characters long.
P-A128-<password>	The selected file will be encrypted using the AES128 encryption algorithm and the specified password. The password can be up to 32 characters long.
P-A256-<password>	The selected file will be encrypted using the AES256 encryption algorithm and the specified password. The password can be up to 32 characters long. DR/Xpert fully supports this keyword with CRYPTDSS and CopyCrypt. DR/Xpert inserts "ENCRYPT(CLRAES256)" in anticipation of IBM's eventual support for this algorithm in DFDSS.
ASIS (or NONE)	No encryption

Defining Encryption Rules in CRYPTRUL

The *CRYPTRUL* member of DR/Xpert's PARMLIB library is used to specify rules that separate or categorize datasets into different DR/Xpert aggregates, depending on which files should be encrypted and which files should be standard DFSMSdss backups. This table uses a simple IF, AND, OR, THEN, DEFAULT logic making the rules easy to define. Each line in a *CRYPTRUL* table may only specify one statement.

Each *CRYPTRUL* rule consists of:

- The **rule logic modifier** (IF, AND, OR), which may be sub-modified with the BY modifier, and **command verbs** (THEN, DEFAULT)
- The **compare field** is one of the following: DSNAME (or DSN), MEDIA, TOKEN, DRIVER, DUMP, RESTORE, APPLNAME (or APPL)
- The **comparison operator** (EQ, NE, GT, etc.)
- The **comparison data or table name**. Comparison data can be specific character strings, character pattern strings, or a PARMLIB member table.
- The **encryption strings** used with THEN and DEFAULT command verbs. This value is used to specify the type of encryption to be used when a true condition is set for the IF, AND, OR statement set

The encryption rules table options are discussed in more detail on the next several pages of this chapter.

```
     Menu  Utilities  Compilers  Help
   ---------------------------------------------------------------------------
---
   BROWSE    OT17.PREV.DRXPERT.PARMLIB(CRYPTRUL) - 11.10  Line 00000073 Col 001
080
   Command ===>                                                Scroll ===> CSR
  ************************************************************************
  *
  *      COMPARE    COMPARE
  *RULE   FIELD  OP  DATA
  *----+ +-----+ -- +----------------------------------------+
  IF     APPL    EQ PAYROLL
  THEN A-KEYLABEL
  DEFAULT NONE
  ******************************** Bottom of Data
********************************
```

Figure 12-20 CRYPTRUL Rule Example

Rule Logic Modifiers

The rule logic modifier is used to specify how the encryption rule statement is processed relative to the previous statement in the table.

IF, NEW, AND, OR Modifiers

If the rule logic modifier is **IF**, **NEW**, or not specified (blank), then the current statement becomes the first statement of a new encryption rule entry.

If the rule logic modifier is **AND**, this indicates that the previous statement and the current statement are part of the same rule and both statements must be "true" for a candidate to be assigned to this encryption rule entry.

If the rule logic modifier is **OR**, this indicates that the previous statement and the current statement are part of the same rule and either statement must be "true" for a candidate to be assigned to this encryption rule entry.

BY Sub-Modifier

The **BY** rule logic sub-modifier can be used with any of the rule logic modifiers or by itself (which is the same as when it is specified with **IF** or **NEW**). The **BY** sub-modifier is helpful in reducing the number of statements that must be coded in the DR/Xpert Rules table to create separate encryption groups because the user can provide a list of comparison criteria in the form of a table.

The **BY** sub-modifier requires that the comparison data is a table name (a member within the DR/Xpert PARMLIB library), and it causes a different encryption group to be created for each entry in the table.

If the rule logic sub-modifier of **BY** is specified, any statements that follow the **BY** statement must begin a new encryption rule group. Specifying a rule logic modifier of **OR** or **AND** on the statement following a **BY** statement will result in a warning messages, and the **OR** or **AND** statement will be ignored.

THEN, DEFAULT Verbs

The **THEN** verb is used to specify the action that should be taken if the encryption rule is “true”. If no **THEN** verb is specified or none of the encryption rules are “true”, then the value of the **DEFAULT** verb specifies the action that DR/Xpert should take. In the case that there is no **DEFAULT** statement specified, DR/Xpert uses an assumed default of “NONE” (no encryption).

Supported actions for the **THEN** and **DEFAULT** verbs are the strings listed in the section “*Supported Encryption Algorithms*”.

Compare Field

The compare field codes are used to identify which criteria will be compared with the user-defined comparison data.

Table 12-12 Compare Field Codes

Field Compare Code	Description
DSNAME (or DSN)	This is the specified DSNAME or DSNAME that uses encrypted characters
MEDIA	Media has two values: DISK or TAPE
ATLNAME (or ATL)	ATLNAME is an eight-character name containing one of your automatic tape library or 'NONE'; 'NONE' is the value when dataset resides on disk.
MIGRATED	YES or NO
APPLNAME (or APPL)	APPLNAME is an application name or pattern defined by the APPLRULE member.
STORCLAS	SMS Storage Class

Comparison Operators

The following table provides a list of the comparison operands supported for encryption rule processing.

Table 12-13 Comparison Operators

Comparison	Operator Description
EQ	Equal
NE	Not equal
GT	Greater than
LT	Less than
GE	Greater than or equal
LE	Less than or equal

Comparison Data

The comparison data is the user-defined dataset or dataset name pattern that will be compared to dataset names, applications, or other fields described earlier in this chapter.

This field supports a fully qualified string, a string containing wildcard characters, or the member name of a DR/Xpert PARMLIB library member that contains strings with wildcards. If using a member name, it must be prefaced with a ">" character to identify the value as a member name. (See "*Using a Table as Comparison Data*").

The content of the string depends on the comparison field to which the string is compared should be a consistent object. Dataset names should be coded as compare objects with the DSNAME field name; application names should be coded as compare objects to the APPLNAME field name, and similarly with each field name and its comparison object.

Using a Table as Comparison Data

As stated in "*Comparison Data*", CRYPTRUL processing accepts the name of a DR/Xpert PARMLIB member as the comparison data. The PARMLIB member should contain a table of dataset names or dataset name patterns. The PARMLIB member name should be prefixed by the > symbol to distinguish it from standard comparison data.

For example:

```
>CRYPTDAT
```

CRYPTDAT would need to be a member in the DR/Xpert PARMLIB library.

If used as the comparison data for an IF, AND or OR statement, then each specified entry in the PARMLIB member compared to the value of the compare field, and any string that matches any of the entries are selected for that encryption rule group. The entries in a member used for comparison data for IF, AND or OR predicate should be in the form of a list with one entry per line. The example shown in Figure 12-21 uses application names, but the same concept is true for any other comparison field and data.

```
  ****** ****************************** Top of Data
******************************
  000001 FILEA.PROD.LIST
  000002 FILEB.PROD.LIST
  000003 FILE*.WORK.LIST
  ****** **************************** Bottom of Data
****************************
```

Figure 12-21 Dataset Name Comparison

Each entry in the PARMLIB member table will be part of the same encryption rule (all will receive encryption, or all will be backed up without encryption).

If used as the comparison data for a BY statement, then each entry in the specified PARMLIB member compared to the value of the compare field, and each entry in the member generates a separate encryption group. The entries in a member used for comparison data for BY sub-statements should be in the form of "comparison data1 THEN value1", as shown is Figure 12-22.

```
  ****** ****************************** Top of Data
******************************
  000001 FILEA.PROD.LIST THEN NONE
  000002 FILEB.PROD.LIST THEN ENCRYPT
  000003 FILE*.WORK.LIST THEN NONE
  ****** **************************** Bottom of Data
****************************
```

Figure 12-22 Comparison Data Encryption

Each entry in the PARMLIB member table will create a new rule ID (each will receive the individually specified encryption settings).

Non-CopyCrypt Encryption Keys

You may decide to perform encryption supported by DFDSS without using any of DR/Xpert's encryption keywords. In this case, code DFDSS encryption directives such as CLRTDES, CLRAES128, and other keywords inside DFDSS control members. Implement the backups governed by these DFDSS control members using DR/Xpert's collocation strings. This implementation of encryption is done in a mode where DR/Xpert is unaware that DFDSS is providing encryption services.

As with the encryption string, the collocation string allows you to be selective in assigning this type of DFDSS encryption to a limited or a wide variety of datasets, applications, and other comparison fields.

Note Refer to Chapter 11 for more details regarding collocation settings.

Note Currently, DR/Xpert only supports tape-to-tape backup encryption using CopyCrypt.

Note Review the syntax for any IBM DFDSS encryption keywords in IBM publications DFSMSdss Storage Administration Guide and DFSMS Storage Administration Reference for information regarding available/suggested DFSMSdss encryption parameters.

Reports Generated by CopyCrypt Processing

This section discusses the types of reports generated by the CopyCrypt processing.

Rules Processor Report

The Rules Processor Report serves as a cross reference between the user-defined rules table and the DR/Xpert generated Rule ID's. A section is printed for each rules processing function that is in effect when the DR/Xpert job runs. Figure 12-23 shows the Rules Processor Report for the *CRYPTRUL* table.

The Rules Processor Report does not list the statement specified by a BY rule logic sub-modifier. It lists the rules that were generated based on the BY statement and the contents of the table it specified.

```
REL x.x.x  PTF x                          D R / X P E R T
PROGRAM OTCDB046
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx    RULES PROCESSOR REPORT FOR TABLE: CRYPTRUL
FOR OPENTECH_SYSTEMS                  PAGE      1

 + RULE  +      COMPARE
+---ID----+   +FIELD+ +-----------------COMPARE DATA-----------------+

      1 IF    MEDIA   EQ TAPE

        THEN  P-3DES-TAPECOPY

              DEFAULT P-3DES-CRYPTDSS

REL x.x.x  PTF x                          D R / X P E R T
PROGRAM OTCDB046
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx    RULES PROCESSOR REPORT FOR TABLE: COLOCTBL
FOR OPENTECH_SYSTEMS                  PAGE      1

 + RULE  +      COMPARE
+---ID----+   +FIELD+ +-----------------COMPARE DATA-----------------+

      1 IF    APPL    EQ JOBS-FOR-T
        AND   MEDIA   EQ DISK

       THEN  GROUP1.CRYPTDSS.DUMP.RESTORE

      2 IF    APPL    EQ JOBS-FOR-T
        AND   MEDIA   EQ TAPE

       THEN  GROUP2.TAPECOPY.NONE.NONE

      3 IF    MEDIA   EQ DISK

       THEN  GROUP3.CRYPTDSS.DUMP.RESTORE

       DEFAULT GROUP4.TAPECOPY.NONE.NONE
```

Figure 12-23 Rules Processor Report

Warning By default, this report displays the entire encryption setting value as defined in the rules table, and includes the key label or label of the key encrypting key (KEK). If you do not want these key labels to be displayed, modify the setting of the *SUPPRESS-ENCRYPTION-KEY-LABELS* parameter to "YES" so that the encryption key labels are not displayed.

Conversion Job Encryption Report

The Conversion Job Encryption Report (see Figure 12-24) is generated for all jobs performing encryption/decryption processing and shows the following information:

- **Input Dataset Name**—The name of the dataset being processed with encryption or decryption
- **E/D**—Action being performed (encryption or decryption)
- **ALG**—Key strength/algorithm
- **KEY**—Type of encryption key or password
- **LABEL**—Label of the key or key encrypting key or password, or indicator that the value was suppressed by user. The maximum length is 64-characters for a key label and 32-characters for a password
- **D/F**—Encryption key management and facility used
- **Comp %**—Percent the file was compressed

Warning By default, this report displays the key label or password used for encryption or decryption. If you do not want this information to be displayed, set the *SUPPRESS-ENCRYPTION-KEY-LABELS* parameter to "YES" in the member of the DR/Xpert PARMLIB.

```
 REL x.x.x  PTF x                          D R / X P E R T
PROGRAM OTDBS008

 DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     CONVERSION JOB ENCRYPTION REPORT FOR
OPENTECH_SYSTEMS_INC                       PAGE      1


*******************************************************************************
**************************************************
 *  "E/D" FIELD: ENC IS ENCRYPTION, DEC IS DECRYPTION
 *  "ALG" FIELD: KEY STRENGTH
 *       D1 = DES1, D2 = DES2, D3 = DES3, D? = DES?
 *       A1 = AES128, A2 = AES192, A3 = AES256, A? = AES?
 *  "KEY" FIELD: KEY TYPE
 *     AUTO - COPY/CRYPT GENERATED THE KEY:              DES3 KEY
 *     USER - USER PROVIDED THE LABEL OF THE KEY TO USE: DES KEY
 *     UAES - USER PROVIDED THE LABEL OF THE KEY TO USE: AES KEY
 *     PDE3 - USER PROVIDED PASSWORD TO USE, DES3
 *     PA12 - USER PROVIDED PASSWORD TO USE, AES128
 *     PA25 - USER PROVIDED PASSWORD TO USE, AES256
 *  "D/F" FIELD: D IS KEY DB USED   - "I" ICSF CKDS
 *                                  - "C" COPYCRYPT KEY DATABASE
 *                                  - "P" PASSWORD (NO KEY DATABASE USED)
 *               F IS FACILITY USED - ICSF OR SOFTWARE
 *                                    U IF SIMULATED
 *  "COMP%" FIELD: PERCENT DATA WAS COMPRESSED IF ENCRYPTION, OR N/A

*******************************************************************************
**************************************************

 INPUT DATASET NAME (TAPE) -----------------+ E/D ALG KEY  LABEL OF KEY TO USE OR
ACTUAL PASSWORD------------------------+  D/F COMP%

 OT.CRYPT.FB11000               ENC A2 UAES KEY#AES192
C S  96

 JOB END SUMMARY FOR DATASETS ENCRYPTED/DECRYPTED

               DATASETS ENCRYPTED:       1
               DATASETS DECRYPTED:       0
                   KEYS GENERATED:       0
                    KEYS PROVIDED:       1
                       (USER DES):       0
                       (USER AES):       1
                    KEYS PASSWORD:       0
                   (PASSWORD DES):       0
                   (PASSWORD AES):       0

       AVERAGE COMPRESSION PERCENT:      96
```

Figure 12-24 Conversion Job Encryption Report

Copy Report

The Copy Report (Figure 12-25) displays the results of the encryption or decryption operation, including the input dataset name or source and the output dataset name and volser (if successful).

```
 REL x.x.x  PTF x                          D R / X P E R T
PROGRAM OTDBS008

DATE: xx/xx/xxxx TIME: xx:xx:xx  COPY REPORT FOR OPENTECH_SYSTEMS_INC
PAGE      1


  DFDSS REQUEST NUMBER:     1
           INPUT DATASET NAME: INPUT DATA CAME FROM DFDSS
          OUTPUT DATASET NAME: OT10.TDBS2101.DKDBSN41.D2006303.T170827
              FIRST 5 VOLSERS: 001376

  THE ENCRYPTION AND WRITING OF DFDSS DATA WAS SUCCESSFUL



  DFDSS REQUEST NUMBER:     2
           INPUT DATASET NAME:   INPUT DATA CAME FROM DFDSS
          OUTPUT DATASET NAME: OT10.TDBS2101.DKDBSN42.D2006303.T170828
              FIRST 5 VOLSERS: 001376

  THE ENCRYPTION AND WRITING OF DFDSS DATA WAS SUCCESSFUL
```

Figure 12-25 Successful Copy and Encryption Operation Results

If the CopyCrypt job was not able to perform the requested function, this report states that the operation was unsuccessful. The user should examine the JES job log for a message that indicates the reason the operation was unable to complete.

```
REL x.x.x  PTF x                          D R / X P E R T
PROGRAM OTDBS008

DATE: xx/xx/xxxx TIME: xx:xx:xx  COPY REPORT FOR OPENTECH_SYSTEMS_INC
PAGE      1



THE ENCRYPTION AND WRITING OF DFDSS DATA WAS UNSUCCESSFUL. SEE ERROR MESSAGES IN
THE LOG FOR DETAILS
```

Figure 12-26 Unsuccessful Copy and Decryption Operation Results

EXCP Performance Report

The EXCP Performance Report provides statistics on the actual copy operation and the elapsed time required for encryption/decryption and compression/expansion of data processed by CopyCrypt.

A message may display at the top of the report, indicating that decryption was performed by this job, causing the block sizes and block counts of the input and output datasets to differ.

```
REL 2.2.4  PTF 1                                        D R / X P E R T                                                OTCDB070 JOB02747
DATE:  04/03/2012   TIME:  09:13:14      EXCP ANALYSIS AND PERFORMANCE DETAIL REPORT FOR OPENTECH_SYSTEMS_INC.          PAGE      1

                                                          MAX     MIN
                                                         READ    READ
   1ST                          BLOCKS                  BLOCK   BLOCK         COPY         COPY   IN  OUT        READ       WRITE
VOLSER   SEQ  MB/SEC RECFM      COPIED      BYTES COPIED  LENGTH  LENGTH ELAPSED TIME     CPU TIME VOLS VOLS       EXCPS       EXCPS
+----+ +---+ +-----+ +---+ +---------+ +---------------+ +-----+ +-----+ +----------+ +----------+ +--+ +--+ +---------+ +--------
-+
V00085     2    .041   F             6               880     160      80        0.021        0.007    1    1           7           6
DSNAME: OT18.DRX.VV00366.F0001.OT18.VTAPE.MOD

V00085     3    .062   F             6               880     160      80        0.014        0.009    1    1           7           6
DSNAME: OT18.DRX.VV00392.F0001.OT18.VTAPX.MOD


 EXCP ANALYSIS AND PERFORMANCE JOB END SUMMARY

      NUMBER OF BYTES COPIED:                        1,760
  PHYSICAL COPY ELAPSED TIME: 00 HOURS 00 MINS 00.035 SECS
      PHYSICAL COPY CPU TIME: 00 HOURS 00 MINS 00.016 SECS
      TOTAL JOB ELAPSED TIME: 00 HOURS 00 MINS 35.842 SECS
            TOTAL JOB MB/SEC:                  .000 MB/SEC
EXCLUDE MOUNT: TOTJOB MB/SEC:                   .000 MB/SEC
```

Figure 12-27 EXCP Performance Report (Showing Compression and Encryption)

13 Reports

TOPICS COVERED IN THIS CHAPTER

Introduction (page 13-2)

Identified Critical Datasets List (page 13-3)

Space Exception Report (page 13-4)

Update Exception Report (page 13-5)

Cross-Application Dependencies Report (page 13-6)

Cross-Application File Reference Report (page 13-7)

Cycle Completion Report (page 13-7)

Dataset Backup Cross Reference (page 13-8)

Dataset Backup Alerts Report (page 13-9)

Dataset Backup Problems Report (page 13-10)

Dataset Backup Cycle History Report (page 13-11)

Tape Error Report (page 13-13)

Critical Tape Report and Volser List (page 13-14)

Aggregate 99 Report (page 13-15)

Critical Dataset Recovery Report (page 13-16)

Introduction

DR/Xpert produces several reports for the purpose of ongoing product monitoring. These reports can be used in problem determination or as reference for the administration processes described in Chapter 15. By default, all reports are written to GDG's rather than listing them in the job SYSOUT so that the reports can be easily accessed by more users and because DR/Xpert "post-processes" some of the reports from DASD. These post-processes include checking the results from the backup to test for success or failure by dataset name, and checking the results from the restore to post the restore as complete for each dataset that was successfully restored.

Note Most reports can be referenced using the ISPF interface documented in Chapter 14.

These reports can also be written to SYSOUT using IEBGENER or some similar program in one of your scheduled production processes.

This chapter describes the reports and shows an example of each.

Reports generated by DR/Xpert:

- *Identified Critical Datasets List* (DSIREPRT)
- *Space Exception Report* (SPACEXPN)
- *Update Exception Report* (UPDTEXPN)
- *Cycle Completion Report* (CREPORT)
- *Dataset Backup Cross Reference* (DSNXREF)
- *Dataset Backup Alerts Report* (ALERTS)
- *Dataset Backup Problems Report* (XREFERRS)
- *Dataset Backup Cycle History Report* (DSNHIST)
- *Tape Error Report* (TAPERROR)
- *Critical Tape Report and Volser List* (TAPELIST)
- *Aggregate 99 Report* (EXREPORT)
- *Critical Dataset Recovery Report*

Identified Critical Datasets List

The Identified Critical Datasets List shows the final status of the BKPDBASE after all of the collection and path analysis processing has completed, and up to the first 5 jobs that reference the dataset.

Table 13-1 Report Field Descriptions

Field	Description
DATASET NAME	the dataset name for this entry
MEDIA TYPE	• D - DASD • S - SMSDASD • T - tape • K - cart • U - unknown
DSN ORG	• PS - physical sequential • PO - partitioned organization (PDS or PDS/E) • VS - VSAM • UN - unknown
DS TYPE	• G - GDG • N - non-GDG • F - GDG family • M - member of a PDS • P - pattern
JOB CNT	Number of jobs that use this dataset
JOB *n*	Jobname for job *n*
IO TYP	I/O intent for job *n* • O - output • I - input • U - unknown

Note The Identified Critical Datasets List can be accessed via the ISPF panels (see Chapter 14), or can be browsed in ISPF option 3.4 using dataset @dsprefix.bkpid.DSIRPRT.

```
REL x.x.x  PTF x                                    D R / X P E R T                                                    PROGRAM OTCDI031
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     BUILD TRIGGERS FROM CRITICAL LIST FOR OPENTECH_SYSTEMS,_INC.                       PAGE      1
BACKUP ID: BATCH

-----------------------------------------------------------------------------------------------------------------
(1) MEDIA: D-DASD, K/T-TAPE, M-MIGRATED
(2) ORG:   PS-SEQUENTIAL, PO-PARTITIONED, DA-DIRECT ACCESS, VS-VSAM, UN-UNKNOWN
(3) TYP:   G-GDG, N-NON GDG, F-GDG FAMILY, M-PDS MEMBER REFERENCE
(4) JCT:   OUTPUT JOB COUNT, THIS COUNT DOES NOT INCLUDE JOBS THAT OPEN CORRESPONDING FILE AS INPUT
           000 - IS A SPECIAL CASE, WHERE ALL JOBS USE THE CORRESPONDING FILE AS INPUT
(5) JOB#N: JOBNAME
(6) IO#N:  O-OUTPUT, U-UPDATE
-----------------------------------------------------------------------------------------------------------------
                                          (1) (2) (3) (4) (5)       (6)
DATASET NAME                             MED ORG TYP JCT JOB#1    IO#1 JOB#2    IO#2 JOB#3    IO#3 JOB#4    IO#4 JOB#5    IO#5
+----------------------------------------+ +-+ +-+ +-+ +-+ +------+ +--+ +------+ +--+ +------+ +--+ +---+   +--+ +--- +--+ +---+
HSM.MCDS                                  D  VS   N  004 DFSMSHSM   U  OT10X056   U  OT10X997   U  OT11X997   U
ISF.HASPINDX                              D  PS   N  013 OT09       U  OT02A      U  OT05       U  OT10       U  OT11A      U
OT.APPLA.SZ14.DATA0003.SFMV.DATASET       T  PS   N  001 DMVP8000   O
OT.TST.DRXPERT.B.BKPCOPY                  W  PS   G  001 BKPAB99P   O
OT.TST.DRXPERT.B.EXREPORT                 W  PS   G  001 BKPAB99P   O
OT.TST.DRXPERT.FILTDATA                   D  PS   N  001 OTCDIWKG   O
OT.TST.DRXPERT.JCLMODEL                   D  PS   N  001 OTCDTASK   O
OT.TST.DRXPERT.JMPFILT                    W  PS   G  001 OTCDCWKC   O
OT.TST.DRXPERT.JOBSTHIS                   W  PS   G  003 OTCDCDLC   O  OTCDCJD2   O  OTCDZJOB   O
OT.TST.DRXPERT.O.BKPCOPY                  W  PS   G  001 BKPAO99P   O
OT.TST.DRXPERT.O.EXREPORT                 W  PS   G  001 BKPAO99P   O
OT.TST.DRXPERT.PREDAILY                   W  PS   G  001 OTCDCDLB   O
OT.TST.DRXPERT.SUSPEND                    W  PS   G  001 OTCDCDLC   O
OT.TST.DRXPERT.VSAM.B.BKPDBASE            D  VS   N  020 BKPAB01P   U  BKPAB02P   U  BKPAB03P   U  BKPAB04P   U  BKPAB05P   U
OT.TST.DRXPERT.VSAM.B.BKPQUEUE            D  VS   N  006 OTCDBA99   U  OTCDBTAL   U  OTCDTASK   U  OTCDBIN1   U  OTCDBSWP   U
OT.TST.DRXPERT.VSAM.JDTFILEX              D  VS   N  002 OTCDBIN1   U  OTCDBWK2   U
OT.TST.DRXPERT.VSAM.O.BKPDBASE            D  VS   N  008 BKPAO99P   U  OTCDBSYN   U  OTCDOA99   U  OTCDOTAL   U  OTCDZCYC   U
OT.TST.DRXPERT.VSAM.O.BKPQUEUE            D  VS   N  004 OTCDOA99   U  OTCDOTAL   U  OTCDTASK   U  OTCDBIN1   U
OT.RELTEST.CA1R11.ZOS14.STATFILE          W  PS   G  003 CA11CA02   U  CA11CA10   U  OTTCCAND   U
OT.RELTEST.CA1R11.ZOS14.TMCDUMP.VOLCHAIN  D  PS   N  004 CA1ARCVY   O  CA11CA02   O  CA11CA10   O  OTTCCAND   O
OT.RELTEST.CA1R11.ZOS14.VOLCHAIN          D  VS   N  004 CA1ARCVY   U  CA11CA02   U  CA11CA10   U  OTTCCAND   U
OT.RELTEST.RMMZ14.ZOS14.EDGHSKP.MESSAGE   D  PS   N  001 RM14RM02   O
OT.RELTEST.RMMZ14.ZOS14.HTTOCXTR          D  VS   N  003 RM14RM02   U  OTTCCAND   U  OT06CONV   U
```

Figure 13-1 Example

Space Exception Report

This Space Exception Report lists any of the datasets that have been identified as critical, but cannot be located in any of the dataset inventories (on DASD, in the DFSMShsm archive, or in the tape management catalog). If the dataset cannot be located in any of these sources, an error message is issued.

There are 2 types of messages; status messages and error messages. The status messages are preceded with “**” and indicate counts or amounts of datasets analyzed. The two errors messages that may occur are:

- "DATA SET NOT FOUND ON DASD, TAPE, OR HSM", which means that DR/Xpert could not locate the dataset in the dataset inventories
- "VSAM MIGRATED OR COMP/PATH USED", which means that DR/Xpert could not find a DASD entry for a VSAM dataset

Note The Space Exception Report can be accessed via the ISPF panels (see Chapter 14), or can be browsed in ISPF option 3.4 using dataset @dsprefix.bkpid.SPACEXPN.

```
REL x.x.x  PTF x                                    D R / X P E R T                                                    PROGRAM OTCDI027
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     SPACE EXCEPTION REPORT FOR OPENTECH_SYSTEMS,_INC.                            PAGE      1

-------------------------------------------------------------------------------------------------------------------------------------
(1) MEDIA; D-DASD, K/T-TAPE, M-MIGRATED
(2) DSORG; PS-SEQUENTIAL, PO-PARTITIONED, DA-DIRECT ACCESS, VS-VSAM, UN-UNKNOWN
(3) TYPE;  G-GDG, N-NON GDG, F-GDG FAMILY
-------------------------------------------------------------------------------------------------------------------------------------

                                              (1)   (2)  (3)
DSNAME                                       MEDIA DSORG TYPE   DESCRIPTION
+----------------------------------------+  +---+ +---+ +--+   +---------------------------------------------+
HLQ.DRXPERT.DOCLIB                             D     PO   N     DATA SET NOT FOUND ON DISK, TMS, OR HSM
HLQ.DRXPERT.INSTALL                            D     PO   N     DATA SET NOT FOUND ON DISK, TMS, OR HSM
HLQ.DRXPERT.JCLLIB                             D     PO   N     DATA SET NOT FOUND ON DISK, TMS, OR HSM
HLQ.DRXPERT.MSGS                               D     PO   N     DATA SET NOT FOUND ON DISK, TMS, OR HSM
HLQ.DRXPERT.OBJ                                D     PO   N     DATA SET NOT FOUND ON DISK, TMS, OR HSM
HLQ.DRXPERT.PANELS                             D     PO   N     DATA SET NOT FOUND ON DISK, TMS, OR HSM
HLQ.DRXPERT.PARMLIB                            D     PO   N     DATA SET NOT FOUND ON DISK, TMS, OR HSM
HLQ.DRXPERT.REXX                               D     PO   N     DATA SET NOT FOUND ON DISK, TMS, OR HSM
HLQ.DRXPERT.SKELS                              D     PO   N     DATA SET NOT FOUND ON DISK, TMS, OR HSM
HLQ.DRXPERT.TABLES                             D     PO   M     DATA SET NOT FOUND ON DISK, TMS, OR HSM
HLQ.DBS.INSTALL                                D     PO   N     DATA SET NOT FOUND ON DISK, TMS, OR HSM
HLQ.DBS.JCLLIB                                 D     PO   N     DATA SET NOT FOUND ON DISK, TMS, OR HSM
         . . . . .


         . . . . .

OTIC0800  - NUMBER OF NON-MIGRATED DATA SETS.........................1,280
OTIC0800  - NUMBER OF MIGRATED DATA SETS.................................0
OTIC0800  - TOTAL DASD SPACE ALLOCATED IN MB............................450
OTIC0800  - TOTAL DASD SPACE MIGRATED IN MB.............................0
```

Figure 13-2 Example of Space Exception Report

Update Exception Report

The Update Exception Report lists the following exceptions:

1 Critical input files without any creating job. This implies that the dataset is a control file, data only file, or rarely updated (a file of zip codes or area codes, for example).

2 A file is critical, but an SMF "last access date" does not exist. This type of dataset could require some review to determine why it was reported as an exception. The cause could be something like the accessing job is not in the production job list.

Note The Update Exception Report can be accessed via the ISPF panels (see Chapter 14), or can be browsed in ISPF option 3.4 using dataset @dsprefix.bkpid.UPDTEXPN.

```
REL x.x.x  PTF x                                    D R / X P E R T                                                    PROGRAM OTCDI027
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     UPDATE EXCEPTION REPORT FOR OPENTECH_SYSTEMS,_INC.                                PAGE      1

-------------------------------------------------------------------------------------------------------------------------------------
(1) MEDIA; D-DASD, K/T-TAPE, M-MIGRATED
(2) DSORG; PS-SEQUENTIAL, PO-PARTITIONED, DA-DIRECT ACCESS, VS-VSAM, UN-UNKNOWN
(3) TYPE;  G-GDG, N-NON GDG, F-GDG FAMILY
-------------------------------------------------------------------------------------------------------------------------------------

                                            (1)   (2)  (3)
DSNAME                                     MEDIA DSORG TYPE   DESCRIPTION
+----------------------------------------+  +---+ +---+ +--+   +---------------------------------------------+
OT.TST.DRXPERT.VSAM.B.BKPDBASE               D     VS   N     NUMBER OF UPDATE JOBS > 20 FOR DATA SET
OT11.TCR250P0.VSAM.ATLDBASE                  D     VS   N     NO ACCESS INFORMATION FROM SMF FOR DATA SET
OT11.TCR250P0.VSAM.ATLDBASE                  D     VS   N     NO UPDATE INFORMATION AVAILABLE FOR DSNAME
OT11.TCR250P0.VSAM.VOLCHAIN                  D     VS   N     NO ACCESS INFORMATION FROM SMF FOR DATA SET
OT31.TEST.DRXPERT.CEOTCDIB                   D     PS   N     NO UPDATE INFORMATION AVAILABLE FOR DSNAME
OT31.TEST.DRXPERT.CEOTCDII                   D     PS   N     NO UPDATE INFORMATION AVAILABLE FOR DSNAME
OT31.TEST.DRXPERT.CEOTPROD                   D     PS   N     NO UPDATE INFORMATION AVAILABLE FOR DSNAME
OT31.TEST.DRXPERT.CEOTSMFD                   D     PS   N     NO UPDATE INFORMATION AVAILABLE FOR DSNAME
OT31.TEST.DRXPERT.CEXTRACT                   W     PS   G     NO UPDATE INFORMATION AVAILABLE FOR DSNAME
OT31.TEST.DRXPERT.DJOTCDIB                   D     PS   N     NO UPDATE INFORMATION AVAILABLE FOR DSNAME
OT31.TEST.DRXPERT.DJOTCDII                   D     PS   N     NO UPDATE INFORMATION AVAILABLE FOR DSNAME
OT31.TEST.DRXPERT.DJOTPROD                   D     PS   N     NO UPDATE INFORMATION AVAILABLE FOR DSNAME


   . . . . .


   . . . . .

NUMBER OF FILES WITHOUT UPDATE INFORMATION......27
NUMBER OF FILES WITHOUT ACCESS INFORMATION.......2
```

Figure 13-3 Example of Update Exception Report

Cross-Application Dependencies Report

The Cross Application Dependencies Report provides a list of applications and their associated prerequisite applications.

```
REL x.x.x  PTF x                                    D R / X P E R T                                                    PROGRAM xxxxxxxx

DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     CROSS-APPLICATION DEPENDENCIES FOR OPENTECH_SYSTEMS                                PAGE     01

+-----------------------APPLICATION-NAME-----------------------+ +-------------------PREREQUISITE-APPLICATION--------------------+
JOBS-FOR-C                                                       JOBS-FOR-B
JOBS-FOR-L                                                       JOBS-FOR-C
JOBS-FOR-T                                                       JOBS-FOR-Y
                                                                 JOBS-FOR-I
JOBS-FOR-L                                                       JOBS-FOR-T
                                                                 JOBS-FOR-S
JOBS-FOR-T                                                       JOBS-FOR-S
                                                                 JOBS-FOR-U

-------------------------------------------------------END OF REPORT-------------------------------------------------------
```

Figure 13-4 Cross-Application Dependencies Report

Cross-Application File Reference Report

The Cross Application File Reference Report provides a list of applications and their associated prerequisite applications, as well as listing the common dataset name.

```
 REL x.x.x  PTF x                                        D R / X P E R T                                                    PROGRAM xxxxxxxx

 DATE:  xx/xx/xxxx   TIME:  xx:xx:xx  CROSS-APPLICATION FILE REFERENCES FOR OPENTECH_SYSTEMS PAGE  01

+--APPLICATION-NAME--+--JOB-+ +-COMMON-DATASET-------+ +PREREQUISITE-APPLICATION-----+
 JOBS-FOR-C
          CMRDJCL  CXCICS.KICIQT$0.CMRDETL4.CLUSTER             JOBS-FOR-B
 JOBS-FOR-L
          LDCAUXBK CXCICS.KICMASA2.DFHBUXT.BKUP                 JOBS-FOR-C
 JOBS-FOR-T
          T71G5A   GD.IBATCT.DF4BCKUP                           JOBS-FOR-Y
          T70B7RDH GZIMVST.T67.Z5GPITBD.SYSTEST4.CLUSTER        JOBS-FOR-I
          T70B7RDH GZIMVST.T67.Z5GPPTBD.SYSTEST4.CLUSTER        JOBS-FOR-I
          T70B7RDH GZIMVST.T67.Z5GPPTBX.SYSTEST4.CLUSTER        JOBS-FOR-I
 JOBS-FOR-L
          LDCSLEA7 UT.SAR.PLIST.SARDBASE.D0000001               JOBS-FOR-T
          LDCSLEA7 UT.SAR.PLIST.SARDBASE.D0000002               JOBS-FOR-T
          LDCSLEA7 UT.SAR.PLIST.SARDBASE.D0000003               JOBS-FOR-T
          LDCSLEA7 UT.SAR.PLIST.SARDBASE.D0000004               JOBS-FOR-T
          LDCSLEA7 UT.SAR.PLIST.SARDBASE.D0000005               JOBS-FOR-T
          LDCSLEA7 UT.SAR.PLIST.SARDBASE.D0000006               JOBS-FOR-T
          LDCSLEA6 UT.SAR.PLIST.SARTAPE.T0000988                JOBS-FOR-S
 JOBS-FOR-T
          T67J87SC UT.SAR.PLIST.SARTAPE.T0000989                JOBS-FOR-S
          T67A54SR UT.SAR.QANDL.SARTAPE.T0003421                JOBS-FOR-S
          T67P35Q  UT.SAR.QANDL.SARTAPE.T0003422                JOBS-FOR-S
          T00W50GN XX.TAPEDSN.LIST                              JOBS-FOR-U

-----------------------------------------END OF REPORT-----------------------------------------------
```

Figure 13-5 Cross-Application File Reference Report

Cycle Completion Report

The Cycle Completion Report prints status indicators, informational messages, and error messages that occurred or were found while switching from the current DR/Xpert cycle to the next cycle. The messages can be used by Technical Support during problem determination.

Note The Cycle Completion Report can be accessed via the ISPF panels (see Chapter 14), or can be browsed in ISPF option 3.4 using dataset @dsprefix.bkpid.CREPORT.

```
REL x.x.x  PTF x                                        D R / X P E R T                                                    PROGRAM OTCDB070

DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     CYCLE COMPLETION REPORT FOR OPENTECH_SYSTEMS                                          PAGE      1

BACKUP ID: BATCH   CYCLE: 001

 AGG
NUMBER   RUN DATE   TIME      SUFFIX             SIZE              STATUS      COLLOCATION ID
+----+  +--------+  +---+  +---------------+  +--------------+  +---------+  +-----------------------+
 00001                     B0010001.X0713594                     SELECTED     GROUPA.DFDSS.DUMP.RESTORE
 00002                     B0010002.X0713594                     PENDING      GROUPA.TAPECOPY.NONE.NONE

              TOTAL BACKUPS..................     2
              GOOD BACKUPS...................     0
              FORCED BACKUPS.................     0
              PROBLEM BACKUPS................     0
              ACTIVE BACKUPS.................     1
              PENDING BACKUPS................     1

                          END OF REPORT
```

Figure 13-6 Cycle Completion Report

Dataset Backup Cross Reference

The Dataset Backup Cross Reference Report shows a list of datasets that have been backed up along with the tape dataset name of the backup.

Table 13-2 Dataset Backup Cross Reference Report field descriptions

Field	Description
BKPID	B - batch dataset O - online dataset
CYCLENUM	Cycle number of this report.
BKUPDSN	Full name of the backed up dataset
AGG	Aggregate number of the backup
TAPEDSN	The dataset name on the backup tape

Note The Dataset Backup Cross Reference Report can be accessed via the ISPF panels (see Chapter 14), or can be browsed in ISPF option 3.4 using dataset @dsprefix.bkpid.DSNXREF.

```
REL x.x.x  PTF x                                        D R / X P E R T                                          PROGRAM OTCDB052

DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     DATASET BACKUP CROSS REFERENCE FOR OPENTECH_SYSTEMS              PAGE   1

BACKUP ID: BATCH    CYCLENUM: 00005

DATA SET NAME                                  CYC   AGGR   BACKUP TAPE DATA SET NAME                    BACKUP STATUS
+------------------------------------------+ +--+ +---+   +-------------------------+ +---------------------------------------------+
OT18.CLUSTER                                    001 0001   OT18.DRX.NEW.B.BKUP.B0050001.X0713591        SUCCESSFUL BACKUP
OT18.DSN0                                       001 0001   OT18.DRX.NEW.B.BKUP.B0050001.X0713591        SUCCESSFUL BACKUP
OT18.DSN0X                                      001 0001   OT18.DRX.NEW.B.BKUP.B0050001.X0713591        SUCCESSFUL BACKUP
OT18.DSN3                                       001 0001   OT18.DRX.NEW.B.BKUP.B0050001.X0713591        SUCCESSFUL BACKUP
OT18.DSN3X                                      001 0001   OT18.DRX.NEW.B.BKUP.B0050001.X0713591        SUCCESSFUL BACKUP
OT18.TEMP.FILE                                  001 0001   OT18.DRX.NEW.B.BKUP.B0050001.X0713591        SUCCESSFUL BACKUP
OT18.TEMX.FILE                                  001 0001   OT18.DRX.NEW.B.BKUP.B0050001.X0713591        SUCCESSFUL BACKUP

-----------------------------------------END OF REPORT-----------------------------------
```

Figure 13-7 Example of Dataset Backup Cross Reference Report

Dataset Backup Alerts Report

The Dataset Backup Alerts Report lists all of the datasets identified as critical, but that have not yet been backed up. This report can be used to identify datasets that should be further researched using the Backup Report (see "*OTCD1105 - Backup Report*") to find out why these datasets were not successfully backed up.

Report field descriptions:

- The first field indicates the dataset name (or group name) that was not backed up.
- The second field is left blank for DASD datasets, and lists "TAPE DATASET" for tape datasets.

Note The Dataset Backup Alerts Report can be accessed via the ISPF panels (see Chapter 14), or can be browsed in ISPF option 3.4 using dataset @dsprefix.bkpid.DSNALERT.

```
REL x.x.x  PTF x                                        D R / X P E R T                                                PROGRAM OTCDB052
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     DATASET BACKUP ALERTS FOR OPENTECH_SYSTEMS,_INC.                                  PAGE      1
BACKUP ID: BATCH    CYCLENUM: 00025

*-----------------------------------------------------------------------*
* THIS REPORT CONTAINS A LIST OF FILES FOR WHICH NO BACKUP EXISTS        *
*-----------------------------------------------------------------------*
DATA SET NAME                                       OTHER INFORMATION
+----------------------------------------+          +------------------+
OT.TST.DRXPERT.ALLSCHED
OT.TST.DRXPERT.DCOLLECT
OT.TST.DRXPERT.JMPFILT
OT.TST.DRXPERT.JOBSTHIS
OT.TST.DRXPERT.PRODJOBS
OT.TST.DRXPERT.SJOB
OT.TST.DRXPERT.SMFJOBS
OT.TST.DRXPERT.SMFMERGE
OT.TST.DRXPERT.SNEXTR
OT.TST.DRXPERT.SNXTRACT
OT.TST.DRXPERT.TMPFIL
OT.TST.DRXPERT.TOTACCUM
OT17.TEST.DRXPERT.B.DSISPSMF
```

Figure 13-8 Example of Dataset Backup Alerts Report

Dataset Backup Problems Report

The Dataset Backup Problems Report lists exception occurrences where a backup was attempted for a critical datasets, but was unsuccessful. Use the Backup Report (see *OTCD1105 - Backup Report*) to identify the error that kept these dataset from being backed up.

Report field descriptions:

Table 13-3 Dataset Backup Problems Report Field Descriptions

Field	Description
BKUPDSN	Dataset name receiving error during backup
AGG	Aggregate number of the attempted backup
RESULTS	INIT (initialized) - the entry is in the initialized state PROB (problem) - a problem occurred during backup GOOD - successful backup taken MULT - multiple backups taken FORCE - backed up by aggregate 99 NFND - not found (indicative of empty GDG bases)
AGG	Aggregate number of the backup
TAPEDSN	The dataset name on the backup tape

Note The Dataset Backup Problems Report can be accessed via the ISPF panels (see Chapter 14), or can be browsed in ISPF option 3.4 using dataset @dsprefix.bkpid.DSNERRS.

```
REL x.x.x  PTF x                                    D R / X P E R T                                          PROGRAM OTCDB052
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     DATASET BACKUP PROBLEMS FOR OPENTECH_SYSTEMS,_INC.                      PAGE      1
BACKUP ID: BATCH    CYCLENUM: 00025

DATA SET NAME                                        RUN     REASON
+----------------------------------------+     UNIT    +-------------------------------------+
OT.TST.DRXPERT.ALLSCHED                          00000    DATA SET NOT FOUND
OT.TST.DRXPERT.DCOLLECT                          00001    PROBLEM WITH BACKUP
OT.TST.DRXPERT.DFILTD                            09999    PROBLEM WITH BACKUP
OT.TST.DRXPERT.DFILTDI                           09999    PROBLEM WITH BACKUP
OT.TST.DRXPERT.INFOUPD                           00001    PROBLEM WITH BACKUP
OT.TST.DRXPERT.JMPFILT                           00001    PROBLEM WITH BACKUP
OT.TST.DRXPERT.JOBLIST.PERM                      09999    PROBLEM WITH BACKUP
OT.TST.DRXPERT.JOBSTHIS                          00001    PROBLEM WITH BACKUP
OT.TST.DRXPERT.ONLDSNS                           00001    PROBLEM WITH BACKUP
OT.TST.DRXPERT.ONLJTEMP                          09999    PROBLEM WITH BACKUP
OT.TST.DRXPERT.PRODJOBS                          00001    PROBLEM WITH BACKUP
OT.TST.DRXPERT.SJOB                              00000    DATA SET NOT FOUND
OT.TST.DRXPERT.SMFJOBS                           00001    PROBLEM WITH BACKUP
OT.TST.DRXPERT.SMFMERGE                           0001    PROBLEM WITH BACKUP
OT.TST.DRXPERT.SNEXTR                            00000    DATA SET NOT FOUND
OT.TST.DRXPERT.SNXTRACT                          00000    DATA SET NOT FOUND
OT.TST.DRXPERT.SUSPEND                           00001    PROBLEM WITH BACKUP
OT.TST.DRXPERT.TMPFIL                            00000    DATA SET NOT FOUND
OT.TST.DRXPERT.TOTACCUM                          00001    PROBLEM WITH BACKUP
```

Figure 13-9 Example of Dataset Backup Problems Report

Dataset Backup Cycle History Report

The Dataset Backup Cycle History Report lists up to 6 cycle's worth of dataset backup History detail. This report prints 2 lines worth of cycle data starting from the left and continuing to the right before wrapping onto the next line.

Report field descriptions:

Table 13-4 Dataset Backup Cycle History Report Field Descriptions

Field	Description
DATASET NAME	the dataset name
SCH	• J - job triggered dataset • S - sweep triggered dataset • T - time triggered dataset
CYCNO	Cycle number. The most current cycle will be the first bucket on the detail line. The oldest cycle will be the last bucket on the second detail like.
FA#	Aggregate number of first attempted backup.
LA#	Aggregate number of last attempted backup.
R	Final backup result G - Good backup M - Multiple backups F - Forced backup P - Problem

Note The Dataset Backup Cycle History Report can be accessed via the ISPF panels (see Chapter 14), or can be browsed in ISPF option 3.4 using dataset @dsprefix.bkpid.DSNHIST.

```
REL x.x.x  PTF x                                    D R / X P E R T                                                    PROGRAM OTCDB070
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     DATASET BACKUP CYCLE HISTORY  FOR OPENTECH_SYSTEMS,_INC.                          PAGE      1
BACKUP ID: B        CYCLENUM: 00025 DBRNAME: BKPDBASE.OTSCPUXB
-------------------------------------------------------------------------------------------------------------------------------------
(1) SCHEDULE IDENTIFIER J-JOB TRIGGER, S-SWEEP, T-TIME SCHEDULED
(2) CYCLE NUMBER IS LOOSELY CONNECTED WITH A PROCESSING DAY
(3) CYCLE FAMILY
(4) G-GDG, F-GDG FAMILY, P-PATTERN DATA SET
(5)
(6) ABSOLUTE GENERATION EXTRACTED FROM G0000V00 NUMBER
-------------------------------------------------------------------------------------------------------------------------------------
                                          (1) (2)  (3)      (4)  (5) (6)
DATASET NAME                               S                -----------------     CYCLE DATA       ------     CYCLE DATA       --
------------                               C        CYC  0 / CYC -3             CYC -1 / CYC -4             CYC -2 / CYC -5
                                           H   CYCNO FA# LA# R CTA/C AGEN  CYCNO FA# LA# R CTA/C AGEN  CYCNO FA# LA# R CTA/C AGEN
OT.ADVR.FIX0297A.XMITFILE                  T   00020 01   0  M 02/02 ...0

OT.TST.DRXPERT.ALLSCHED                    J

OT.TST.DRXPERT.DCOLLECT                    J   00022 01      P 00/00 ...0  00021 01      P 00/00 ...0  00020 01      P 00/00 ...0
                                               00019 01      P 00/00 ...0  00018 01      P 00/00 ...0  00017 01      P 00/00 ...0
OT.TST.DRXPERT.DFILTD                      J   00021 99  01  P 00/00 ...0  00011 01   0  G 01/01 ...0  00001 01      G 01/01 ...0

OT.TST.DRXPERT.DFILTDI                     J   00021 99  01  P 00/00 ...0  00011 01   0  G 01/01 ...0  00001 01      G 01/01 ...0

OT.TST.DRXPERT.FILTDATA                    J   00001 01      G 01/01 ...0

OT.TST.DRXPERT.INFOUPD                     J   00025 01      P 00/00 ...0  00024 01      G 01/01 0270  00023 01      G 01/01 0269
                                               00022 01      G 01/01 0268  00021 99  01  M 02/02 0267  00020 01      P 00/00 ...0
OT.TST.DRXPERT.JMPFILT                     J   00025 01      P 00/00 ...0  00024 01      P 00/00 ...0  00023 01      P 00/00 ...0
                                               00022 01      P 00/00 ...0  00021 01      P 00/00 ...0  00020 01      P 00/00 ...0
OT.TST.DRXPERT.JOBLIST.PERM                J   00021 99  01  P 00/00 ...0  00001 01      G 01/01 ...0

OT.TST.DRXPERT.JOBSTHIS                    J   00025 01      P 00/00 ...0  00024 01      P 00/00 ...0  00023 01      P 00/00 ...0
                                               00022 01      P 00/00 ...0  00021 99  01  P 00/00 ...0  00020 01      P 00/00 ...0
OT.TST.DRXPERT.ONLDSNS                     S   00025 01      P 00/00 ...0  00024 01      P 00/00 ...0  00023 01      P 00/00 ...0
```

Figure 13-10 Example of Dataset Backup Cycle History Report

Tape Error Report

The Tape Error Report lists all of the critical datasets located on tape or disk, which has not yet been backed up. Compare this report with the *Dataset Backup Alerts Report*.

Note The Tape Error Report can be accessed via the ISPF panels (see Chapter 14), or can be browsed in ISPF option 3.4 using dataset @dsprefix.bkpid.TAPERROR.

```
REL x.x.x  PTF x                                    D R / X P E R T                                                    PROGRAM OTCDB070
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     TAPE ERROR REPORT FOR OPENTECH_SYSTEMS,_INC.                                  PAGE      1
BACKUP ID: B        CYCLENUM: 00001 DBRNAME: BKPDBASE.OTSCPUXB

-------------------------------------------------------------------------------------------------------------------------------
NO VALID BACKUP COPY EXISTS FOR THESE DATA SETS
-------------------------------------------------------------------------------------------------------------------------------
DSNAME                                          REASON
+----------------------------------------+   +-------------------------------------------------------+

 OT.ADVR.R122.PTF1.XMITFILE                      WHERE SUCCESS IND=INITIAL VALUE
 OT.TST.DRXPERT.B.DSSPRN.B0019999.Y0526540       WHERE SUCCESS IND=INITIAL VALUE
 OT.TST.DRXPERT.B.HSMPRN.B0019999.Y0526540       WHERE SUCCESS IND=INITIAL VALUE
 OT.TST.DRXPERT.JCLDELTA                         WHERE SUCCESS IND=INITIAL VALUE
 OT.TST.DRXPERT.JMPPMF                           WHERE SUCCESS IND=INITIAL VALUE
 OT.TST.DRXPERT.SMFLOGGR                         WHERE SUCCESS IND=INITIAL VALUE
 OT.RELTEST.INCLDSNS.DATASET                     WHERE SUCCESS IND=INITIAL VALUE
 OT.USER.UMB.J6354                               WHERE SUCCESS IND=INITIAL VALUE
 OT03.ACS.ACU1.SMFDATA                           WHERE SUCCESS IND=INITIAL VALUE
 OT10.DBS210.VOLFILE                             WHERE SUCCESS IND=INITIAL VALUE
 OT15.TC262.PTF1.IODEFEDT                        WHERE SUCCESS IND=INITIAL VALUE
 OT17.DRXPERT.DCOLLECT.EXPAMPLE.DATA             WHERE SUCCESS IND=INITIAL VALUE
 OT17.DRXPERT.HSMPRN.REPORT                      WHERE SUCCESS IND=INITIAL VALUE
 OT17.DRXPERT.ONLDDNF                            WHERE SUCCESS IND=INITIAL VALUE
 OT17.DRXPERT.ONLJOBS                            WHERE SUCCESS IND=INITIAL VALUE
 OT17.DRXPERT.PARMLIB.XMIT                       WHERE SUCCESS IND=INITIAL VALUE
 OT17.TEST.DRXPERT.TEMPINFO                      WHERE SUCCESS IND=INITIAL VALUE
 OT18.ADVRA.ALBERTA.SMFEXTR                      WHERE SUCCESS IND=INITIAL VALUE
 OT31.TEST.DRXPERT.B.DSISPSMF                    WHERE SUCCESS IND=PROBLEM WITH BACKUP
 OT31.TEST.DRXPERT.MEXTRACT                      WHERE SUCCESS IND=PROBLEM WITH BACKUP
 OT31.TEST.DRXPERT.SCHDJOBS                      WHERE SUCCESS IND=PROBLEM WITH BACKUP
 OT31.TEST.DRXPERT.SMFDAILY                      WHERE SUCCESS IND=PROBLEM WITH BACKUP
 OT31.TEST.DRXPERT.SMFMERGE                      WHERE SUCCESS IND=PROBLEM WITH BACKUP
 TCPIP.FTP.DATA                                  WHERE SUCCESS IND=INITIAL VALUE
 TCPIP.STANDARD.TCPXLBIN                         WHERE SUCCESS IND=INITIAL VALUE
 TCPIP.TCPIP.DATA                                WHERE SUCCESS IND=INITIAL VALUE
```

Figure 13-11 Example of Tape Error Report

Critical Tape Report and Volser List

The Critical Tape Report and Volser List shows critical tape files that DR/Xpert has identified as having been backed up. This report contains 3 sections:

- The first section provides a tape volume list for all of the DR/Xpert backup tapes and its dataset aggregate.
- The second section provides a listing of the critical tape datasets and tape volumes.
- The third section provides a tape pull listing of all tape volumes in volser order.

Note The Critical Tape Report and Volser List can be accessed via the ISPF panels (see Chapter 14), or can be browsed in ISPF option 3.4 using dataset @dsprefix.bkpid.TAPELIST.

Warning DR/Xpert does not manage critical tape files. This report is for informational use.

```
REL x.x.x  PTF x                                    D R / X P E R T                                          PROGRAM OTCDB070
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     CRITICAL TAPE AND VOLSER IDENTIFICATION FOR OPENTECH_SYSTEMS,_INC.          PAGE      1
BACKUP ID: B        CYCLENUM: 00001 DBRNAME: BKPDBASE.OTSCPUXB
-----------------------------------------------------------------------------------------------------
THE FOLLOWING LIST CONTAINS A TAPE VOLUME PULL LIST FOR BACKUP TAPES
-----------------------------------------------------------------------------------------------------
BACKUP ID: B        CYCLENUM: 00001 DBRNAME: BKPDBASE.OTSCPUXB
BACKUP DSNAME                               TRUE HLQ CREDATE    VOLUME SERIAL NUMBERS
-------------                               --------- -------   ---------------------

OT.TEST01.DRXPERT.B.BKUP.B0010001.Y0608352            2006/083   000085 000086

BACKUP ID: B        CYCLENUM: 00001 DBRNAME: BKPDBASE.OTSCPUXB
-----------------------------------------------------------------------------------------------------
THE FOLLOWING PULLLIST PROVIDES A LIST OF CRITICAL DATA SETS THAT RESIDE ON TAPES
-----------------------------------------------------------------------------------------------------
BACKUP ID: B        CYCLENUM: 00001 DBRNAME: BKPDBASE.OTSCPUXB
BACKUP DSNAME                               TRUE HLQ CREDATE    VOLUME SERIAL NUMBERS
-------------                               --------- -------   ---------------------


OT.APPLA.SZ14.DATA0004.MFSV.FILE01           OT       2006/076   000024

OT.APPLA.SZ14.DATA0004.MFSV.FILE02           OT       2006/076   000024

OT.APPLA.SZ14.DATA0004.MFSV.FILE03           OT       2006/076   000024

OT.APPLA.SZ14.DATA0004.MFSV.FILE04           OT       2006/076   000024

OT.APPLA.SZ14.DATA0004.MFSV.FILE05           OT       2006/076   000024

OT.APPLA.SZ14.DATA0004.MFSV.FILE06           OT       2006/076   000024

OT.APPLA.SZ14.DATA0004.MFSV.FILE07           OT       2006/076   000024

OT.RELTEST.SZ14.FDR.SFSV.DATASET             OT       2006/076   000031

-----------------------------------------------------------------------------------------------------
THE FOLLOWING LIST IS A SORTED VOLUME PULL LIST.
-----------------------------------------------------------------------------------------------------
       000024 000024 000024 000024 000024 000024 000024 000031 000085 000086
```

Figure 13-12 Example of Critical Tape Report

Aggregate 99 Report

The Aggregate 99 Report is a summary of the exceptions reported on DFSMShsm Report and the Backup Report for the final backup aggregate (aggregate 99). The intent of this report is to provide a quick synopsis of the status of the aggregate 99 backup run. More in depth details on any exceptions can be found in the DFSMShsm Report and the Backup Report.

Note The Aggregate 99 Report can be accessed via the ISPF panels (see Chapter 14), or can be browsed in ISPF option 3.4 using dataset @dsprefix.bkpid.EXREPORT.

```
REL x.x.x  PTF x                                        D R / X P E R T                                          PROGRAM OTCDB070
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx        AGGREGATE 99 REPORT FOR OPENTECH_SYSTEMS,_INC.                              PAGE     1

PGM   MESSAGE DESCRIPTION      TEXT
+-+   +--------------------+  +-------------------------------------------------------------------------------------------+
HSM   NOT IN CAT_(ARC1056I)     *** NO ENTRIES ***
HSM   RACF ERROR_(ARC1139I)     *** NO ENTRIES ***
HSM   OTHER                     *** NO ENTRIES ***

DSS   NOT ON VOL (ADR321E)      PR175PI.MOD9.SKYLINE VOL=BATD54
DSS   NOT PROCESSED (ADR380E)   *** NO ENTRIES ***
DSS   NOT SERIALIZED (ADR411W   *** NO ENTRIES ***
DSS   VSAM ERROR (ADR788I)      *** NO ENTRIES ***
DSS   OTHER                     *** NO ENTRIES ***
DSS   NOT SELECTED (ADR383W)    PE548PW1.IDC.MONTH.FORPRICE
                                PE549PI.FHLO22.MFHA.HAPB.DATA
                                PR140PI.L1P.BANKCI.HOLDING.DSNA
                                PR140PI.L2P.BANKCI.ISSUE.DSNA
                                PR140PI.L2P.BANKCI.TRANS.DSNA
```

Figure 13-13 Example of Aggregate 99 Report

Critical Dataset Recovery Report

The Critical Dataset Recovery Report is generated by the DR/Xpert recovery jobs. The report contains four sections:

- Recovery Processing Log - Shows the updates made to the BKPDBASE records as the datasets are recovered.
- Recovery Recap - Summary of the action taken against the BKPDBASE.
- Aggregate Recap Report - Summary of the number of datasets recovered and number of datasets not recovered by the restore job.
- Aggregate Recovery Log - List of datasets processed and the status of the restore.

```
REL x.x.x  PTF x                                        D R / X P E R T                                                PROGRAM OTCDB085
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     CRITICAL DATASET RECOVERY REPORT  FOR OPENTECH_SYSTEMS,_INC.                       PAGE     01
-------------------------------------------------------------------------------------------------------------------------------------
RECOVERY PROCESSING LOG
-------------------------------------------------------------------------------------------------------------------------------------
                     STATUS  DSNAME
         +----------------+  +----------------------------------------+
             RECORD UPDATED  B.DOTSCLM.ACCOUNT.FILE
             RECORD UPDATED  B.DOT15.TC262.PTF1.VOLCHAIN
             RECORD UPDATED  B.DOT.RELTEST.CA1R11.ZOS14.VOLCHAIN
             RECORD UPDATED                                          SUCCESS INDICATOR CHANGED FROM ' 'TO "R"
             RECORD UPDATED  B.DOT10.OTDBS011.LST
             RECORD UPDATED  B.DISF.HASPINDX
             RECORD UPDATED  B.DOT.RELTEST.CA1R11.ZOS14.CANDSEL.FORECAST
             RECORD UPDATED  B.DOT.TST.DRXPERT.DSXTRACT
             RECORD UPDATED                                          SUCCESS INDICATOR CHANGED FROM ' 'TO "R"
             RECORD UPDATED  B.DOT31.TEST.DRXPERT.SNEXTR
             RECORD UPDATED  B.DOT31.TEST.DRXPERT.TMPFIL
             RECORD UPDATED                                          SUCCESS INDICATOR CHANGED FROM ' 'TO "R"
             . . . . . . . .
             . . . . . . . .
-------------------------------------------------------------------------------------------------------------------------------------
RECOVERY RECAP
-------------------------------------------------------------------------------------------------------------------------------------
                       COUNT  DESCRIPTION
         +----------------+  +----------------------------------------+
                         160  INPUT RECORDS
                           1  RECORDS NOT FOUND
                           0  RECORDS NOT UPDATED
                         159  RECORDS UPDATED

-------------------------------------------------------------------------------------------------------------------------------------
AGGREGATE RECAP REPORT
-------------------------------------------------------------------------------------------------------------------------------------
    AGGREGATE      RESTORED    NOT RESTORED    PATTERNS        TOTAL
  +-----------+ +-----------+ +-----------+ +-----------+ +-----------+
      0000            159           035           000           194

-------------------------------------------------------------------------------------------------------------------------------------
AGGREGATE RECOVERY LOG
-------------------------------------------------------------------------------------------------------------------------------------
              DMS.ARCHPRIM.DMSN.S2006069.T143311            NOT RESTORED
              ISF.HASPINDX                                  RESTORED
              OT.ADVR.R122.PTF1.XMITFILE                    NOT RESTORED
              OT.APPLA.SZ14.DATA0004.MFSV.FILE01            NOT RESTORED
              OT.APPLA.SZ14.DATA0004.MFSV.FILE02            NOT RESTORED
              OT.APPLA.SZ14.DATA0004.MFSV.FILE03            NOT RESTORED
              OT.APPLA.SZ14.DATA0009.SFSV.UNCATFIL          NOT RESTORED
              OT.TST.DRXPERT.B.BKPCOPY                      RESTORED
              OT.TST.DRXPERT.B.DSIREPRT                     RESTORED
              OT.TST.DRXPERT.B.DSISPSMF                     RESTORED
              OT.TST.DRXPERT.B.DSNALERT                     RESTORED
```

Figure 13-14 Critical Dataset Recovery Report

14 ISPF Interface

TOPICS COVERED IN THIS CHAPTER

Introduction (page 14-2)

Invoking DR/Xpert ISPF Dialog (page 14-2)

Navigating the ISPF Panels (page 14-2)

Main Menu (page 14-2)

Identification Menu Option (page 14-4)

Backup Menu Options (page 14-13)

Recovery Menu Options (page 14-35)

Identification Report Menu Options (page 14-47)

Backup Report Menu Options (page 14-52)

Introduction

This chapter provides an introductory overview for using the DR/Xpert ISPF panels. The DR/Xpert ISPF interface provides a menu driven interface to view reports by eliminating the technical specifics (dataset names), and replacing them with easy to use ISPF panels. It also provides the user the means to query DR/Xpert's "Job and File Access Database" to determine the reason DR/Xpert has deemed a dataset as "critical" or "not critical".

Invoking DR/Xpert ISPF Dialog

The DR/Xpert ISPF panels can be invoked in three ways:

- If DR/Xpert was added as an option on the ISPF menu at your data center during installation, users can select DR/Xpert from the ISPF menu as they would any other menu option.
- If DR/Xpert was added to a SYSPROC or SYSEXEC concatenated dataset during installation, users can issue the TSO command:

  ```
  TSO DRXPERT
  ```

- DR/Xpert can also be accessed by entering the following command from the TSO command panel (usually option 6 from the ISPF Main Menu):

  ```
  EX '@DSPREFIX.DRXPERT.REXX'
  ```

Navigating the ISPF Panels

The function keys for panel navigation through all panels are three keys:

- F7 - UP
- F8 - DOWN
- F3 - BACK to previous menu

Main Menu

DR/Xpert's menu (Figure 14-1) is the main entry into DR/Xpert's ISPF interface. The main menu has a "Backup ID" field in which the report context is specified. The context can be either "batch" for which "B" is entered, or "online" for which "O" is entered.

The following six sections are available within this menu:

Identification	Identification component reports and the dataset query function
Backup	Backup components are ISPF applications providing query and update functions for DR/Xpert's backup database.
Recovery	The Recovery ISPF application displays the backup database's current status of recovery.
Identification-Reports	Links to disk files containing important reports from DR/Xpert's Identification component

Backup-Reports	Links to disk files containing important reports from DR/Xpert's backup component.
Setup	Routines that set up and submit jobs for ABARS and COPYCRYPT applications.

```
                                   DR/Xpert
-------------------------------- Main  Menu ----------------------------------

 Backup ID: B

 Identification:
 ---------------
      Critical Dataset Query

 Backup:
 -------
      View Aggregate List
      View Backup Definitions
      View Backup Inventory
      View Volume Backup Data

 Recovery:
 ---------
      Recovery Simulation

 Identification-Reports:
 -----------------------
      Identified Critical Data Sets
      Cross Application Dependencies
      Cross Application Dependencies with Datasets

 Backup-Reports:
 ---------------
      Cycle Completion Report
      Dataset Backup Cross Reference
      Dataset Backup Alerts Report
      Dataset Backup Problems Report
      Backup Reports
      Archive Recall Report
      Dataset Backup Cycle History Report
      Tape Error Report
      Critical Tape Report and Volser List

 Setup:
 ------
      Inquire PARMSUMM
      Invoke Copy Crypt Interface
      Submit Batch Job to create ABARS Aggregate Definitions
```

Figure 14-1 DR/Xpert Main Menu

Identification Menu Option

Critical Dataset Query

The **Critical Dataset Query** application gives visibility into DR/Xpert's critical file list. From this TSO application, DR/Xpert presents a list of production files from where the customer may further query decision information that DR/Xpert made related to specific production datasets.

To invoke this TSO application, place any character before "Critical Dataset Query" on the menu screen. After pressing Enter, DR/Xpert will open a filter popup window related to the critical list query and will overlay the top part of the main menu.

The filter popup window contains six choices, any number of filter fields or none of the filter fields may be entered. The filter may be comprised of fully qualified data; or it may contain information with wild card characters. (See Figure 14-2.)

The fields include:

- **Application** - Allowable values:
  - If this field is blank, all applications will be selected.
  - If this field contains a lone asterisk (*), or a lone forward slash (/), then all applications are selected.
  - If this field contains a question mark (?), a panel containing a list of all applications is presented. From this panel, one or more applications may be selected. (See Figure 14-4.)
  - If this field contains an asterisk followed by a question mark (*?), this is a special comment value indicating that an application list was built by the applications filter panel.
  - An application name can be fully qualified.
  - An application name can contain wildcard characters. If the wildcards cause DR/Xpert to find more than one application, then datasets from more than one application will be selected (e.g. GL*).
  - A fully qualified application name (e.g. GL-AR).
- **DSNAME** - Allowable values:
  - A fully qualified dataset name
  - A dataset name containing wildcards.
- **MEDIA** - Allowable values:
  - DISK
  - TAPE
  - "D" and "T" are abbreviations for "DISK" and "TAPE", respectively.
- **CRITICAL** - Allowable values:
  - CRITICAL for a critical file
  - NOTCRIT
  - YES and NO are synonyms for Critical and NotCrit, respectively.

  - Blanks in this field means DR/Xpert will select critical and non-critical datasets for this display.
- **FILTER** - Contains the filter member name that prevented a dataset from being critical. Currently, those values are:
  - DSNAME
  - VOLUMES
  - DDNAME
  - PDSFILT
- **REASONS** - Allowable reasons are one of the following. The value entered can contain wildcards.
  - YES- 1st access is read
  - NO - 1st access is write
  - NO - Last access is delete
  - NO - 1st access is delete
  - NO - 1st DISP=(MOD,DELETE)
  - NO - Excluded by filter
  - NO - Excluded by filter
  - NO - File life is one job
  - NO - DISP=MOD as NEW'
  - YES- Status is forced by DR/Xpert
  - NO - Not production
  - YES- Required list

Critical Dataset List Displays

The **Critical Dataset Display** application displays the data with three different displays, and one display has four different views.

Filter Popup

Figure 14-3 depicts the Critical Dataset Filter popup menu. This menu is entered when the application is started, and it is entered again whenever the terminal operator enters a non-blank value in the filter flag from the Critical File Status Display (Figure 14-5, Figure 14-6, Figure 14-7, and Figure 14-8).

The application leaves the popup menu when PF3 is entered.

Filter Popup Results

If the terminal operator enters filter criteria that results in no records returned, another popup menu display record results. (See Figure 14-3.)

Application Selection Panel

If the terminal operator enters a question mark (?) in the Application filter entry, a panel containing all known applications is displayed. (See Figure 14-4.)

One or more applications may be entered on this panel. The selected items are stored in the operator's ISPF profile so that these entries are remembered through several executions of this TSO application.

The Application filter will contain an asterisk followed by a question mark (*?), if one or more applications were retained in the operator's ISPF profile.

```
*? nn APPLICATIONS SELECTED
```

DR/Xpert Critical File Display

The critical display is a list of production file names, limited by the filter entered by the operator. The display contains four different views of the data:

1. Filenames with Media, DSORG, and Filetype (Figure 14-5)
2. Filenames with Application Names (Figure 14-6)
3. Filenames with Critical Reasons (Figure 14-7)
4. Filenames with the job name that caused the critical decision or the filter that was considered when making the file non-critical (Figure 14-8)

The application scrolls through the different views of critical displays by pressing PF11 repeatedly.

The application scrolls through the filtered dataset list by pressing PF7 and PF8. Pressing PF8 moves the display toward the end-of-file; pressing PF7 moves the display toward the beginning-of-file.

Each item row on the DR/Xpert Critical File Display is selectable; and if selected, DR/Xpert will display more detailed information regarding critical file decisions. By entering any character beside a dataset name and pressing Enter will invoke DR/Xpert's Critical Dataset Selection application. This transaction was formerly known as the DRWHY transaction.

```
                                 DR/Xpert
.------------------------ Qualify Selection by Filter ------------------------.
| Enter Applicable Filters and then press PF3 to continue                     |
|                                                                             |
| Application:  *? 8 APPLICATIONS SELECTED                                    |
| DSNAME:                                                                     |
| Media Type:                                    (Disk or Tape)               |
| Critical:                                      (Critical or Non-Critical)   |
| Filter:                                        (Filter Name or Jobname)~    |
| Reasons:                                                                    |
|                                                                             |
|                                                                             |
'-----------------------------------------------------------------------------'
      View Backup Inventory
      View Volume Backup Data

 Recovery:
 ---------
      Recovery Simulation

 Identification-Reports:
 -----------------------
      Identified Critical Data Sets
      Cross Application Dependencies
      Cross Application Dependencies with Datasets

 Backup-Reports:
 ---------------
      Cycle Completion Report
      Dataset Backup Cross Reference
      Dataset Backup Alerts Report
      Dataset Backup Problems Report
      Backup Reports
      Archive Recall Report
      Dataset Backup Cycle History Report
      Tape Error Report
      Critical Tape Report and Volser List

 Setup:
 ------
      Inquire PARMSUMM
      Invoke Copy Crypt Interface
      Submit Batch Job to create ABARS Aggregate Definitions
```

Figure 14-2 Critical Dataset Filter Popup Menu

```
.--------------------- Results of filter ---------------------. -------------
| Press PF3 to continue                                        |
|                                                              |
|      113 data set items read                                 |
|      113 item passing DSN filter                             |
|       21 item passing application filter                     |
|        7 item passing media filter                           |
|        7 item passing critical=yes|no filter                 |
|        0 item passing filter name or job name filter         |
|        0 item passing reason filter                          |
|        0 displayable                                         |
|                                                              |
'--------------------------------------------------------------'
------
    View Aggregate List
    View Backup Definitions
    View Backup Inventory
    View Volume Backup Data
```

Figure 14-3 DR/Xpert Critical Dataset Filter Popup Menu Results

```
  DR/Xpert Release 2.2.3 PTF 1                        Application Selection Panel
  ------------------------------------------------------------------------------
  Command ===>                                                  Scroll ===> CSR

  + S Application Name
  - - +-------------------------------------------------------------+
      *ALL APPLICATIONS
    S |  BELONGS-TO-ONLINE
    S |  DFDSS-TO-DISK
    S |  DFDSS-TO-TAPE
    S |  GOES-TO-ABARS-DRIVER
    S |  GOES-TO-FDR-DRIVER
    S |  GOES-TO-TAPECOPY-DRIVER
    S |  GOES-TO-VDR-DRIVER
    S |  NONE
  ********************************Bottom of Data********************************
```

Figure 14-4 Application Selection Panel

```
DR/Xpert Release 2.2.3 PTF 1                                Critical File Status
 ------------------------------------------------------------------------------
 Command ===>                                                  Scroll ===> CSR

 Edit:     OT.DRXPERT.FILEUSEJ                                 Filter:

 S Dataset                                        Media Dsorg Filetype
 - +----------------------------------------+ +---+ +---+ +------+
   OT.ABARS.GDGFILE1                              DISK   PS   Gdg
   OT.DSSDISK.GDGFILE1                            DISK   PS   Gdg
   OT.FDR.GDGFILE1                                DISK   PS   Gdg
   OT.ONLINE.CLUSTER1                             DISK   VS   Nongdg
   OT.ONLINE.CLUSTER2                             DISK   VS   Nongdg
   OT.ONLINE.CLUSTER3                             DISK   VS   Nongdg
   OT.TAPE.GDGFILE1                               TAPE   PS   Gdg
   OT.TAPE.GDGFILE2                               TAPE   PS   Gdg
   OT.TAPE.GDGFILE3                               TAPE   PS   Gdg
   OT.TAPE.TEST0001.BACKUP                        TAPE   PS   Gdg
   OT.PROD.GDGFILE1                               DISK   PS   Gdg
   OT.PROD.GDGFILE2                               DISK   PS   Gdg
   OT.PROD.MEDIUM.TESTDATA                        DISK   PS   Nongdg
   OT.PROD.NONGDG.FLAT0001                        DISK   PS   Nongdg
   OT.PROD.NONGDG.FLAT0002                        DISK   PS   Nongdg
   OT.PROD.NONGDG.FLAT0003                        DISK   PS   Nongdg
   OT.PROD.SMALL.TESTDATA                         DISK   PS   Nongdg
   OT.PROD.VSAMTEST                               DISK   VS   Nongdg
   OT.VDR.GDGFILE1                                TAPE   PS   Gdg
   OT.VDR.GDGFILE2                                TAPE   PS   Gdg
   OT.VDR.GDGFILE3                                TAPE   PS   Gdg

 ******************************Bottom of Data*********************************
```

Figure 14-5 DR/Xpert Critical File Status Display with DSORG and Filetype

```
DR/Xpert Release 2.2.3 PTF 1                                Critical File Status
 ------------------------------------------------------------------------------
 Command ===>                                                   Scroll ===> CSR

 Edit:     OT.DRXPERT.FILEUSEJ                                  Filter:

 S Dataset                                        Applname
 - +----------------------------------------+ +----------------------------+
   OT.ABARS.GDGFILE1                              GOES-TO-ABARS-DRIVER
   OT.DSSDISK.GDGFILE1                            DFDSS-TO-DISK
   OT.FDR.GDGFILE1                                GOES-TO-FDR-DRIVER
   OT.ONLINE.CLUSTER1                             BELONGS-TO-ONLINE
   OT.ONLINE.CLUSTER2                             BELONGS-TO-ONLINE
   OT.ONLINE.CLUSTER3                             BELONGS-TO-ONLINE
   OT.TAPE.GDGFILE1                               GOES-TO-TAPECOPY-DRIVER
   OT.TAPE.GDGFILE2                               GOES-TO-TAPECOPY-DRIVER
   OT.TAPE.GDGFILE3                               GOES-TO-TAPECOPY-DRIVER
   OT.TAPE.TEST0001.BACKUP                        GOES-TO-TAPECOPY-DRIVER
   OT.PROD.GDGFILE1                               DFDSS-TO-TAPE
   OT.PROD.GDGFILE2                               DFDSS-TO-TAPE
   OT.PROD.MEDIUM.TESTDATA                        DFDSS-TO-DISK
   OT.PROD.NONGDG.FLAT0001                        DFDSS-TO-TAPE
   OT.PROD.NONGDG.FLAT0002                        DFDSS-TO-TAPE
   OT.PROD.NONGDG.FLAT0003                        DFDSS-TO-TAPE
   OT.PROD.SMALL.TESTDATA                         GOES-TO-ABARS-DRIVER
   OT.PROD.VSAMTEST                               DFDSS-TO-TAPE
   OT.VDR.GDGFILE1                                GOES-TO-VDR-DRIVER
   OT.VDR.GDGFILE2                                GOES-TO-VDR-DRIVER
   OT.VDR.GDGFILE3                                GOES-TO-VDR-DRIVER

 ******************************Bottom of Data*********************************
```

Figure 14-6 DR/Xpert Critical File Status Display with Application Name

```
DR/Xpert Release 2.2.3 PTF 1                                Critical File Status
 ---------------------------------------------------------------------------------
 Command ===>                                                   Scroll ===> CSR

 Edit:     OT.DRXPERT.FILEUSEJ                                  Filter:

 S Dataset                                        Critical/Reason
 - +----------------------------------------+ +----------------------------+
   OT.ABARS.GDGFILE1                            YES- 1st access is read
   OT.DSSDISK.GDGFILE1                          YES- 1st access is read
   OT.FDR.GDGFILE1                              YES- 1st access is read
   OT.ONLINE.CLUSTER1                           YES- 1st access is read
   OT.ONLINE.CLUSTER2                           YES- 1st access is read
   OT.ONLINE.CLUSTER3                           YES- 1st access is read
   OT.TAPE.GDGFILE1                             YES- 1st access is read
   OT.TAPE.GDGFILE2                             YES- 1st access is read
   OT.TAPE.GDGFILE3                             YES- 1st access is read
   OT.TAPE.TEST0001.BACKUP                      YES- 1st access is read
   OT.PROD.GDGFILE1                             YES- 1st access is read
   OT.PROD.GDGFILE2                             YES- 1st access is read
   OT.PROD.MEDIUM.TESTDATA                      YES- 1st access is read
   OT.PROD.NONGDG.FLAT0001                      YES- 1st access is read
   OT.PROD.NONGDG.FLAT0002                      YES- 1st access is read
   OT.PROD.NONGDG.FLAT0003                      YES- 1st access is read
   OT.PROD.SMALL.TESTDATA                       YES- 1st access is read
   OT.PROD.VSAMTEST                             YES- 1st access is read
   OT.VDR.GDGFILE1                              YES- 1st access is read
   OT.VDR.GDGFILE2                              YES- 1st access is read
   OT.VDR.GDGFILE3                              YES- 1st access is read

 ******************************Bottom of Data*********************************
```

Figure 14-7 DR/Xpert Critical File Status Display with Critical Reason

```
DR/Xpert Release 2.2.3 PTF 1                                Critical File Status
 ---------------------------------------------------------------------------
 Command ===>                                                   Scroll ===> CSR

 Edit:     OT.DRXPERT.FILEUSEJ                                  Filter:

 S Dataset                                        Status   Cause    Details  Filte
 - +----------------------------------------+ +------+ +------+ +------+ +--+
   OT.ABARS.GDGFILE1                              Critical READABAR G0001V00
   OT.DSSDISK.GDGFILE1                            Critical READDSSD G0001V00
   OT.FDR.GDGFILE1                                Critical READFDR  GDGFILE1
   OT.ONLINE.CLUSTER1                             Critical ONLINE
   OT.ONLINE.CLUSTER2                             Critical ONLINE
   OT.ONLINE.CLUSTER3                             Critical ONLINE
   OT.TAPE.GDGFILE1                               Critical READTAPE GDGFILE1
   OT.TAPE.GDGFILE2                               Critical READTAPE GDGFILE2
   OT.TAPE.GDGFILE3                               Critical READTAPE GDGFILE3
   OT.TAPE.TEST0001.BACKUP                        Critical READTAPE TEST0001
   OT.PROD.GDGFILE1                               Critical READDSST GDGFILE1
   OT.PROD.GDGFILE2                               Critical READDSST GDGFILE2
   OT.PROD.MEDIUM.TESTDATA                        Critical DAY2DSSD FLAT004
   OT.PROD.NONGDG.FLAT0001                        Critical DAY2DSST FLAT001
   OT.PROD.NONGDG.FLAT0002                        Critical DAY2DSST FLAT002
   OT.PROD.NONGDG.FLAT0003                        Critical DAY2DSST FLAT003
   OT.PROD.SMALL.TESTDATA                         Critical DAY2ABAR G0001V00
   OT.PROD.VSAMTEST                               Critical DAY2DSST VSAM
   OT.VDR.GDGFILE1                                Critical READVDR  GDGFILE1
   OT.VDR.GDGFILE2                                Critical READVDR  GDGFILE2
   OT.VDR.GDGFILE3                                Critical READVDR  GDGFILE3

 ******************************Bottom of Data*********************************
```

Figure 14-8 DR/Xpert Critical File Status Display with Status and Causing Job

Critical Dataset Selection

The **Critical Dataset Selection** display contains a description of DR/Xpert's critical decisions for a file. The display is comprised of two components: a header and file access detail. (See Figure 14-9.) This transaction was formerly known as "DRWHY".

The five-lined header section describes attributes belonging to the file: the name, whether the file is a GDG, its DSORG, and media. Most importantly, the header contains the critical decision status, the reason the decision was made, and the causing job.

The detail section includes a list of accessing job streams and their most recent execution. Each one of the detail entries is selectable to get DR/Xpert's Critical Dataset Selection Detail. Figure 14-10 contains details related to a specific access; for example, step, DDNAME, I/O access, and file disposition.

```
OTCD1111------------ DR/Xpert's Critical Dataset Selection -------- Row 1 of 3
Cmd ==>                                                   Scroll ===> CUR

 DSNAME: OT.TAPE.GDGFILE2                                        ( BATCH  )
   TYPE: GDG              DSORG: Sequential   MEDIA: Tape
 STATUS: Critical
 REASON: First use is read or read_for_update    BY: DAY2TAPE
OWNAPPL: GOES-TO-TAPECOPY-DRIVER                                 ( 000006 )

                                          I/O
Sel Jobname  Stepname Program  DDname   Intent   Date       Time
--- -------- -------- -------- -------- -------- ---------- --------
    DAY2TAPE GDGFILE2 IEBGENER SYSUT1   Input    04/08/2010 16:37:26
    DAY2TAPE GDGFILE2 IEBGENER SYSUT2   Output   04/08/2010 16:37:26
    READTAPE GDGFILE2 IEBGENER SYSUT1   Input    04/07/2010 13:10:51
```

Figure 14-9 DR/Xpert Critical Dataset Selection

```
OTCD1112-------- DR/Xpert's Critical Dataset Selection Detail -----------------
  Cmd ==>                                                   Scroll ===> CUR

      DSNAME: OT.TAPE.GDGFILE2
     JOBNAME: DAY2TAPE     STEPNAME: GDGFILE2     PROGRAM: IEBGENER
    JOB APPL: GOES-TO-TAPECOPY-DRIVER                                ( 000006 )

      DDNAME: SYSUT1
      DSNIDX: 0000005F     DSN Number within this list
  JOBDSN SEQ: 00000001     Seq pos of jobs access
  STP SEQNUM: 0002         Step number within job
      GDGNUM: (0)          Relative GDG number
  I/O INTENT: INPUT        I/O type (I)nput (U)pdate (A)lloc (O)utput
  JOB SEQNUM: 00000007     Job sequence inside cycle
      PATHID: 0005         Days from current day
       DISP1: SHR          DISP=(XXX,----,----) (N)ew (M)od (O)ld (S)hr
       DISP2:              DISP=(---,XXXX,----) (C)atlg (D)elete (K)eep (P)ass
       DISP3:              DISP=(---,----,XXXX) (C)atlg (D)elete (K)eep (P)ass
        DATE: 04/08/2010   Date of path
        TIME: 16:37:26     Time within path
```

Figure 14-10 DR/Xpert Critical Dataset Selection Detail

Backup Menu Options

DR/Xpert has four ISPF applications belonging to DR/Xpert's Backup Component. The transactions display the contents of the backup database. There are two types of displays:

- **List Displays** are a collection of entries presented in a list.
- **Detail Displays** provide information for a specific item in the backup database.

DR/Xpert's menu provides the following Backup Component transactions:

- View Aggregate List
- View Backup Definitions
- View Backup Inventory
- View Volume Backup Data

The transactions are somewhat interconnected. They can be entered via the main menu, and, they can be called by selecting data from within one of the list views. For example, the “View Aggregate List” can invoke “View Backup Inventory”.

Any of the four transactions are invoked by entering any character beside the item on the main menu.

Display Aggregates

View Aggregate List

The **View Aggregate List** transaction displays assigned aggregates. The display can be changed from active backups (those running today); and completed aggregates (those that finished yesterday). There is a window of time after the final sweep (aggregate 9999) and before the first sweep of the active cycle (today); where the active aggregate display is meaningless. The terminal operator can toggle between today’s and yesterday’s aggregate display by repeatedly pressing PF11.

Detailed information for a single aggregate can be obtained by entering A, V, B, F, or N on the row for a specific aggregate. If any other character is entered, a popup window is presented with valid transaction codes. A transaction code can be entered from the popup menu. (See Figure 14-12.)

View Aggregate Record List (Figure 14-11)

V	View Backup Volume Record (Figure 14-39)
B	View Backup Report. Selecting this option will display the backup driver’s backup report.
F	List DR/Xpert Backup Files. Selecting this option will present an ISPF DSLIST of DR/Xpert overhead files for a given aggregate, including the BKUP tape file.
N	List File Names in Backup. This option will invoke the View Backup Inventory transaction with filters set for the current cycle and current aggregate.

```
DR/Xpert Release 2.2.3 PTF 1                                        Aggregate List
 ------------------------------------------------------------------------------
 Edit:     OT.DRXPERT.B.BKPDBASE
 Command ===>                                                  Scroll ===> CSR

 -------------------------------Completed Backups------------------------------

 S  Aggr- -Status- ---Date--- Time- -Items -Good- -Fail- Size (MB) -Driver-    .
 -  ----- -------- ---------- ----- ------ ------ ------ --------- --------
    00001 Good     04/08/2010 16:49      3      3      0         1 ABARS
    00002 Good     04/08/2010 16:47      4      4      0         2 DFDSS
    00003 Good     04/08/2010 16:48      5      5      0         2 DFDSS
    00004 Problem  04/08/2010 16:48      4      2      2         1 DFDSS
    00005 Good     04/08/2010 16:48      1      1      0       < 1 DFDSS
    00006 Good     04/08/2010 16:49      3      3      0         4 DFDSS
    00007 Good     04/08/2010 16:50      3      3      0         1 DSSDISK
    00008 Good     04/08/2010 16:50      3      3      0         1 FDRABR
    00009 Good     04/08/2010 16:51      8      8      0         2 TAPECOPY
    00010 Good     04/08/2010 17:00      6      6      0         2 VDR
    09999 Unknown                        0      0      0       < 1

 ********************************Bottom of Data********************************
```

Figure 14-11 DR/Xpert View Aggregate List

```
DR/Xpert Release 2.2.3 PTF 1                                        Aggregate List
 - .--------- Cycle 00002 Aggregate ---------. --------------------------------
 E |   (A) View Aggregate Record             |
 C |   (V) View Backup Volume Record         |                 Scroll ===> CSR
   |   (B) View Backup Report                |
 - |   (F) List DR/Xpert Backup Files        | ps------------------------------
   |   (N) List File Names in Backup         |
 S '-----------------------------------------' d- -Fail- Size (MB) -Driver-    .
 -  ----- -------- ---------- ----- ------ ------ ------ --------- --------
    00001 Good     04/08/2010 16:49      3      3      0         1 ABARS
 s  00002 Good     04/08/2010 16:47      4      4      0         2 DFDSS
    00003 Good     04/08/2010 16:48      5      5      0         2 DFDSS
    00004 Problem  04/08/2010 16:48      4      2      2         1 DFDSS
    00005 Good     04/08/2010 16:48      1      1      0       < 1 DFDSS
    00006 Good     04/08/2010 16:49      3      3      0         4 DFDSS
    00007 Good     04/08/2010 16:50      3      3      0         1 DSSDISK
    00008 Good     04/08/2010 16:50      3      3      0         1 FDRABR
    00009 Good     04/08/2010 16:51      8      8      0         2 TAPECOPY
    00010 Good     04/08/2010 17:00      6      6      0         2 VDR
    09999 Unknown                        0      0      0       < 1

 ********************************Bottom of Data********************************
```

Figure 14-12 DR/Xpert Transaction Popup Panel

View Aggregate Detail

The **View Aggregate Detail** transaction displays information recorded in DR/Xpert's BKPDBASE for a specific aggregate.

DR/Xpert displays ten instances of any aggregate; however, the first and second instances are the most important. The instances are indicated in the **Row** field. Scrolling from the first instances to the last is performed by toggling PF10 and PF11. PF10 will scroll toward Row 01, PF11 will scroll toward Row 10. Row 01 represents today's aggregate instance. Row 02 represents yesterday's backup.

DR/Xpert also allows scrolling from one aggregate to the next. PF7 scrolls data toward aggregate 0001 and PF8 scrolls data toward aggregate 00050.

Note Most customers never use the fifty aggregates created when DR/Xpert is installed. Once the terminal operator scrolls past a high-water mark, expect the aggregate displays to contain no meaningful data.

```
DR/Xpert Release 2.2.3 PTF 1                                    Aggregate Detail
 ------------------------------------------------------------------------------
 Edit:     OT.DRXPERT.B.BKPDBASE
 Command ===>                                                   Scroll ===> CSR

    Aggregate-ID..... 00001
    Row............... 02
    Cycle............ 00002
    Backup Name...... B0020001.Y1009864
    Started.......... 04/08/2010 16:40
    Completed........ 04/08/2010 16:49
    Status........... GOOD
    Items............ 3
    Good Backups..... 3
    Failed Backups... 0
    Aggregates Size.. 1           MB
    Collocation ID... 0003 GROUPA.ABARS
    Encryption ID.... 0001 ASIS
    Description...... AGGREGATE BACKUP # 1
    DSNAME Prefix.... OT.DRXPERT.B.BKUP
```

Figure 14-13 DR/Xpert View Aggregate Detail

Backup Definitions

View Backup Definitions Filter

The **View Backup Definitions** transaction displays dataset information recorded in DR/Xpert's BKPDBASE for backup purposes.

Upon entry to this transaction, DR/Xpert will present a filter for limiting data. See Figure 14-14. Data must pass all filters in order to be selected and displayed. Blanks cause DR/Xpert to skip a filter.

DSNAME	Contains a dataset name with or without wildcard characters
Application	Contains an application name known to DR/Xpert. The application name may include wildcard characters. If a question mark (?) is entered, the application displays a list of known application names. If this field contains an asterisk followed by a question mark (*?), an application list will be stored in the TSO User's ISPF profile. This is the application list used as a filter. Expect the full text following the (*?) to be: `*? nn APPLICATIONS SELECTED`
DSORG	Values may be VS, PS, PO, DA, or blank
TYPE	Values may be GDG, NonGDG, Family, Pattern, or blank
FLAG	Must be Yes, No, or blank. This flag depicts whether the SMF logger application has set this file ready for backup.

Note For best performance, use wildcard characters in the DSNAME filter, especially after the first node of the dataset you want to display.

```
.------------------------ Qualify Selection by Filter ------------------------.
| Enter Applicable Filters and then press PF3 to continue                     |
|                                                                             |
| DSNAME     => OT.T/                                                         |
| Application=>                                                               |
| DSORG      =>                                                               |
| File Type  =>                                                               |
| Flag       =>                                                               |
|                                                                             |
|                                                                             |
|                                                                             |
|                                                                             |
|                                                                             |
'-----------------------------------------------------------------------------'

 Recovery:
 ---------
      Recovery Simulation

 Identification-Reports:
 -----------------------
      Identified Critical Data Sets
      Cross Application Dependencies
      Cross Application Dependencies with Datasets

 Backup-Reports:
 ---------------
      Cycle Completion Report
      Dataset Backup Cross Reference
      Dataset Backup Alerts Report
      Dataset Backup Problems Report
      Backup Reports
      Archive Recall Report
      Dataset Backup Cycle History Report
      Tape Error Report
      Critical Tape Report and Volser List

 Setup:
 ------
      Inquire PARMSUMM
      Invoke Copy Crypt Interface
      Submit Batch Job to create ABARS Aggregate Definitions
```

Figure 14-14 DR/Xpert Filter Selection for Backup Definitions

View Backup Definitions List

The **Backup Definitions** application presents the following three views. The transaction can scroll through these views by pressing PF11, repeatedly.

- Dataset name with DSORG, Filetype, GDG (limit), and a flag indicating whether the file has been backed up. (See Figure 14-15.)
- Dataset name with application name. (See Figure 14-16.)
- Dataset name with the last backup date and time. (See Figure 14-17.)

The terminal operator may scroll through multiple frames if the data is larger than one panel by pressing PF7 to go toward the top of data, and pressing PF8 to go toward bottom of data.

Note The GDG column is the number of generations DR/Xpert will recover for the given dataset. This field is either numeric or blanks. Zeros in this field mean DR/Xpert will use the default value (shipped as two generations). Blanks means the dataset is a non-GDG.

```
 DR/Xpert Release 2.2.3 PTF 1                                  Backup Definitions
  ---------------------------------------------------------------------------------
  Command ===>                                                   Scroll ===> CSR

  Base:     OT.DRXPERT.B.BKPDBASE                                Filter:

   Today's Backup  No  (Yes|No) Enter "yes" for backups in-progress for today;
                                or, enter "no" for yesterday's completed backup.

  S Data Set Name                                 DSORG Filetype GDG Backup
  - +-----------------------------------------+ +---+ +------+ +-+ +----+
    OT.TAPE.GDGFILE1                              PS  GDG      000   Yes
    OT.TAPE.GDGFILE2                              PS  GDG      000   Yes
    OT.TAPE.GDGFILE3                              PS  GDG      003   Yes
    OT.TAPE.TEST0001.BACKUP                       PS  GDG      000   Yes
    OT.PROD.GDGFILE.LONG.DSNAME.TAPES             PS  GDG      000   Yes
    OT.PROD.GDGFILE1                              PS  GDG      000   Yes
    OT.PROD.GDGFILE2                              PS  GDG      000   Yes
    OT.PROD.GDGFILE3                              PS  GDG      000   Yes
    OT.PROD.MEDIUM.TESTDATA                       PS  NONGDG         Yes
    OT.PROD.NONGDG.FLAT0001                       PS  NONGDG         Yes
    OT.PROD.NONGDG.FLAT0002                       PS  NONGDG         Yes
    OT.PROD.NONGDG.FLAT0003                       PS  NONGDG         Yes
    OT.PROD.SMALL.TESTDATA                        PS  NONGDG         Yes
    OT.PROD.VSAMTEST                              VS  NONGDG         Yes
********************************Bottom of Data*********************************
```

Figure 14-15 DR/Xpert View Backup Definitions List

```
DR/Xpert Release 2.2.3 PTF 1                                  Backup Definitions
 ---------------------------------------------------------------------------
 Command ===>                                                   Scroll ===> CSR

 Base:     OT.DRXPERT.B.BKPDBASE                                Filter:

  Today's Backup  No  (Yes|No) Enter "yes" for backups in-progress for today;
                               or, enter "no" for yesterday's completed backup.

   S Data Set Name                                Application Name
 - +----------------------------------------+ +------------------------------+
   OT.TAPE.GDGFILE1                            GOES-TO+TAPECOPY-DRIVER
   OT.TAPE.GDGFILE2                            GOES-TO+TAPECOPY-DRIVER
   OT.TAPE.GDGFILE3                            GOES-TO+TAPECOPY-DRIVER
   OT.TAPE.TEST0001.BACKUP                     GOES-TO+TAPECOPY-DRIVER
   OT.PROD.GDGFILE.LONG.DSNAME.TAPES           UNKNOWN
   OT.PROD.GDGFILE1                            DFDSS+TO-TAPE
   OT.PROD.GDGFILE2                            DFDSS+TO-TAPE
   OT.PROD.GDGFILE3                            UNKNOWN
   OT.PROD.MEDIUM.TESTDATA                     DFDSS+TO-DISK
   OT.PROD.NONGDG.FLAT0001                     DFDSS+TO-TAPE
   OT.PROD.NONGDG.FLAT0002                     DFDSS+TO-TAPE
   OT.PROD.NONGDG.FLAT0003                     DFDSS+TO-TAPE
   OT.PROD.SMALL.TESTDATA                      GOES-TO+ABARS-DRIVER
   OT.PROD.VSAMTEST                            DFDSS+TO-TAPE

*******************************Bottom of Data*******************************
```

Figure 14-16 DR/Xpert View Backup Definitions List with Applications

```
DR/Xpert Release 2.2.3 PTF 1                                  Backup Definitions
 ---------------------------------------------------------------------------
 Command ===>                                                   Scroll ===> CSR

 Base:     OT.DRXPERT.B.BKPDBASE                                Filter:

  Today's Backup  No  (Yes|No) Enter "yes" for backups in-progress for today;
                               or, enter "no" for yesterday's completed backup.

 S Data Set Name                                Backup Date
 - +----------------------------------------+ +--------------+
   OT.TAPE.GDGFILE1                            04/08/2010 16:41
   OT.TAPE.GDGFILE2                            04/08/2010 16:41
   OT.TAPE.GDGFILE3                            04/08/2010 16:41
   OT.TAPE.TEST0001.BACKUP                     04/08/2010 16:41
   OT.PROD.GDGFILE1                            04/08/2010 16:40
   OT.PROD.GDGFILE2                            04/08/2010 16:40
   OT.PROD.MEDIUM.TESTDATA                     04/08/2010 16:40
   OT.PROD.NONGDG.FLAT0001                     04/08/2010 16:41
   OT.PROD.NONGDG.FLAT0002                     04/08/2010 16:40
   OT.PROD.NONGDG.FLAT0003                     04/08/2010 16:41
   OT.PROD.SMALL.TESTDATA                      04/08/2010 16:40
   OT.PROD.VSAMTEST                            04/08/2010 16:40

*******************************Bottom of Data*******************************
```

Figure 14-17 DR/Xpert View Backup Definitions List with Backup Dates

Selecting Additional Backup Information

The terminal operator may request more detailed information about a backup definition entry by entering special transaction codes (I, H, or G) next to a dataset name. If any non-blank character is entered, then DR/Xpert will present a popup menu (Figure 14-18) from where the transaction code can be entered.

Valid transaction codes are:

I	View Dataset Backup Definition Detail. (See Figure 14-19.)
H	View Dataset Backup History. (See Figure 14-20 through Figure 14-24.)
G	View Generation Dataset Information (where applicable). (See Figure 14-25 through Figure 14-28.)

```
DR/Xpert Release 2.2.3 PTF 1                                  Backup Definitions
 - .-------------------- OT.TAPE.GDGFILE3 ---------------------. -------------
 C |   (I) View Data Set Information                             | ll ===> CSR
   |   (H) View Data Set History                                |
 B |   (G) View GDG List                                        | er:
   '------------------------------------------------------------'
  Today's Backup  No  (Yes|No) Enter "yes" for backups in-progress for today;
                               or, enter "no" for yesterday's completed backup.

 S Data Set Name                                 Backup Date
 - +----------------------------------------+ +--------------+
   OT.TAPE.GDGFILE1                             04/08/2010 16:41
   OT.TAPE.GDGFILE2                             04/08/2010 16:41
 s OT.TAPE.GDGFILE3                             04/08/2010 16:41
   OT.TAPE.TEST0001.BACKUP                      04/08/2010 16:41
   OT.PROD.GDGFILE1                             04/08/2010 16:40
   OT.PROD.GDGFILE2                             04/08/2010 16:40
   OT.PROD.MEDIUM.TESTDATA                      04/08/2010 16:40
   OT.PROD.NONGDG.FLAT0001                      04/08/2010 16:41
   OT.PROD.NONGDG.FLAT0002                      04/08/2010 16:40
   OT.PROD.NONGDG.FLAT0003                      04/08/2010 16:41
   OT.PROD.SMALL.TESTDATA                       04/08/2010 16:40
   OT.PROD.VSAMTEST                             04/08/2010 16:40

 ********************************Bottom of Data*********************************
```

Figure 14-18 View Dataset Backup Detail Popup Menu

View Backup Definitions Detail

The **View Dataset Backup Definitions Detail** transaction displays information recorded in DR/Xpert's BKPDBASE for a specific dataset or GDG base.

Every dataset backup definition recorded in the BKPDBASE has a header section and up to ten instances of variable information. The backup defintion header information contains the dataset name, DSORG, file type, and owning application. There are up to ten instances of the variable part of the dataset record; each contains cycle, aggregate, media, status, and backup information.

The instances of the variable part of the dataset record are indicated in the **Row** field. Scrolling from the first instances to the last is performed by toggling PF10 and PF11. PF10 will scroll toward Row 01, PF11 will scroll toward Row 10. Row 01 represents a backup before today's cycle has been completed. Row 02 represents yesterday's backup.

DR/Xpert also allows scrolling from one dataset definition to the next. PF7 scrolls data toward aggregate 0001 and PF8 scrolls data toward aggregate 00050.

```
DR/Xpert Release 2.2.3 PTF 1                                    Data Set Detail
 ------------------------------------------------------------------------------
 Edit:     OT.DRXPERT.B.BKPDBASE
 Command ===>                                                Scroll ===> CSR

  Dataset........... OT.TAPE.GDGFILE2
  Active Indicator. ACTIVE
  Data Set Org..... PS
  Data Set Type.... GDG      Limit...
  Application ..... 000006   GOES-TO+TAPECOPY-DRIVER

  Row............... 02          Cycle...... 00002       Aggr....... 00009
  Media............. TAPE        Suffix..... Y1009864    AbsGen..... 0009

  Status........... GOOD        Written....              Size.KB.... 280
  Original Backup.. 04/08/2010  Completed.. 04/08/2010  Recovered..
                    16:41                   16:51
  Collocation-id... 0006 GROUPA.TAPECOPY
  Encrypt-id....... 0001 ASIS

  Volume...........
  Fileseq.......... 0000
```

Figure 14-19 DR/Xpert View Backup Definitions Detail

View Dataset Backup History

The **View Dataset Backup History** transaction displays historic information related to a dataset's backup. There are up to ten detail lines for each display.

There are five views of DR/Xpert's history display. The terminal operator can scroll through the five views by repeatedly pressing PF11. The views are described as follows:

- Primary backup dataset information and its volume. This view describes the backup dataset upon which the user's selected file has been copied for backup. This view also reports the backup's cycle and aggregate. (See Figure 14-20.)
- Duplex backup dataset information and its volume. This view is similar to the view that reports the primary backup dataset. Rows in this panel will show **Notfound** if duplex backups are not in effect. (See Figure 14-21.)
- Miscellaneous fields display cycle, aggregate, status, driver, file size, media, and collocation information associated with a user file's backup. (See Figure 14-22.)
- Backup and recovery dates. (See Figure 14-23.)

```
DR/Xpert Release 2.2.3 PTF 1                            Data Set Backup History
 ------------------------------------------------------------------------------
 Edit:     OT.DRXPERT.B.BKPDBASE
 Command ===>                                                Scroll ===> CSR

  View Data set list: OT.TAPE.GDGFILE2

 .S Cycle Aggr   Status  Primary Backup DSNAME                        Volume
 -- +---+ +---+ +------+ +----------------------------------------+ +----+
 01 00000 00000 --------
 02 00002 00009 Good     OT.DRXPERT.B.BKUP.B0020009.Y1009864          ETR378
 03 00001 00006 Good     OT.DRXPERT.B.BKUP.B0010006.Y1009732          WORK08



 ********************************Bottom of Data*********************************
```

Figure 14-20 View Backup Definitions History with Primary Backup Information

```
DR/Xpert Release 2.2.3 PTF 1                            Data Set Backup History
 ------------------------------------------------------------------------------
 Edit:     OT.DRXPERT.B.BKPDBASE
 Command ===>                                                Scroll ===> CSR

  View Data set list: OT.TAPE.GDGFILE3

 .S Cycle Aggr   Status  Duplex Backup DSNAME                         Volume
 -- +---+ +---+ +------+ +----------------------------------------+ +----+
 01 00000 00000 --------
 02 00002 00009 Good     NotFound
 03 00001 00006 Good     NotFound



 ********************************Bottom of Data*********************************
```

Figure 14-21 View Backup Definitions History with Duplex Backup Information

```
DR/Xpert Release 2.2.3 PTF 1                            Data Set Backup History
 ------------------------------------------------------------------------------
 Edit:     OT.DRXPERT.B.BKPDBASE
 Command ===>                                                Scroll ===> CSR

  View Data set list: OT.TAPE.GDGFILE2

 .S Cycle Aggr   Status   Driver       Size       Media ABSGEN ENCR COLL UPD
 -- +---+ +---+ +------+ +------+ +------------+ +----+ +----+ +--+ +--+ +-+
 01 00000 00000 -------- TAPECOPY
 02 00002 00009 Good     TAPECOPY         280 KB  TAPE   0009  0001 0006
 03 00001 00006 Good     VDR              280 KB  TAPE   0006  0001 0002



 ********************************Bottom of Data*********************************
```

Figure 14-22 View Backup Definitions History with Miscellaneous Fields

```
DR/Xpert Release 2.2.3 PTF 1                          Data Set Backup History
 ------------------------------------------------------------------------------
 Edit:     OT.DRXPERT.B.BKPDBASE
 Command ===>                                                Scroll ===> CSR

  View Data set list: OT.TAPE.GDGFILE2

  .S Cycle Aggr   Status   Backup Started  Backup Completed      Recovered
  -- +---+ +---+ +------+ +--------------+ +--------------+ +----------------+
  01 00000 00000 --------
  02 00002 00009 Good     04/08/2010 16:41 04/08/2010 16:51
  03 00001 00006 Good     04/07/2010 13:27 04/07/2010 13:29



 ********************************Bottom of Data*********************************
```

Figure 14-23 View Backup Definitions History with Backup and Recover Dates

View Generation Dataset Information

The **View Generation Dataset Information** transaction displays historic information related to generation data groups and their backups.

There are four views for this display. Each view contains a list of generation datasets (from highest to lowest G0000V00 number). The terminal operator can scroll through the four views by repeatedly pressing PF11. The views are described as follows:

- Backup cycle, aggregate, and backup date information. (See Figure 14-24.)
- Backup cycle, aggregate, and status. (See Figure 14-25.)
- Backup cycle, aggregate, driver, and file type. (See Figure 14-26.)
- Backup cycle, aggregate, driver, and size. (See Figure 14-27.)

The terminal operator can enter “H” and “I” transaction codes adjacent to generation dataset names to get historical and detailed information for a specific GDS file.

- The **H** transaction will display historic information as shown earlier in Figure 14-20 through Figure 14-23; although, the detail from the history transaction will be less than that for a GDG base or non-GDG file.
- The **I** transaction will display dataset detail information, as shown in Figure 14-19.

```
DR/Xpert Release 2.2.3 PTF 1                          Generation Data Set List
 ------------------------------------------------------------------------------
 Command ===>                                                Scroll ===> CSR

 Edit:     OT.DRXPERT.B.BKPDBASE

 S Data Set Name                                 Cycle Aggr     Backup Date
 - +-----------------------------------------+ +---+ +---+ +--------------+
   OT.TAPE.GDGFILE3.G0009V00                     00002 00009 04/08/2010 16:51
   OT.TAPE.GDGFILE3.G0008V00                     00002 00009 04/08/2010 16:51
   OT.TAPE.GDGFILE3.G0006V00                     00001 00006 04/07/2010 13:29
   OT.TAPE.GDGFILE3.G0005V00                     00001 00006 04/07/2010 13:29

 ********************************Bottom of Data*********************************
```

Figure 14-24 View Backup Generation List with Backup Date

```
DR/Xpert Release 2.2.3 PTF 1                          Generation Data Set List
 ------------------------------------------------------------------------------
 Command ===>                                                  Scroll ===> CSR

 Edit:     OT.DRXPERT.B.BKPDBASE

 S Data Set Name                                 Cycle Aggr   Status
 - +----------------------------------------+ +---+ +---+ +------+
   OT.TAPE.GDGFILE2.G0009V00                    00002 00009 Good
   OT.TAPE.GDGFILE2.G0008V00                    00002 00009 Good
   OT.TAPE.GDGFILE2.G0006V00                    00001 00006 Good
   OT.TAPE.GDGFILE2.G0005V00                    00001 00006 Good
 ********************************Bottom of Data*********************************
```

Figure 14-25 View Backup Generation List with Status

View Generation Dataset Information

The **View Generation Dataset Information** transaction displays historic information related to generation data groups and their backups.

There are four views for this display. Each view contains a list of generation datasets (from highest to lowest G0000V00 number). The terminal operator can scroll through the four views by repeatedly pressing PF11. The views are described as follows:

```
DR/Xpert Release 2.2.3 PTF 1                          Generation Data Set List
 ------------------------------------------------------------------------------
 Command ===>                                                  Scroll ===> CSR

 Edit:     OT.DRXPERT.B.BKPDBASE

 S Data Set Name                                  Driver  Media TYPE FLAG
 - +----------------------------------------+ +------+ +---+ +--+ +--+
   OT.TAPE.GDGFILE2.G0009V00                    TAPECOPY Tape   G
   OT.TAPE.GDGFILE2.G0008V00                    TAPECOPY Tape   G
   OT.TAPE.GDGFILE2.G0006V00                    VDR      Tape   G
   OT.TAPE.GDGFILE2.G0005V00                    VDR      Tape   G

********************************Bottom of Data*********************************
```

Figure 14-26 View Backup Generation List with Driver and FileType

```
DR/Xpert Release 2.2.3 PTF 1                          Generation Data Set List
 ------------------------------------------------------------------------------
 Command ===>                                                  Scroll ===> CSR

 Edit:     OT.DRXPERT.B.BKPDBASE

  S Data Set Name                                  Driver  Media      Size
  - +----------------------------------------+ +------+ +---+ +------------+
    OT.TAPE.GDGFILE2.G0009V00                    TAPECOPY Tape          280 KB
    OT.TAPE.GDGFILE2.G0008V00                    TAPECOPY Tape          280 KB
    OT.TAPE.GDGFILE2.G0006V00                    VDR      Tape          280 KB
    OT.TAPE.GDGFILE2.G0005V00                    VDR      Tape          280 KB

 ********************************Bottom of Data*********************************
```

Figure 14-27 View Backup Generation List with Driver Names and Size

View Backup Inventory

The **View Backup Inventory** transaction is very similar to the View Backup Definitions except the inventory transaction puts more emphasis on providing backup status. Particularly, the inventory report contains generation datasets; whereas, the view backup definition transaction contains generation data group bases.

Backup Inventory Filter

The **View Backup Inventory** transaction displays dataset information related to backups. Upon entry to this transaction, DR/Xpert will present a filter for limiting data. See Figure 14-28. Data must pass all filters in order to be selected and displayed. Blanks cause DR/Xpert to skip a filter.

DSNAME	Contains a dataset name with or without wildcard characters
Application	Contains an application name known to DR/Xpert. The application name may include wildcard characters. If a question mark (?) is entered, the application displays a list of known application names. If this field contains an asterisk followed by a question mark (*?), an application list will be stored in the TSO User's ISPF profile. This is the application list used as a filter. Expect the full text following the (*?) to be, `*? nn APPLICATIONS SELECTED`
Cycle	Limits selection to a particular backup cycle
Aggregate	Limits selection to a particular backup aggregate
Media	Limits selection to either Disk or Tape
Driver	Limits selection to a list of supported drivers
Backup Date	Limits selection to a backup date range
Status	Limits selection to a backup status: Good or Problem
FLAG	Must be Yes, No, or blank. This flag depicts whether the SMF logger application has set this file ready for backup.

Note For best performance, use wildcard characters in the DSNAME filter, especially after the first node of the dataset you want to display. Aggregate should probably be specified in conjunctions Cycle; however, it is correct to specify aggregate by itself.

```
DR/Xpert
.------------------------ Qualify Selection by Filter ------------------------.
| Enter Applicable Filters and then press PF3 to continue                     |
|                                                                             |
| DSNAME     => OT./                                                          |
| Application=>                                                               |
| Cycle      => 00002                                                         |
| Aggregate  =>                                                               |
| Media      =>                                                               |
| Driver     => DFDSS                                                         |
| Backup Date=>                                                               |
| Status     =>                                                               |
| Flag       =>                                                               |
|                                                                             |
'-----------------------------------------------------------------------------'
 Recovery:
 ---------
      Recovery Simulation

 Identification-Reports:
 -----------------------
      Identified Critical Data Sets
      Cross Application Dependencies
      Cross Application Dependencies with Datasets

 Backup-Reports:
 ---------------
      Cycle Completion Report
      Dataset Backup Cross Reference
      Dataset Backup Alerts Report
      Dataset Backup Problems Report
      Backup Reports
      Archive Recall Report
      Dataset Backup Cycle History Report
      Tape Error Report
      Critical Tape Report and Volser List

 Setup:
 ------
      Inquire PARMSUMM
      Invoke Copy Crypt Interface
      Submit Batch Job to create ABARS Aggregate Definitions
```

Figure 14-28 Backup Inventory Filter Panel

View Backup Inventory

The **View Backup Inventory** transaction displays information related to active backups within DR/Xpert.

There are five views for this display. Each view contains generation datasets and non-GDG files. The generation datasets are displayed highest to lowest G0000V00 number. The terminal operator can scroll through the five views by repeatedly pressing PF11. The views are described as follows:

- Dataset name, cycle, aggregate, and backup date information. (See Figure 14-29.)
- Dataset name, backup cycle, aggregate, status, and internal record type. (See Figure 14-30.)

- Dataset name, backup cycle, aggregate, driver, and file type. (See Figure 14-31.)
- Dataset name, backup cycle, aggregate, driver, and size. (See Figure 14-32.)
- Dataset name and application name. (See Figure 14-33.)

The terminal operator can enter **H** and **I** transaction codes adjacent to generation dataset names to get historical and detailed information for a specific GDS file.

- The **H** transaction will display historic information, as shown in Figure 14-20 through Figure 14-23; although, the detail from the history transaction will be less than that for a GDG base or non-GDG file.
- The **I** transaction will display dataset detail information, as shown in Figure 14-19.

```
DR/Xpert Release 2.2.3 PTF 1                                    Backup Inventory
 ---------------------------------------------------------------------------------
 Command ===>                                                   Scroll ===> CSR

 Base:     OT.DRXPERT.B.BKPDBASE                                Filter:

  Today's Backup  No  (Yes|No) Enter "yes" for backups in-progress for today;
                               or, enter "no" for yesterday's completed backup.

 S Data Set Name                                  Cycle Aggr     Backup Date
 - +----------------------------------------+ +---+ +---+ +--------------+
   OT.ONLINE.CLUSTER1                             00002 00006 04/08/2010 16:41
   OT.ONLINE.CLUSTER2                             00002 00002 04/08/2010 16:40
   OT.ONLINE.CLUSTER3                             00002 00005 04/08/2010 16:40
   OT.PROD.GDGFILE1.G0010V00                      00002 00002 04/08/2010 16:40
   OT.PROD.GDGFILE1.G0009V00                      00002 00002 04/08/2010 16:40
   OT.PROD.GDGFILE2.G0010V00                      00002 00003 04/08/2010 16:40
   OT.PROD.GDGFILE2.G0009V00                      00002 00003 04/08/2010 16:40
   OT.PROD.MEDIUM.TESTDATA                        00002 00003 04/08/2010 16:40
   OT.PROD.NONGDG.FLAT0001                        00002 00006 04/08/2010 16:41
   OT.PROD.NONGDG.FLAT0002                        00002 00004 04/08/2010 16:40
   OT.PROD.NONGDG.FLAT0003                        00002 00006 04/08/2010 16:41
   OT.PROD.SMALL.TESTDATA                         00002 00003 04/08/2010 16:40
   OT.PROD.VSAMTEST                               00002 00002 04/08/2010 16:40

 ********************************Bottom of Data*********************************
```

Figure 14-29 Dataset Name, Cycle, Aggregate, and Backup Date

```
DR/Xpert Release 2.2.3 PTF 1                                   Backup Inventory
 ---------------------------------------------------------------------------
 Command ===>                                                  Scroll ===> CSR

 Base:     OT.DRXPERT.B.BKPDBASE                               Filter:

  Today's Backup  NO  (Yes|No) Enter "yes" for backups in-progress for today;
                               or, enter "no" for yesterday's completed backup.

 S Data Set Name                                 Cycle Aggr  Status   Rectype
 - +----------------------------------------+ +---+ +---+ +------+ +------+
   OT.ONLINE.CLUSTER1                            00002 00006 Good     D
   OT.ONLINE.CLUSTER2                            00002 00002 Good     D
   OT.ONLINE.CLUSTER3                            00002 00005 Good     D
   OT.PROD.GDGFILE1.G0010V00                     00002 00002 Good     O
   OT.PROD.GDGFILE1.G0009V00                     00002 00002 Good     O
   OT.PROD.GDGFILE2.G0010V00                     00002 00003 Good     O
   OT.PROD.GDGFILE2.G0009V00                     00002 00003 Good     O
   OT.PROD.MEDIUM.TESTDATA                       00002 00003 Good     D
   OT.PROD.NONGDG.FLAT0001                       00002 00006 Good     D
   OT.PROD.NONGDG.FLAT0002                       00002 00004 Good     D
   OT.PROD.NONGDG.FLAT0003                       00002 00006 Good     D
   OT.PROD.SMALL.TESTDATA                        00002 00003 Good     D
   OT.PROD.VSAMTEST                              00002 00002 Good     D

 ********************************Bottom of Data*********************************
```

Figure 14-30 Dataset Name, Cycle, Aggregate, Status, and Internal Record Type

```
DR/Xpert Release 2.2.3 PTF 1                                   Backup Inventory
 ---------------------------------------------------------------------------
 Command ===>                                                  Scroll ===> CSR

 Base:     OT.DRXPERT.B.BKPDBASE                               Filter:

  Today's Backup  NO  (Yes|No) Enter "yes" for backups in-progress for today;
                               or, enter "no" for yesterday's completed backup.

 S Data Set Name                                 Driver   Media    TYPE FLAG
 - +----------------------------------------+ +------+ +------+ +--+ +--+
   OT.ONLINE.CLUSTER1                            DFDSS    Disk      N
   OT.ONLINE.CLUSTER2                            DFDSS    Disk      N
   OT.ONLINE.CLUSTER3                            DFDSS    Disk      N
   OT.PROD.GDGFILE1.G0010V00                     DFDSS    Disk      G
   OT.PROD.GDGFILE1.G0009V00                     DFDSS    Disk      G
   OT.PROD.GDGFILE2.G0010V00                     DFDSS    Disk      G
   OT.PROD.GDGFILE2.G0009V00                     DFDSS    Disk      G
   OT.PROD.MEDIUM.TESTDATA                       DFDSS    Disk      N
   OT.PROD.NONGDG.FLAT0001                       DFDSS    Disk      N
   OT.PROD.NONGDG.FLAT0002                       DFDSS    Disk      N
   OT.PROD.NONGDG.FLAT0003                       DFDSS    Disk      N
   OT.PROD.SMALL.TESTDATA                        DFDSS    Disk      N
   OT.PROD.VSAMTEST                              DFDSS    Disk      N

 ********************************Bottom of Data*********************************
```

Figure 14-31 Dataset Name, Driver, Media, File Type, and Flag

```
DR/Xpert Release 2.2.3 PTF 1                                    Backup Inventory
 ------------------------------------------------------------------------------
 Command ===>                                                   Scroll ===> CSR

 Base:     OT.DRXPERT.B.BKPDBASE                                Filter:

  Today's Backup  NO  (Yes|No) Enter "yes" for backups in-progress for today;
                               or, enter "no" for yesterday's completed backup.

 S Data Set Name                                  Driver    Media       Size
 - +----------------------------------------+ +------+ +------+ +------------+
   OT.ONLINE.CLUSTER1                          DFDSS    Disk          1,660 KB
   OT.ONLINE.CLUSTER2                          DFDSS    Disk          1,660 KB
   OT.ONLINE.CLUSTER3                          DFDSS    Disk          1,660 KB
   OT.PROD.GDGFILE1.G0010V00                   DFDSS    Disk            250 KB
   OT.PROD.GDGFILE1.G0009V00                   DFDSS    Disk            250 KB
   OT.PROD.GDGFILE2.G0010V00                   DFDSS    Disk            250 KB
   OT.PROD.GDGFILE2.G0009V00                   DFDSS    Disk            250 KB
   OT.PROD.MEDIUM.TESTDATA                     DFDSS    Disk          1,249 KB
   OT.PROD.NONGDG.FLAT0001                     DFDSS    Disk          1,249 KB
   OT.PROD.NONGDG.FLAT0002                     DFDSS    Disk          1,249 KB
   OT.PROD.NONGDG.FLAT0003                     DFDSS    Disk          1,249 KB
   OT.PROD.SMALL.TESTDATA                      DFDSS    Disk            250 KB
   OT.PROD.VSAMTEST                            DFDSS    Disk             56 KB

 ********************************Bottom of Data*********************************
```

Figure 14-32 Dataset Name, Driver, Media, and Size

```
DR/Xpert Release 2.2.3 PTF 1                                    Backup Inventory
 ------------------------------------------------------------------------------
 Command ===>                                                   Scroll ===> CSR

 Base:     OT.DRXPERT.B.BKPDBASE                                Filter:

  Today's Backup  NO  (Yes|No) Enter "yes" for backups in-progress for today;
                               or, enter "no" for yesterday's completed backup.

 S Data Set Name                                  Application Name
 - +----------------------------------------+ +-----------------------------+
   OT.ONLINE.CLUSTER1                          BELONGS-TO-ONLINE
   OT.ONLINE.CLUSTER2                          BELONGS-TO-ONLINE
   OT.ONLINE.CLUSTER3                          BELONGS-TO-ONLINE
   OT.PROD.GDGFILE1.G0010V00                   DFDSS+TO-TAPE
   OT.PROD.GDGFILE1.G0009V00                   DFDSS+TO-TAPE
   OT.PROD.GDGFILE2.G0010V00                   DFDSS+TO-TAPE
   OT.PROD.GDGFILE2.G0009V00                   DFDSS+TO-TAPE
   OT.PROD.MEDIUM.TESTDATA                     DFDSS+TO-DISK
   OT.PROD.NONGDG.FLAT0001                     DFDSS+TO-TAPE
   OT.PROD.NONGDG.FLAT0002                     DFDSS+TO-TAPE
   OT.PROD.NONGDG.FLAT0003                     DFDSS+TO-TAPE
   OT.PROD.SMALL.TESTDATA                      GOES-TO+ABARS-DRIVER
   OT.PROD.VSAMTEST                            DFDSS+TO-TAPE

 ********************************Bottom of Data*********************************
```

Figure 14-33 Dataset Name and Owning Application

View Volume Backup Data

The **View Volume Backup Data** transaction provides information related to the backup driver's backup dataset. DR/Xpert also refers to this dataset as the aggregate backup file.

Backup Aggregate File Filter

The **View Volume Backup Data** transaction displays dataset information related to the aggregate backup file.

Upon entry to this transaction, DR/Xpert will present a filter for limiting data. See Figure 14-34. Data must pass all filters in order to be selected and displayed. Blanks cause DR/Xpert to skip a filter.

Backup DSN	Contains a backup aggregate file name with or without wildcard characters
Backup Date	Contains a date aggregate backups. If this is the only specified parameter, DR/Xpert will return all aggregate backups created on that date.
Driver	A specific driver name. If this is the only specified parameter, DR/Xpert will return all aggregate backup files created by the specified driver.
Cycle	Contains the backup cycle. If this is the only specified parameter, DR/Xpert will return all aggregate backup files created within the specified cycle.

```
DR/Xpert
 .------------------------------ Filter Prompt ------------------------------.
 | Enter Applicable Filters and then press PF3 to continue                   |
 |                                                                           |
 | Backup DSN =>                                                             |
 | Backup Date=>                                                             |
 | Driver     =>                                (DFDSS, TAPECOPY, etc)       |
 | Cycle      =>                                (DRXpert's cycle)            |
 |                                                                           |
 '---------------------------------------------------------------------------'

      View Aggregate List
      View Backup Definitions
      View Backup Inventory
      View Volume Backup Data

 Recovery:
 ---------
      Recovery Simulation

 Identification-Reports:
 -----------------------
      Identified Critical Data Sets
      Cross Application Dependencies
      Cross Application Dependencies with Datasets

 Backup-Reports:
 ---------------
      Cycle Completion Report
      Dataset Backup Cross Reference
      Dataset Backup Alerts Report
      Dataset Backup Problems Report
      Backup Reports
      Archive Recall Report
      Dataset Backup Cycle History Report
      Tape Error Report
      Critical Tape Report and Volser List

 Setup:
 ------
      Inquire PARMSUMM
      Invoke Copy Crypt Interface
      Submit Batch Job to create ABARS Aggregate Definitions
```

Figure 14-34 Backup Aggregate File Selection Filter

Backup Aggregate Display List

The **View Backup Aggregate Display List** transaction displays information related to DR/Xpert's aggregate backup files.

There are three views for this display. Each view contains a list of cycles, aggregates, and aggregate backup file names. The list is sorted in cycle descending and aggregate ascending order. Therefore, the most recent cycles are listed first.

The terminal operator can scroll through the three views by repeatedly pressing PF11. The views are described as follows:

- Backup aggregate file name with backup date and driver name. (See Figure 14-35.)

- Backup aggregate file name with backup date and time. (See Figure 14-36.)
- Backup aggregate file name with backup volume information. (See Figure 14-37.)

```
DR/Xpert Release 2.2.3 PTF 1                                   Backup Volume List
 ------------------------------------------------------------------------------
 Command ===>                                                   Scroll ===> CSR

 Edit:     OT.DRXPERT.B.BKPDBASE                                Filter:

 S Cycle Aggr  Backup DSNAME                                    Date     Driver
 - +---+ +---+ +----------------------------------------+ +--------+ +------+
   00002 00001 OT.DRXPERT.B.DRXB0001.C.C01V0007             04/08/2010 ABARS
   00002 00002 OT.DRXPERT.B.BKUP.B0020002.Y1009864          04/08/2010 DFDSS
   00002 00003 OT.DRXPERT.B.BKUP.B0020003.Y1009864          04/08/2010 DFDSS
   00002 00004 OT.DRXPERT.B.BKUP.B0020004.Y1009864          04/08/2010 DFDSS
   00002 00005 OT.DRXPERT.B.BKUP.B0020005.Y1009864          04/08/2010 DFDSS
   00002 00006 OT.DRXPERT.B.BKUP.B0020006.Y1009864          04/08/2010 DFDSS
   00002 00007 OT.DRXPERT.B.BKUP.B0020007.Y1009864          04/08/2010 DFDSS
   00002 00008 OT.DRXPERT.B.BKUP.B0020008.Y1009864          04/08/2010 FDRABR
   00002 00009 OT.DRXPERT.B.BKUP.B0020009.Y1009864          04/08/2010 TAPECOPY
   00002 00010 OT.DRXPERT.B.BKUP.B0020010.Y1009864          04/08/2010 VDR
   00001 00001 OT.DRXPERT.B.BKUP.B0010001.Y1009732          04/07/2010 DFDSS
   00001 00002 OT.DRXPERT.B.BKUP.B0010002.Y1009732          04/07/2010 DFDSS
   00001 00003 OT.DRXPERT.B.BKUP.B0010003.Y1009732          04/07/2010 DFDSS
   00001 00004 OT.DRXPERT.B.BKUP.B0010004.Y1009732          04/07/2010 DFDSS
   00001 00005 OT.DRXPERT.B.BKUP.B0010005.Y1009732          04/07/2010 DFDSS
   00001 00006 OT.DRXPERT.B.BKUP.B0010006.Y1009732          04/07/2010 VDR

 ********************************Bottom of Data*********************************
```

Figure 14-35 Backup Aggregate Filename with Backup Date and Driver

```
DR/Xpert Release 2.2.3 PTF 1                                   Backup Volume List
 ------------------------------------------------------------------------------
 Command ===>                                                   Scroll ===> CSR

 Edit:     OT.DRXPERT.B.BKPDBASE                                Filter:

 S Cycle Aggr  Backup DSNAME                                    Date      Time
 - +---+ +---+ +----------------------------------------+ +--------+ +------+
   00002 00001 OT.DRXPERT.B.DRXB0001.C.C01V0007             04/08/2010 16:49:09
   00002 00002 OT.DRXPERT.B.BKUP.B0020002.Y1009864          04/08/2010 16:47:27
   00002 00003 OT.DRXPERT.B.BKUP.B0020003.Y1009864          04/08/2010 16:47:55
   00002 00004 OT.DRXPERT.B.BKUP.B0020004.Y1009864          04/08/2010 16:48:21
   00002 00005 OT.DRXPERT.B.BKUP.B0020005.Y1009864          04/08/2010 16:48:43
   00002 00006 OT.DRXPERT.B.BKUP.B0020006.Y1009864          04/08/2010 16:49:49
   00002 00007 OT.DRXPERT.B.BKUP.B0020007.Y1009864          04/08/2010 16:50:14
   00002 00008 OT.DRXPERT.B.BKUP.B0020008.Y1009864          04/08/2010 16:50:33
   00002 00009 OT.DRXPERT.B.BKUP.B0020009.Y1009864          04/08/2010 16:51:03
   00002 00010 OT.DRXPERT.B.BKUP.B0020010.Y1009864          04/08/2010 17:00:29
   00001 00001 OT.DRXPERT.B.BKUP.B0010001.Y1009732          04/07/2010 13:28:43
   00001 00002 OT.DRXPERT.B.BKUP.B0010002.Y1009732          04/07/2010 13:28:40
   00001 00003 OT.DRXPERT.B.BKUP.B0010003.Y1009732          04/07/2010 13:28:43
   00001 00004 OT.DRXPERT.B.BKUP.B0010004.Y1009732          04/07/2010 13:28:44
   00001 00005 OT.DRXPERT.B.BKUP.B0010005.Y1009732          04/07/2010 13:28:52
   00001 00006 OT.DRXPERT.B.BKUP.B0010006.Y1009732          04/07/2010 13:29:11

 ********************************Bottom of Data*********************************
```

Figure 14-36 Backup Aggregate Filename with Backup Date and Time

```
DR/Xpert Release 2.2.3 PTF 1                                  Backup Volume List
  ---------------------------------------------------------------------------
  Command ===>                                                  Scroll ===> CSR

  Edit:     OT.DRXPERT.B.BKPDBASE                               Filter:

  S Cycle Aggr  Backup DSNAME                                   Date      Vol
  - +---+ +---+ +-----------------------------------------+ +--------+ +----+
    00002 00001 OT.DRXPERT.B.DRXB0001.C.C01V0007             04/08/2010 ETR473
    00002 00002 OT.DRXPERT.B.BKUP.B0020002.Y1009864          04/08/2010 ETR181
    00002 00003 OT.DRXPERT.B.BKUP.B0020003.Y1009864          04/08/2010 ETR348
    00002 00004 OT.DRXPERT.B.BKUP.B0020004.Y1009864          04/08/2010 ETR277
    00002 00005 OT.DRXPERT.B.BKUP.B0020005.Y1009864          04/08/2010 ETR350
    00002 00006 OT.DRXPERT.B.BKUP.B0020006.Y1009864          04/08/2010 ETR352
    00002 00007 OT.DRXPERT.B.BKUP.B0020007.Y1009864          04/08/2010 WORK11
    00002 00008 OT.DRXPERT.B.BKUP.B0020008.Y1009864          04/08/2010 ETR327
    00002 00009 OT.DRXPERT.B.BKUP.B0020009.Y1009864          04/08/2010 ETR378
    00002 00010 OT.DRXPERT.B.BKUP.B0020010.Y1009864          04/08/2010 WORK06
    00001 00001 OT.DRXPERT.B.BKUP.B0010001.Y1009732          04/07/2010 ETR099
    00001 00002 OT.DRXPERT.B.BKUP.B0010002.Y1009732          04/07/2010 ETR447
    00001 00003 OT.DRXPERT.B.BKUP.B0010003.Y1009732          04/07/2010 ETR014
    00001 00004 OT.DRXPERT.B.BKUP.B0010004.Y1009732          04/07/2010 ETR030
    00001 00005 OT.DRXPERT.B.BKUP.B0010005.Y1009732          04/07/2010 ETR157
    00001 00006 OT.DRXPERT.B.BKUP.B0010006.Y1009732          04/07/2010 WORK08

  ********************************Bottom of Data*********************************
```

Figure 14-37 Backup Aggregate Filename with Backup Volume Information

Backup Aggregate Detail Popup Menu

The terminal operator may request more detailed information about a Backup Aggregate File by entering special transaction codes (V, B, or F) next to a dataset name. If any non-blank character is entered, then DR/Xpert will open a popup menu (Figure 14-38) from where the transaction code can be entered.

Valid transaction codes are:

V	View Backup Volume Record. This selection displays the information recorded in DR/Xpert's BKPDBASE for an aggregate backup. This includes volume and driver information. (See Figure 14-39.)
B	View Backup Report. This selection will display the backup report from the utility that created the aggregate file, assuming it is available.
F	List Backup Files. This selection will invoke ISPF DSLIST services to present a list of files belonging to an aggregate backup. The is the same performing an ISPF 3.4 operation with a wildcard character before last 17 characters of the aggregate backup ID. For example, DRX.B.*.B0020001.Y1009864

```
DR/Xpert Release 2.2.3 PTF 1                                Backup Volume List
 - .----------------- Backup B0020010.Y1009864 ------------------. -------------
 C |   (V) View Backup Volume Record                              | ll ===> CSR
   |   (B) View Backup Report                                     |
 E |   (F) List Backup Files                                      | er:
   '-------------------------------------------------------------'
 S Cycle Aggr  Backup DSNAME                                    Date     Driver
 - +---+ +---+ +----------------------------------------+ +--------+ +------+
   00002 00001 OT.DRXPERT.B.DRXB0001.C.C01V0007            04/08/2010 ABARS
 s 00002 00002 OT.DRXPERT.B.BKUP.B0020002.Y1009864         04/08/2010 DFDSS
   00002 00003 OT.DRXPERT.B.BKUP.B0020003.Y1009864         04/08/2010 DFDSS
   00002 00004 OT.DRXPERT.B.BKUP.B0020004.Y1009864         04/08/2010 DFDSS
   00002 00005 OT.DRXPERT.B.BKUP.B0020005.Y1009864         04/08/2010 DFDSS
   00002 00006 OT.DRXPERT.B.BKUP.B0020006.Y1009864         04/08/2010 DFDSS
   00002 00007 OT.DRXPERT.B.BKUP.B0020007.Y1009864         04/08/2010 DFDSS
   00002 00008 OT.DRXPERT.B.BKUP.B0020008.Y1009864         04/08/2010 FDRABR
   00002 00009 OT.DRXPERT.B.BKUP.B0020009.Y1009864         04/08/2010 TAPECOPY
   00002 00010 OT.DRXPERT.B.BKUP.B0020010.Y1009864         04/08/2010 VDR
   00001 00001 OT.DRXPERT.B.BKUP.B0010001.Y1009732         04/07/2010 DFDSS
   00001 00002 OT.DRXPERT.B.BKUP.B0010002.Y1009732         04/07/2010 DFDSS
   00001 00003 OT.DRXPERT.B.BKUP.B0010003.Y1009732         04/07/2010 DFDSS
   00001 00004 OT.DRXPERT.B.BKUP.B0010004.Y1009732         04/07/2010 DFDSS
   00001 00005 OT.DRXPERT.B.BKUP.B0010005.Y1009732         04/07/2010 DFDSS
   00001 00006 OT.DRXPERT.B.BKUP.B0010006.Y1009732         04/07/2010 VDR

 ********************************Bottom of Data*********************************
```

Figure 14-38 Backup Aggregate Filename Detail Popup

```
DR/Xpert Release 2.2.3 PTF 1                                Backup Volume Detail
 ------------------------------------------------------------------------------
 Edit:     OT.DRX.PROD.B.BKPDBASE
 Command ===>                                                 Scroll ===> CSR

    Backup Name       BKUP.B0020002.Y1009864
    Aggregate DSNAME  OT.DRX.PROD.B.BKUP.B0020002.Y1009864
    Backup Date       04/08/2010 16:47:27
    Driver            DFDSS
    Vault
    Slot
    Abars Data        NO
    Device Type       78048081
    File Sequence     0001
    Volume Count      0001
    Volumes           ETR181
```

Figure 14-39 Backup Aggregate File Detail

Recovery Menu Options

Recovery Simulation

The Recovery Simulation selection monitors recovery and predicts remaining resources to complete recovery. This application keeps track of recovery activity recording data in two states: recovered and not recovered.

The prediction part or simulation part of this application uses knowledge of the remaining unrecovered aggregates and calculates the time it takes to recover those components.

Recovery Simulation Cycle Selection

The initial panel for Recovery Simulation is the Cycle Selection panel. From this panel, select the cycle that will be used for monitoring and simulation. (See Figure 14-40.)

Press **PF3** to continue to the Application Selection Panel.

Enter **cancel** to exit and return to the main menu.

```
DR/Xpert Release 2.2.3 PTF 1                Recovery Simulation Cycle Selection
-------------------------------------------------------------------------------
 Edit:     OT.DRXPERT.B.BKPDBASE
 Command ===>                                                Scroll ===> CSR

 Sel   Cycle    Start date/time            Select a completed cycle using S OR /
 ---   -----   ----------------
  S    00002   04/08/2010 17:18   <--Selected cycle
       00001   04/07/2010 13:31

 ******************Bottom of Data******************
```

Figure 14-40 DR/Xpert Recovery Simulation Cycle Selection

Application Selection Panel

The **Application Selection Panel** is a list of all applications registered in DR/Xpert's APPLNAME list. The display for this panel is a tree structure and can contain multiple levels.

Figure 14-41 is an example of a simple application list. Figure 14-42 is an example of a multi-leveled application list.

The three columns on the panel display are as follows:

+	The column with a plus sign is for selecting and deselecting applications. Enter **S** to select and application and **U** to deselect one. Only information associated with selected applications is passed to the monitor/simulator. Entering **S** next to the **ALL APPLICATIONS** entry will select all applications. For multi-leveled application name lists; a minus sign (-) collapses a branch, a plus sign (+) expands it.
S	The column with an **S** displays applications that are selected. **S** indicates the corresponding application is selected, a blank indicates the application is not selected.
•	The last column contains the application name.

Enter **GO** to continue, Press **PF3** to continue to the Filter Selection Panel.

Enter **cancel** to exit and return to the main menu.

```
DR/Xpert Release 2.2.3 PTF 1                        Application Selection Panel
 ------------------------------------------------------------------------------
 Command ===> go                                                Scroll ===> CSR

 + S Application Name
 - - +-------------------------------------------------------------+
     *ALL APPLICATIONS
   S |  BELONGS-TO-ONLINE
   S |  DFDSS-TO-DISK
   S |  DFDSS-TO-TAPE
   S |  GOES-TO-ABARS-DRIVER
   S |  GOES-TO-FDR-DRIVER
   S |  GOES-TO-TAPECOPY-DRIVER
   S |  GOES-TO-VDR-DRIVER
   S |  NONE
 ********************************Bottom of Data*********************************



 .-------------------------------------------.
 | Enter GO to start the recovery simulation. |
 | Enter CANCEL or QUIT to terminate          |
 '-------------------------------------------'
```

Figure 14-41 DR/Xpert Application Selection Panel (simple)

```
DR/Xpert Release 2.2.3 PTF 1                        Application Selection Panel
 ------------------------------------------------------------------------------
 Command ===>                                                   Scroll ===> CSR

 + S Application Name
 - - +-------------------------------------------------------------+
     *ALL APPLICATIONS
   S |  BELONGS-TO-ONLINE
     +  DFDSS
   S |  |  TO-DISK
   S |  |  TO-TAPE
     +  GOES-TO
   S |  |  ABARS-DRIVER
   S |  |  FDR-DRIVER
   S |  |  TAPECOPY-DRIVER
   S |  |  VDR-DRIVER
   S |  NONE
 ********************************Bottom of Data*********************************

 .-------------------------------------------.
 | Enter GO to start the recovery simulation. |
 | Enter CANCEL or QUIT to terminate          |
 '-------------------------------------------'
```

Figure 14-42 DR/Xpert Application Selection Panel (multi-leveled)

Recovery Simulation Filter Selection

The Filter Selection Panel contains a list of filters to limit the data considered for monitoring and simulation. Records passed to the monitor and simulator must pass all filters. A blank filter field causes the filter to be skipped; and therefore, have no bearing on the final selection. Figure 14-43 is an example filter selection panel.

DSNAME	Any valid dataset name with or without wildcard characters
Cycle	Limits data selection to a single backup cycle
Aggregate	Limits data selection to a single aggregate. OpenTech Systems recommends using this filter in conjunction with “Cycle”.
Driver	Limits data selection by driver name. Using this parameter one can observe recovery activity for one specific driver.
Media	Limits data selection to a single source media type
Status	Limits data selection by original backup status: GOOD, PROBLEM, FORCED, WITHDRAWN

```
DR/Xpert Release 2.2.3 PTF 1                        Application Selection Panel
 ------------------------------------------------------------------------------
 Command ===>                                                  Scroll ===> CSR

 + S Application Name
 - - +-------------------------------------------------------------+
     *ALL APPLICATIONS
  .-----------------------------------------------------------------------------.
  | Enter Applicable Filters and then press PF3 to continue                    |
  |                                                                             |
  | DSNAME     => /                                                             |
  | Cycle      =>                                                               |
  | Aggregate  =>                                                               |
  | Driver     =>                                                               |
  | Media      =>                                                               |
  | Status     =>                                                               |
  |                                                                             |
  '-----------------------------------------------------------------------------'
   S |  |  TAPECOPY-DRIVER
   S |  |  VDR-DRIVER
   S |  NONE
 ********************************Bottom of Data*********************************
```

Figure 14-43 DR/Xpert Filter Selection Panel

Application Recovery Simulation

The **Application Recovery Simulation** contains five views of recovery information. The views come in two parts: cycle and aggregate list, and application lists. The terminal operator can scroll through each view by pressing PF11, repeatedly. These views are:

- Cycle and aggregate with file count and kilobyte size. (See Figure 14-44.)
- Cycle, aggregate, backup dataset name, and driver. (See Figure 14-45.)
- Cycle, aggregate, backup dataset name, and backup time. (See Figure 14-46.)

- Cycle, aggregate, backup dataset name, and the recovery file's first VOLSER. (See Figure 14-47.)
- Application names with total file count and kilobyte sizes. (See Figure 14-48.)
- Application names with recovered file count and kilobytes sizes. (See Figure 14-49.)

If these views exceed one screen size, all displays are scrollable back and forth from the top of data to the bottom of data with the standard use of PF7 and PF8.

Lastly, the views are color sensitive. There are three colors that reflect current status for elements in the recovery display:

Red	Data not recovered
Green	Data recovered
Turquoise	Data partially recovered

If a cycle and aggregate row or an application row is red, no datasets have been recovered for that aggregate or application. If the row is turquoise, at least one dataset has been recovered. If the row is green, all items in the associated aggregate or application have been recovered.

Each one of the rows is selectable. If **F** is placed next to any row, DR/Xpert would display the datasets associated with the aggregate or application. Each one of those dataset rows will be green or red depicting whether it has been recovered.

```
DR/Xpert Release 2.2.3 PTF 1                    Application Recovery Simulation
 ------------------------------------------------------------------------------
 Command ===>                                                   Scroll ===> CSR

                  Total Recovered                   Total       Recovered
 S Cycle Aggr     Files     Files    Pct             Size            Size    Pct
 - +---+ +---+  +-----+   +-----+  +---+  +------------+  +------------+  +---+
   00002 00001        3         0    0.0             750               0    0.0
   00002 00002        4         0    0.0           2,216               0    0.0
   00002 00003        4         0    0.0           1,999               0    0.0
   00002 00004        1         0    0.0           1,249               0    0.0
   00002 00005        1         0    0.0           1,660               0    0.0
   00002 00006        3         0    0.0           4,158               0    0.0
   00002 00007        3         0    0.0             750               0    0.0
   00002 00008        3         0    0.0             750               0    0.0
   00002 00009        8         0    0.0           2,240               0    0.0
   00002 00010        6         0    0.0           1,680               0    0.0
```

Figure 14-44 Cycle and Aggregate with File Count and Kilobyte Size

```
DR/Xpert Release 2.2.3 PTF 1                    Application Recovery Simulation
  ---------------------------------------------------------------------------
  Command ===>                                                Scroll ===> CSR


  S Cycle Aggr  Backup data set                                 Date    Driver
  - +---+ +---+ +----------------------------------------+ +--------+ +------+
    00002 00001 OT.DRXPERT.B.DRXB0001.C.C01V0007             04/08/2010 ABARS
    00002 00002 OT.DRXPERT.B.BKUP.B0020002.Y1009864          04/08/2010 DFDSS
    00002 00003 OT.DRXPERT.B.BKUP.B0020003.Y1009864          04/08/2010 DFDSS
    00002 00004 OT.DRXPERT.B.BKUP.B0020004.Y1009864          04/08/2010 DFDSS
    00002 00005 OT.DRXPERT.B.BKUP.B0020005.Y1009864          04/08/2010 DFDSS
    00002 00006 OT.DRXPERT.B.BKUP.B0020006.Y1009864          04/08/2010 DFDSS
    00002 00007 OT.DRXPERT.B.BKUP.B0020007.Y1009864          04/08/2010 DFDSS
    00002 00008 OT.DRXPERT.B.BKUP.B0020008.Y1009864          04/08/2010 FDRABR
    00002 00009 OT.DRXPERT.B.BKUP.B0020009.Y1009864          04/08/2010 TAPECOPY
    00002 00010 OT.DRXPERT.B.BKUP.B0020010.Y1009864          04/08/2010 VDR
```

Figure 14-45 Cycle and Aggregate with Backup Dataset Name and Driver

```
DR/Xpert Release 2.2.3 PTF 1                    Application Recovery Simulation
  ----------------------------------------------------------------------------
  Command ===>                                                Scroll ===> CSR


  S Cycle Aggr  Backup data set                                 Date      Time
  - +---+ +---+ +----------------------------------------+ +--------+ +------+
    00002 00001 OT.DRXPERT.B.DRXB0001.C.C01V0007             04/08/2010 16:50:03
    00002 00002 OT.DRXPERT.B.BKUP.B0020002.Y1009864          04/08/2010 16:48:03
    00002 00003 OT.DRXPERT.B.BKUP.B0020003.Y1009864          04/08/2010 16:48:03
    00002 00004 OT.DRXPERT.B.BKUP.B0020004.Y1009864          04/08/2010 16:49:03
    00002 00005 OT.DRXPERT.B.BKUP.B0020005.Y1009864          04/08/2010 16:49:03
    00002 00006 OT.DRXPERT.B.BKUP.B0020006.Y1009864          04/08/2010 16:50:03
    00002 00007 OT.DRXPERT.B.BKUP.B0020007.Y1009864          04/08/2010 16:51:03
    00002 00008 OT.DRXPERT.B.BKUP.B0020008.Y1009864          04/08/2010 16:51:03
    00002 00009 OT.DRXPERT.B.BKUP.B0020009.Y1009864          04/08/2010 16:52:03
    00002 00010 OT.DRXPERT.B.BKUP.B0020010.Y1009864          04/08/2010 17:01:03
```

Figure 14-46 Cycle, Aggregate, Backup Dataset Name, and Backup Time

```
DR/Xpert Release 2.2.3 PTF 1                    Application Recovery Simulation
 ------------------------------------------------------------------------------
 Command ===>                                                  Scroll ===> CSR


 S Cycle Aggr  Backup data set                                  Date    Volser
 - +---+ +---+ +----------------------------------------+ +--------+ +----+
   00002 00001 OT.DRXPERT.B.DRXB0001.C.C01V0007             04/08/2010 ETR473
   00002 00002 OT.DRXPERT.B.BKUP.B0020002.Y1009864          04/08/2010 ETR181
   00002 00003 OT.DRXPERT.B.BKUP.B0020003.Y1009864          04/08/2010 ETR348
   00002 00004 OT.DRXPERT.B.BKUP.B0020004.Y1009864          04/08/2010 ETR277
   00002 00005 OT.DRXPERT.B.BKUP.B0020005.Y1009864          04/08/2010 ETR350
   00002 00006 OT.DRXPERT.B.BKUP.B0020006.Y1009864          04/08/2010 ETR352
   00002 00007 OT.DRXPERT.B.BKUP.B0020007.Y1009864          04/08/2010 WORK11
   00002 00008 OT.DRXPERT.B.BKUP.B0020008.Y1009864          04/08/2010 ETR327
   00002 00009 OT.DRXPERT.B.BKUP.B0020009.Y1009864          04/08/2010 ETR378
   00002 00010 OT.DRXPERT.B.BKUP.B0020010.Y1009864          04/08/2010 WORK06
```

Figure 14-47 Cycle, Aggregate, Backup Dataset Name, and Backup Volser

```
DR/Xpert Release 2.2.3 PTF 1                    Application Recovery Simulation
 ------------------------------------------------------------------------------
 Command ===>                                                  Scroll ===> CSR

 -------------------------------------Total-------------------------------------
 S Application Name                                       Files            Size
 - +-----------------------------------------------+ +-----+ +-------------+
   *ALL APPLICATIONS
   |  BELONGS-TO-ONLINE                                     3           4,980
   +  DFDSS                                                 4           1,999
   |  |  TO-DISK                                            4           1,999
   |  |  TO-TAPE                                            8           4,803
   +  GOES-TO                                               4           1,000
   |  |  ABARS-DRIVER                                       4           1,000
   |  |  FDR-DRIVER                                         3             750
   |  |  TAPECOPY-DRIVER                                    8           2,240
   |  |  VDR-DRIVER                                         6           1,680
   |  NONE                                                  0               0
```

Figure 14-48 Application names, with Total File Counts and Kilobyte Sizes

```
DR/Xpert Release 2.2.3 PTF 1                    Application Recovery Simulation
 ------------------------------------------------------------------------------
 Command ===>                                                   Scroll ===> CSR

 -----------------------------------Recovered-----------------------------------
 S Application Name                                      Files            Size
 - +-----------------------------------------------+ +-----+ +-------------+
   *ALL APPLICATIONS
   |  BELONGS-TO-ONLINE                                    0                0
   +  DFDSS
   |  |  TO-DISK                                           0                0
   |  |  TO-TAPE                                           0                0
   +  GOES-TO
   |  |  ABARS-DRIVER                                      0                0
   |  |  FDR-DRIVER                                        0                0
   |  |  TAPECOPY-DRIVER                                   0                0
   |  |  VDR-DRIVER                                        0                0
   |  NONE                                                 0                0
```

Figure 14-49 Application names, with Recovered File Counts and Kilobyte Sizes

Popup for Browsing Aggregate Related Information

The detail entries from the Application Recovery Simulation panel are selectable. The terminal operator can enter one of four selection codes to display different information related to the recovery. The selection values are V, B, R, and F. Any other value invokes a popup selection screen, as shown in Figure 14-50.

V	Displays DR/Xpert's backup volume. This record contains detailed information related to a specific backup file. (See Figure 14-39.)
B	For the given cycle and aggregate, DR/Xpert displays the backup driver's backup report. For example, if the backup driver was DFDSS, DR/Xpert will display the SYSPRINT file from the original backup (if available).
R	For the given cycle and aggregate, DR/Xpert displays the recovery driver's recovery report. For example, if the backup driver was DFDSS, DR/Xpert will display the SYSPRINT file from the recovery (if available).
F	Lists file names associated with selected aggregate or application. This display contains five different views, as shown in Figure 14-51 through Figure 14-55.

Note Selection codes V, B, and R can be entered from an aggregate view panel. The aggregate view panels are Figure 14-44 through Figure 14-47.

Selection code F is available for aggregate views panels and application views panels. These include Figure 14-44 through Figure 14-47, and also Figure 14-48 and Figure 14-20).

```
DR/Xpert Release 2.2.3 PTF 1                    Application Recovery Simulation
 - .------------- Choices for Application          --------------. -------------
 C |    (V) View Backup Volume Record                               | ll ===> CSR
   |    (B) View Backup Report                                     |
   |    (R) View Recovery Report                                   | vered
 S |    (F) List Selected Files                                    |  Size    Pct
 - |                                                               | ----+  +---+
 s '-------------------------------------------------------------'     0    0.0
   00002 00002        4         0    0.0           2,216               0    0.0
   00002 00003        4         0    0.0           1,999               0    0.0
   00002 00004        1         0    0.0           1,249               0    0.0
   00002 00005        1         0    0.0           1,660               0    0.0
   00002 00006        3         0    0.0           4,158               0    0.0
   00002 00007        3         0    0.0             750               0    0.0
   00002 00008        3         0    0.0             750               0    0.0
   00002 00009        8         0    0.0           2,240               0    0.0
   00002 00010        6         0    0.0           1,680               0    0.0
```

Figure 14-50 Choices for selecting items from Application Recovery Simulation

Recovery Dataset List Displays

The **Recovered Dataset Display** has five views. Each view is color sensitive where green rows indicate the file has been recovered and red indicates the file is not yet recovered.

The different views are described as follows:

- Dataset name with recovery date. Rows without a recovery date are not recovered. Figure 14-51.
- Dataset name with driver name and file size (Figure 14-52)
- Dataset name with the file's application name (Figure 14-53)
- Dataset name with backup cycle, aggregate, and backup date (Figure 14-54)
- Dataset name with backup cycle, aggregate, and original backup status (Figure 14-55)

```
DR/Xpert Release 2.2.3 PTF 1                                        Data Set List
 ------------------------------------------------------------------------------
 Command ===>                                                     Scroll ===> CSR

 Data Set Name                                            Recovery Date
 +-----------------------------------------+              +--------------+
 OT.ABARS.GDGFILE1.G0014V00                                04/10/2010 10:21
 OT.ABARS.GDGFILE1.G0015V00                                04/10/2010 10:21
 OT.ABARS.GDGFILE1.G0016V00                                04/10/2010 10:21
 OT.DSSDISK.GDGFILE1.G0014V00
 OT.DSSDISK.GDGFILE1.G0015V00
 OT.DSSDISK.GDGFILE1.G0016V00
 OT.FDR.GDGFILE1.G0014V00
 OT.FDR.GDGFILE1.G0015V00
 OT.FDR.GDGFILE1.G0016V00
 OT.ONLINE.CLUSTER1
 OT.ONLINE.CLUSTER2
 OT.ONLINE.CLUSTER3
 OT.TAPE.GDGFILE1.G0008V00
 OT.TAPE.GDGFILE1.G0009V00
 OT.TAPE.GDGFILE2.G0008V00
 OT.TAPE.GDGFILE2.G0009V00
 OT.TAPE.GDGFILE3.G0008V00
 OT.TAPE.GDGFILE3.G0009V00
```

Figure 14-51 Dataset Name with Recovery Date

```
DR/Xpert Release 2.2.3 PTF 1                                        Data Set List
 ------------------------------------------------------------------------------
 Command ===>                                                     Scroll ===> CSR

 Data Set Name                                 Driver  Media      Size
 +-----------------------------------------+ +------+ +--+ +---------------+
 OT.ABARS.GDGFILE1.G0014V00                  ABARS    Disk            250 KB
 OT.ABARS.GDGFILE1.G0015V00                  ABARS    Disk            250 KB
 OT.ABARS.GDGFILE1.G0016V00                  ABARS    Disk            250 KB
 OT.DSSDISK.GDGFILE1.G0014V00                DFDSS    Disk            250 KB
 OT.DSSDISK.GDGFILE1.G0015V00                DFDSS    Disk            250 KB
 OT.DSSDISK.GDGFILE1.G0016V00                DFDSS    Disk            250 KB
 OT.FDR.GDGFILE1.G0014V00                    FDRABR   Disk            250 KB
 OT.FDR.GDGFILE1.G0015V00                    FDRABR   Disk            250 KB
 OT.FDR.GDGFILE1.G0016V00                    FDRABR   Disk            250 KB
 OT.ONLINE.CLUSTER1                          DFDSS    Disk          1,660 KB
 OT.ONLINE.CLUSTER2                          DFDSS    Disk          1,660 KB
 OT.ONLINE.CLUSTER3                          DFDSS    Disk          1,660 KB
 OT.TAPE.GDGFILE1.G0008V00                   TAPECOPY Tape            280 KB
 OT.TAPE.GDGFILE1.G0009V00                   TAPECOPY Tape            280 KB
 OT.TAPE.GDGFILE2.G0008V00                   TAPECOPY Tape            280 KB
 OT.TAPE.GDGFILE2.G0009V00                   TAPECOPY Tape            280 KB
 OT.TAPE.GDGFILE3.G0008V00                   TAPECOPY Tape            280 KB
 OT.TAPE.GDGFILE3.G0009V00                   TAPECOPY Tape            280 KB
```

Figure 14-52 Dataset Name with Driver and File Size

```
DR/Xpert Release 2.2.3 PTF 1                                        Data Set List
 ------------------------------------------------------------------------------
 Command ===>                                                   Scroll ===> CSR

 Data Set Name                                 Application Name
 +----------------------------------------+ +-----------------------------+
 OT.ABARS.GDGFILE1.G0014V00                  GOES-TO+ABARS-DRIVER
 OT.ABARS.GDGFILE1.G0015V00                  GOES-TO+ABARS-DRIVER
 OT.ABARS.GDGFILE1.G0016V00                  GOES-TO+ABARS-DRIVER
 OT.DSSDISK.GDGFILE1.G0014V00                DFDSS+TO-DISK
 OT.DSSDISK.GDGFILE1.G0015V00                DFDSS+TO-DISK
 OT.DSSDISK.GDGFILE1.G0016V00                DFDSS+TO-DISK
 OT.FDR.GDGFILE1.G0014V00                    GOES-TO+FDR-DRIVER
 OT.FDR.GDGFILE1.G0015V00                    GOES-TO+FDR-DRIVER
 OT.FDR.GDGFILE1.G0016V00                    GOES-TO+FDR-DRIVER
 OT.ONLINE.CLUSTER1                          BELONGS-TO-ONLINE
 OT.ONLINE.CLUSTER2                          BELONGS-TO-ONLINE
 OT.ONLINE.CLUSTER3                          BELONGS-TO-ONLINE
 OT.TAPE.GDGFILE1.G0008V00                   GOES-TO+TAPECOPY-DRIVER
 OT.TAPE.GDGFILE1.G0009V00                   GOES-TO+TAPECOPY-DRIVER
 OT.TAPE.GDGFILE2.G0008V00                   GOES-TO+TAPECOPY-DRIVER
 OT.TAPE.GDGFILE2.G0009V00                   GOES-TO+TAPECOPY-DRIVER
 OT.TAPE.GDGFILE3.G0008V00                   GOES-TO+TAPECOPY-DRIVER
 OT.TAPE.GDGFILE3.G0009V00                   GOES-TO+TAPECOPY-DRIVER
```

Figure 14-53 Dataset Name with Application Name

```
DR/Xpert Release 2.2.3 PTF 1                                        Data Set List
 ------------------------------------------------------------------------------
 Command ===>                                                   Scroll ===> CSR

 Data Set Name                                 Cycle Aggr     Backup Date
 +----------------------------------------+ +---+ +---+ +--------------+
 OT.ABARS.GDGFILE1.G0014V00                  00002 00001 04/08/2010 16:40
 OT.ABARS.GDGFILE1.G0015V00                  00002 00001 04/08/2010 16:40
 OT.ABARS.GDGFILE1.G0016V00                  00002 00001 04/08/2010 16:40
 OT.DSSDISK.GDGFILE1.G0014V00                00002 00007 04/08/2010 16:41
 OT.DSSDISK.GDGFILE1.G0015V00                00002 00007 04/08/2010 16:41
 OT.DSSDISK.GDGFILE1.G0016V00                00002 00007 04/08/2010 16:41
 OT.FDR.GDGFILE1.G0014V00                    00002 00008 04/08/2010 16:41
 OT.FDR.GDGFILE1.G0015V00                    00002 00008 04/08/2010 16:41
 OT.FDR.GDGFILE1.G0016V00                    00002 00008 04/08/2010 16:41
 OT.ONLINE.CLUSTER1                          00002 00006 04/08/2010 16:41
 OT.ONLINE.CLUSTER2                          00002 00002 04/08/2010 16:40
 OT.ONLINE.CLUSTER3                          00002 00005 04/08/2010 16:40
 OT.TAPE.GDGFILE1.G0008V00                   00002 00009 04/08/2010 16:41
 OT.TAPE.GDGFILE1.G0009V00                   00002 00009 04/08/2010 16:41
 OT.TAPE.GDGFILE2.G0008V00                   00002 00009 04/08/2010 16:41
 OT.TAPE.GDGFILE2.G0009V00                   00002 00009 04/08/2010 16:41
 OT.TAPE.GDGFILE3.G0008V00                   00002 00009 04/08/2010 16:41
 OT.TAPE.GDGFILE3.G0009V00                   00002 00009 04/08/2010 16:41
```

Figure 14-54 Dataset Name with Backup Cycle, Aggregate, and Backup Date

```
DR/Xpert Release 2.2.3 PTF 1                                        Data Set List
 ------------------------------------------------------------------------------
 Command ===>                                                     Scroll ===> CSR

 Data Set Name                                 Cycle Aggr   Status
 +----------------------------------------+ +---+ +---+ +------+
 OT.ABARS.GDGFILE1.G0014V00                    00002 00001 Good
 OT.ABARS.GDGFILE1.G0015V00                    00002 00001 Good
 OT.ABARS.GDGFILE1.G0016V00                    00002 00001 Good
 OT.DSSDISK.GDGFILE1.G0014V00                  00002 00007 Good
 OT.DSSDISK.GDGFILE1.G0015V00                  00002 00007 Good
 OT.DSSDISK.GDGFILE1.G0016V00                  00002 00007 Good
 OT.FDR.GDGFILE1.G0014V00                      00002 00008 Good
 OT.FDR.GDGFILE1.G0015V00                      00002 00008 Good
 OT.FDR.GDGFILE1.G0016V00                      00002 00008 Good
 OT.ONLINE.CLUSTER1                            00002 00006 Good
 OT.ONLINE.CLUSTER2                            00002 00002 Good
 OT.ONLINE.CLUSTER3                            00002 00005 Good
 OT.TAPE.GDGFILE1.G0008V00                     00002 00009 Good
 OT.TAPE.GDGFILE1.G0009V00                     00002 00009 Good
 OT.TAPE.GDGFILE2.G0008V00                     00002 00009 Good
 OT.TAPE.GDGFILE2.G0009V00                     00002 00009 Good
 OT.TAPE.GDGFILE3.G0008V00                     00002 00009 Good
 OT.TAPE.GDGFILE3.G0009V00                     00002 00009 Good
```

Figure 14-55 Dataset Name with Backup Cycle, Aggregate, and Backup Status

Browsing Reports

When selecting a directory of reports to browse, the catalog is searched for all generations of that report. The directory is displayed and ordered with the most recent generation number for the reports first, progressing to the oldest report last. The generation base dataset name for the report is displayed at the top of the file directory's panel. Each detail row contains a generation number for the report along with its creation date for the report's dataset.

If the dataset is moved (such as, with an IEBGENER job) then the creation date will no longer reflect the execution date for the cycle that created the report.

If an individual row on the panel has "Migrated file" in the creation date column, then the dataset containing that report is migrated. The report can still be browsed, but its creation date is temporarily unavailable to the directory menu. There may be a longer wait before that particular report can be browsed.

Identification Report Menu Options

The table below outlines the options available on the Main Menu under the "Identification" heading. These options are detailed further on the next few pages.

Table 14-1 Identification Menu Options

Panel ID	Report ID	Description
OTCD1301	DSIREPRT	Identified Critical Data Sets
OTCD1302	SPACEXPN	Datasets with Space Problems. This report contains datasets that were critical, but were not found during Analysis.
OTCD1303	UPDTEXPN	Datasets without Identified Update Jobs. This report identifies datasets that are potentially read-only. This report has significance for back-level support of Time Scheduled backups.
OTCD1304	A#COREQS	Cross Application Dependencies This report provides a list of applications and their associated prerequisite applications.
OTCD1305	F#COREQS	Cross Application Dependencies with Datasets This report provides a list of applications, their associated prerequisite applications, and the common dataset.

OTCD1301 - Identified Critical Datasets

The following panel is a directory menu for the Identified Critical Dataset Report. The directory lists DSIREPRT Reports by generation data group order with the most recent generation first. Place a non-blank character beside the directory item to display the corresponding report.

```
OTCD1301                          DR/Xpert
                        Identified Critical Data Sets

Backup ID: B Base Name: OT.TST.DRXPERT.B.DSIREPRT

Sel   GDG        Creation date
---   --------   -----------------
      G0037V00   Mon, Mar 27, 2006
      G0036V00   Tue, Mar 21, 2006
      G0035V00   Mon, Mar 13, 2006
      G0034V00   Mon, Mar 06, 2006
      G0033V00   Mon, Feb 27, 2006
      G0032V00   Mon, Feb 20, 2006
      G0031V00   Mon, Feb 13, 2006
```

Figure 14-56 Directory Menu for Identified Critical Dataset Report

```
REL x.x.x  PTF x                                    D R / X P E R T                                                    PROGRAM OTCDI031

DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     BUILD TRIGGERS FROM CRITICAL LIST FOR OPENTECH_SYSTEMS,_INC.                       PAGE      1

BACKUP ID: BATCH

-------------------------------------------------------------------------------------------------------------------------------------
(1) MEDIA: D-DASD, K/T-TAPE, M-MIGRATED
(2) ORG:   PS-SEQUENTIAL, PO-PARTITIONED, DA-DIRECT ACCESS, VS-VSAM, UN-UNKNOWN
(2) TYP:   G-GDG, N-NON GDG, F-GDG FAMILY, M-PDS MEMBER REFERENCE
(4) JCT:   OUTPUT JOB COUNT, THIS COUNT DOES NOT INCLUDE JOBS THAT OPEN CORRESPONDING FILE AS INPUT
           000 - IS A SPECIAL CASE, WHERE ALL JOBS USE THE CORRESPONDING FILE AS INPUT
(5) JOB#N: JOBNAME
(6) IO#N:  O-OUTPUT, U-UPDATE
-------------------------------------------------------------------------------------------------------------------------------------
                                          (1) (2) (3) (4) (5)       (6)
DATASET NAME                             MED ORG TYP JCT JOB#1    IO#1 JOB#2    IO#2 JOB#3    IO#3 JOB#4    IO#4 JOB#5    IO#5
+----------------------------------------+ +-+ +-+ +-+ +-+ +------+ +--+ +------+ +--+ +------+ +--+ +------+ +--+ +------+ +--+
HSM.MCDS                                  D  VS   N  004 DFSMSHSM   U  OT10X056   U  OT10X997   U  OT11X997   U
ISF.HASPINDX                              D  PS   N  013 OT09       U  OT02A      U  OT05       U  OT10       U  OT11A      U
OT.APPLA.SZ14.DATA0003.SFMV.DATASET       T  PS   N  001 DMVP8000   O
OT.TST.DRXPERT.B.BKPCOPY                  W  PS   G  001 BKPAB99P   O
OT.TST.DRXPERT.B.EXREPORT                 W  PS   G  001 BKPAB99P   O
OT.TST.DRXPERT.FILTDATA                   D  PS   N  001 OTCDIWKG   O
OT.TST.DRXPERT.JCLMODEL                   D  PS   N  001 OTCDTASK   O
OT.TST.DRXPERT.JMPFILT                    W  PS   G  001 OTCDCWKC   O
OT.TST.DRXPERT.JOBSTHIS                   W  PS   G  003 OTCDCDLC   O  OTCDCJD2   O  OTCDZJOB   O
OT.TST.DRXPERT.O.BKPCOPY                  W  PS   G  001 BKPAO99P   O
OT.TST.DRXPERT.O.EXREPORT                 W  PS   G  001 BKPAO99P   O
OT.TST.DRXPERT.PREDAILY                   W  PS   G  001 OTCDCDLB   O
OT.TST.DRXPERT.SUSPEND                    W  PS   G  001 OTCDCDLC   O
OT.TST.DRXPERT.VSAM.B.BKPDBASE            D  VS   N  020 BKPAB01P   U  BKPAB02P   U  BKPAB03P   U  BKPAB04P   U  BKPAB05P   U
OT.TST.DRXPERT.VSAM.B.BKPQUEUE            D  VS   N  006 OTCDBA99   U  OTCDBTAL   U  OTCDTASK   U  OTCDBIN1   U  OTCDBSWP   U
OT.TST.DRXPERT.VSAM.JDTFILEX              D  VS   N  002 OTCDBIN1   U  OTCDBWK2   U
OT.TST.DRXPERT.VSAM.O.BKPDBASE            D  VS   N  008 BKPAO99P   U  OTCDBSYN   U  OTCDOA99   U  OTCDOTAL   U  OTCDZCYC   U
OT.TST.DRXPERT.VSAM.O.BKPQUEUE            D  VS   N  004 OTCDOA99   U  OTCDOTAL   U  OTCDTASK   U  OTCDBIN1   U
OT.RELTEST.CA1R11.ZOS14.STATFILE          W  PS   G  003 CA11CA02   U  CA11CA10   U  OTTCCAND   U
OT.RELTEST.CA1R11.ZOS14.TMCDUMP.VOLCHAIN  D  PS   N  004 CA1ARCVY   O  CA11CA02   O  CA11CA10   O  OTTCCAND   O
OT.RELTEST.CA1R11.ZOS14.VOLCHAIN          D  VS   N  004 CA1ARCVY   U  CA11CA02   U  CA11CA10   U  OTTCCAND   U
OT.RELTEST.RMMZ14.ZOS14.EDGHSKP.MESSAGE   D  PS   N  001 RM14RM02   O
OT.RELTEST.RMMZ14.ZOS14.HTTOCXTR          D  VS   N  003 RM14RM02   U  OTTCCAND   U  OT06CONV   U
```

Figure 14-57 Sample output from OTCD1301

OTCD1302 - Datasets with Space Problems

The following panel is a directory menu for the Space Exceptions Report which contains a list of critical datasets that DR/Xpert is unable to find in the catalog. The directory lists SPACEXPN Reports by generation data group order with the most recent generation first. Place a non-blank character beside the directory item to display the corresponding report.

```
OTCD1302                          DR/Xpert
                        Data Sets with Space Problems

              Base Name: OT.TST.DRXPERT.SPACEXPN

Sel   GDG        Creation date
---   --------   -----------------
      G0037V00   Mon, Mar 27, 2006
      G0036V00   Tue, Mar 21, 2006
      G0035V00   Mon, Mar 13, 2006
      G0034V00   Mon, Mar 06, 2006
      G0033V00   Mon, Feb 27, 2006
      G0032V00   Mon, Feb 20, 2006
      G0031V00   Mon, Feb 13, 2006
```

Figure 14-58 Directory Menu for Space Exceptions Report

```
REL x.x.x  PTF x                                    D R / X P E R T                                          PROGRAM OTCDI027
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     SPACE EXCEPTION REPORT FOR OPENTECH_SYSTEMS,_INC.                     PAGE      1

-----------------------------------------------------------------------------------------------------------------------------------
(1) MEDIA; D-DASD, K/T-TAPE, M-MIGRATED
(2) DSORG; PS-SEQUENTIAL, PO-PARTITIONED, DA-DIRECT ACCESS, VS-VSAM, UN-UNKNOWN
(3) TYPE;  G-GDG, N-NON GDG, F-GDG FAMILY
-----------------------------------------------------------------------------------------------------------------------------------

                                            (1)   (2)  (3)
DSNAME                                     MEDIA DSORG TYPE   DESCRIPTION
+----------------------------------------+  +---+ +---+ +--+   +---------------------------------------------+
HLQ.DRXPERT.DOCLIB                           D     PO   N     DATA SET NOT FOUND ON DISK, TMS, OR HSM
HLQ.DRXPERT.INSTALL                          D     PO   N     DATA SET NOT FOUND ON DISK, TMS, OR HSM
HLQ.DRXPERT.JCLLIB                           D     PO   N     DATA SET NOT FOUND ON DISK, TMS, OR HSM
HLQ.DRXPERT.MSGS                             D     PO   N     DATA SET NOT FOUND ON DISK, TMS, OR HSM
HLQ.DRXPERT.OBJ                              D     PO   N     DATA SET NOT FOUND ON DISK, TMS, OR HSM
HLQ.DRXPERT.PANELS                           D     PO   N     DATA SET NOT FOUND ON DISK, TMS, OR HSM
HLQ.DRXPERT.PARMLIB                          D     PO   N     DATA SET NOT FOUND ON DISK, TMS, OR HSM
HLQ.DRXPERT.REXX                             D     PO   N     DATA SET NOT FOUND ON DISK, TMS, OR HSM
HLQ.DRXPERT.SKELS                            D     PO   N     DATA SET NOT FOUND ON DISK, TMS, OR HSM
HLQ.DRXPERT.TABLES                           D     PO   M     DATA SET NOT FOUND ON DISK, TMS, OR HSM
HLQ.DBS.INSTALL                              D     PO   N     DATA SET NOT FOUND ON DISK, TMS, OR HSM
HLQ.DBS.JCLLIB                               D     PO   N     DATA SET NOT FOUND ON DISK, TMS, OR HSM
         . . . . .


         . . . . .

OTIC0800  - NUMBER OF NON-MIGRATED DATA SETS.........................1,280
OTIC0800  - NUMBER OF MIGRATED DATA SETS................................0
OTIC0800  - TOTAL DASD SPACE ALLOCATED IN MB............................450
OTIC0800  - TOTAL DASD SPACE MIGRATED IN MB.............................0
```

Figure 14-59 Sample output from OTCD1302

OTCD1303 - Datasets without Identified Update Jobs

The following panel is a directory menu for the Datasets without Identified Update Jobs Report. This report identifies datasets for which no job updates were found, or datasets for which more than 20 jobs update the dataset. The directory lists UPDTEXPN Reports by generation data group order with the most recent generation first. Place a non-blank character beside the directory item to display the corresponding report.

```
OTCD1303                                DR/Xpert
                     Data Sets without Identified Update Jobs

               Base Name: OT17.TEST.DRXPERT.UPDTEXPN


Sel   GDG        Creation date
---   --------   -----------------
      G0002V00   Sat, May 13, 2006
      G0001V00   Sat, May 13, 2006
```

Figure 14-60 Directory Menu for Datasets Without Identified Update Jobs Report

```
REL x.x.x  PTF x                                    D R / X P E R T                                          PROGRAM OTCDI027
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx   UPDATE EXCEPTION REPORT FOR OPENTECH_SYSTEMS,_INC.                     PAGE      1

-----------------------------------------------------------------------------------------------------------------------------------
(1) MEDIA; D-DASD, K/T-TAPE, M-MIGRATED
(2) DSORG; PS-SEQUENTIAL, PO-PARTITIONED, DA-DIRECT ACCESS, VS-VSAM, UN-UNKNOWN
(3) TYPE;  G-GDG, N-NON GDG, F-GDG FAMILY
-----------------------------------------------------------------------------------------------------------------------------------

                                          (1)   (2)  (3)
DSNAME                                   MEDIA DSORG TYPE   DESCRIPTION
+----------------------------------------+ +---+ +---+ +--+   +---------------------------------------------+
OT.TST.DRXPERT.VSAM.B.BKPDBASE              D     VS   N     NUMBER OF UPDATE JOBS > 20 FOR DATA SET
OT11.TCR250P0.VSAM.ATLDBASE                 D     VS   N     NO ACCESS INFORMATION FROM SMF FOR DATA SET
OT11.TCR250P0.VSAM.ATLDBASE                 D     VS   N     NO UPDATE INFORMATION AVAILABLE FOR DSNAME
OT11.TCR250P0.VSAM.VOLCHAIN                 D     VS   N     NO ACCESS INFORMATION FROM SMF FOR DATA SET
OT31.TEST.DRXPERT.CEOTCDIB                  D     PS   N     NO UPDATE INFORMATION AVAILABLE FOR DSNAME
OT31.TEST.DRXPERT.CEOTCDII                  D     PS   N     NO UPDATE INFORMATION AVAILABLE FOR DSNAME
OT31.TEST.DRXPERT.CEOTPROD                  D     PS   N     NO UPDATE INFORMATION AVAILABLE FOR DSNAME
OT31.TEST.DRXPERT.CEOTSMFD                  D     PS   N     NO UPDATE INFORMATION AVAILABLE FOR DSNAME
OT31.TEST.DRXPERT.CEXTRACT                  W     PS   G     NO UPDATE INFORMATION AVAILABLE FOR DSNAME
OT31.TEST.DRXPERT.DJOTCDIB                  D     PS   N     NO UPDATE INFORMATION AVAILABLE FOR DSNAME
OT31.TEST.DRXPERT.DJOTCDII                  D     PS   N     NO UPDATE INFORMATION AVAILABLE FOR DSNAME
OT31.TEST.DRXPERT.DJOTPROD                  D     PS   N     NO UPDATE INFORMATION AVAILABLE FOR DSNAME


   . . . . .

NUMBER OF FILES WITHOUT UPDATE INFORMATION......27
NUMBER OF FILES WITHOUT ACCESS INFORMATION.......2
```

Figure 14-61 Sample output from OTCD1303

OTCD1304 - Cross Application Dependencies

The following panel is a directory menu for the Cross-Application Dependencies Report. The directory lists A#COREQS Reports by generation data group order with the most recent generation first. Place a non-blank character beside the directory item to display the corresponding report.

```
OTCD1304                              DR/Xpert
                           Cross Application Dependencies

                 Base Name: OT18.DRX.NEW.A#COREQS


Sel   GDG        Creation date
---   --------   -----------------
                                                                    More:     +
      G0009V00   Wed, May 16, 2007
      G0008V00   Tue, May 15, 2007
      G0007V00   Tue, May 15, 2007
      G0006V00   Tue, May 15, 2007
      G0005V00   Fri, May 11, 2007
      G0004V00   Fri, May 11, 2007
      G0003V00   Thu, May 10, 2007
```

Figure 14-62 Directory Menu for Cross-Application Dependencies Report

```
 REL x.x.x  PTF x                                    D R / X P E R T                                          PROGRAM xxxxxxxx

DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     CROSS-APPLICATION DEPENDENCIES FOR OPENTECH_SYSTEMS                          PAGE     01

 +-----------------------APPLICATION-NAME-----------------------+ +-------------------PREREQUISITE-APPLICATION--------------------+
 JOBS-FOR-C                                                      JOBS-FOR-B
 JOBS-FOR-L                                                      JOBS-FOR-C
 JOBS-FOR-T                                                      JOBS-FOR-Y
                                                                 JOBS-FOR-I
 JOBS-FOR-L                                                      JOBS-FOR-T
                                                                 JOBS-FOR-S
 JOBS-FOR-T                                                      JOBS-FOR-S
                                                                 JOBS-FOR-U

 ----------------------------------------------------------END OF REPORT-----------------------------------------------------------
```

Figure 14-63 Sample output from OTCD1304

OTCD1305 - Cross Application Dependencies with Datasets

The following panel is a directory menu for the Cross-Application Dependencies Report. The directory lists F#COREQS Reports by generation data group order with the most recent generation first. Place a non-blank character beside the directory item to display the corresponding report.

```
OTCD1305                              DR/Xpert
             Cross Application Dependencies with Causing Datasets

             Base Name: OT18.DRX.NEW.F#COREQS


Sel   GDG        Creation date
---   --------   -----------------
                                                                    More:     +
      G0009V00   Wed, May 16, 2007
      G0008V00   Tue, May 15, 2007
      G0007V00   Tue, May 15, 2007
      G0006V00   Tue, May 15, 2007
      G0005V00   Fri, May 11, 2007
      G0004V00   Fri, May 11, 2007
      G0003V00   Thu, May 10, 2007
```

Figure 14-64 Directory Menu for Cross-Application Dependencies Report

```
REL x.x.x  PTF x                                        D R / X P E R T                                        PROGRAM xxxxxxxx

DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     CROSS-APPLICATION FILE REFERENCES FOR OPENTECH_SYSTEMS                          PAGE     01

+------------------------APPLICATION-NAME------------------------+
         +--JOB-+ +--------------COMMON-DATASET--------------+ +--------------------PREREQUISITE-APPLICATION--------------------+
JOBS-FOR-C
         CMRDJCL  CXCICS.KICIQT$0.CMRDETL4.CLUSTER             JOBS-FOR-B
JOBS-FOR-L
         LDCAUXBK CXCICS.KICMASA2.DFHBUXT.BKUP                 JOBS-FOR-C
JOBS-FOR-T
         T71G5A   GD.IBATCT.DF4BCKUP                           JOBS-FOR-Y
         T70B7RDH GZIMVST.T67.Z5GPITBD.SYSTEST4.CLUSTER        JOBS-FOR-I
         T70B7RDH GZIMVST.T67.Z5GPPTBD.SYSTEST4.CLUSTER        JOBS-FOR-I
         T70B7RDH GZIMVST.T67.Z5GPPTBX.SYSTEST4.CLUSTER        JOBS-FOR-I
JOBS-FOR-L
         LDCSLEA7 UT.SAR.PLIST.SARDBASE.D0000001               JOBS-FOR-T
         LDCSLEA7 UT.SAR.PLIST.SARDBASE.D0000002               JOBS-FOR-T
         LDCSLEA7 UT.SAR.PLIST.SARDBASE.D0000003               JOBS-FOR-T
         LDCSLEA7 UT.SAR.PLIST.SARDBASE.D0000004               JOBS-FOR-T
         LDCSLEA7 UT.SAR.PLIST.SARDBASE.D0000005               JOBS-FOR-T
         LDCSLEA7 UT.SAR.PLIST.SARDBASE.D0000006               JOBS-FOR-T
         LDCSLEA6 UT.SAR.PLIST.SARTAPE.T0000988                JOBS-FOR-S
JOBS-FOR-T
         T67J87SC UT.SAR.PLIST.SARTAPE.T0000989                JOBS-FOR-S
         T67A54SR UT.SAR.QANDL.SARTAPE.T0003421                JOBS-FOR-S
         T67P35Q  UT.SAR.QANDL.SARTAPE.T0003422                JOBS-FOR-S
         T00W50GN XX.TAPEDSN.LIST                              JOBS-FOR-U

-------------------------------------------------------------END OF REPORT-------------------------------------------------------------
```

Figure 14-65 Sample output from OTCD1305

Backup Report Menu Options

The table below outlines the options available on the Main Menu under the “Backup” heading. These options are detailed further on the next few pages.

Table 14-2 Backup Menu Options

Panel ID	Report ID	Description
OTCD1101	CREPORT	Cycle Completion Report. This report summarizes the results of the aggregates within a cycle.
OTCD1102	DSNXREF	Dataset Backup Cross Reference. This report maps critical dataset to valid backup within cycle and aggregate
OTCD1103	DSNALERT	Dataset Backup Alerts Report. This report lists datasets requiring attention because no valid backup exists.
OTCD1104	DSNERRS	Dataset Backup Problems Report. This report lists datasets whose backup failed and a brief description why it failed.
OTCD1105	DSSPRN	Backup Report. SYSPRINT file from IBM's ADRDSSU program (for DFSMSdss backups) and/or Tape Completion Report (for tape-to-tape backups).
OTCD1106	HSMPRN	Archive Recall Report. This is a list of datasets that required HSM restore before backup.

Table 14-2 Backup Menu Options

Panel ID	Report ID	Description
OTCD1107	DSNHIST	Dataset Backup Cycle History Report. This report lists critical dataset identifying cycles by which the dataset has backup.
OTCD1108	TAPERROR	Tape Error Report. This report shows datasets without a valid backup
OTCD1109	TAPELIST	Critical Tape Report and Volser List. This three-part report identifies critical tape files, DR/Xpert backup files, and critical tape volume pull list.

OTCD1101 - Cycle Completion Report

The following panel is a directory menu for the Cycle Completion Report. The directory lists CREPORT Reports by generation data group order with the most recent generation first. Place a non-blank character beside the directory item to display the corresponding report.

```
  OTCD1101                          DR/Xpert
                              Cycle Completion Report

  Backup ID: B Base Name: OT.TST.DRXPERT.B.CREPORT


 Sel   Cycle    ID         Creation date
 ---   -------- --------   -----------------
                                                                  More:     +
       004 9999 Y0713602   Wed, May 16, 2007
       004 0001 Y0713602   Wed, May 16, 2007
       003 9999 Y0713534   Tue, May 15, 2007
       002 0001 Y0713534   Tue, May 15, 2007
       001 0002 X0713594   Tue, May 15, 2007
       001 0001 X0713594   Tue, May 15, 2007
```

Figure 14-66 Directory Menu for Cycle Completion Report

```
REL x.x.x  PTF x                                    D R / X P E R T                                          PROGRAM OTCDB070

DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     CYCLE COMPLETION REPORT FOR OPENTECH_SYSTEMS                              PAGE      1
BACKUP ID: BATCH   CYCLE: 001

 AGG
NUMBER   RUN DATE   TIME       SUFFIX                    SIZE  STATUS       COLLOCATION ID
+----+  +--------+  +---+  +---------------+  +--------------+  +---------+  +------------------------------+
 00001                      B0010001.X0713594                   SELECTED     GROUPA.DFDSS.DUMP.RESTORE
 00002                      B0010002.X0713594                   PENDING      GROUPA.TAPECOPY.NONE.NONE

             TOTAL BACKUPS...................     2
             GOOD BACKUPS....................     0
             FORCED BACKUPS..................     0
             PROBLEM BACKUPS.................     0
             ACTIVE BACKUPS..................     1
             PENDING BACKUPS.................     1

                        END OF REPORT
```

Figure 14-67 Sample output from OTCD1101

OTCD1102 - Dataset Backup Cross Reference

The following panel is a directory menu for the Dataset Backup Cross Reference Reports. The directory lists DSNXREF Reports by generation data group order with the most recent generation first. Place a non-blank character beside the directory item to display the corresponding report.

```
OTCD1102                          DR/Xpert
                      Dataset Backup Cross Reference

 Backup ID: B Base Name: OT.TST.DRXPERT.B.DSNXREF


 Sel   GDG        Creation date
 ---   --------   -----------------
       G0026V00   Wed, Mar 29, 2006
       G0025V00   Tue, Mar 28, 2006
       G0024V00   Sun, Mar 26, 2006
       G0023V00   Sat, Mar 25, 2006
       G0022V00   Fri, Mar 24, 2006
       G0021V00   Thu, Mar 23, 2006
       G0020V00   Wed, Mar 22, 2006
```

Figure 14-68 Directory Menu for Dataset Backup Cross Reference Reports

```
REL x.x.x  PTF x                                        D R / X P E R T                                                PROGRAM OTCDB052

DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     DATASET BACKUP CROSS REFERENCE FOR OPENTECH_SYSTEMS                            PAGE      1

BACKUP ID: BATCH    CYCLENUM: 00005

DATA SET NAME                                 CYC   AGGR   BACKUP TAPE DATA SET NAME                    BACKUP STATUS
+-----------------------------------------+ +--+ +---+   +-----------------------------------------+ +--------------------------
-+
OT18.CLUSTER                                   001 0001   OT18.DRX.NEW.B.BKUP.B0050001.X0713591        SUCCESSFUL BACKUP
OT18.DSN0                                      001 0001   OT18.DRX.NEW.B.BKUP.B0050001.X0713591        SUCCESSFUL BACKUP
OT18.DSN0X                                     001 0001   OT18.DRX.NEW.B.BKUP.B0050001.X0713591        SUCCESSFUL BACKUP
OT18.DSN3                                      001 0001   OT18.DRX.NEW.B.BKUP.B0050001.X0713591        SUCCESSFUL BACKUP
OT18.DSN3X                                     001 0001   OT18.DRX.NEW.B.BKUP.B0050001.X0713591        SUCCESSFUL BACKUP
OT18.TEMP.FILE                                 001 0001   OT18.DRX.NEW.B.BKUP.B0050001.X0713591        SUCCESSFUL BACKUP
OT18.TEMX.FILE                                 001 0001   OT18.DRX.NEW.B.BKUP.B0050001.X0713591        SUCCESSFUL BACKUP

-------------------------------------------------------------END OF REPORT-------------------------------------------------------------
--
```

Figure 14-69 Sample output from OTCD1102

OTCD1103 - Dataset Backup Alerts Report

The following panel is a directory menu for the Dataset Backup Alerts Report. The directory lists DSNALERT Reports by generation data group order with the most recent generation first. Place a non-blank character beside the directory item to display the corresponding report.

```
OTCD1103                              DR/Xpert
                           Dataset Backup Alerts Report

Backup ID: B Base Name: OT.TST.DRXPERT.B.DSNALERT


Sel   GDG        Creation date
---   --------   -----------------
      G0026V00   Wed, Mar 29, 2006
      G0025V00   Tue, Mar 28, 2006
      G0024V00   Sun, Mar 26, 2006
      G0023V00   Sat, Mar 25, 2006
      G0022V00   Fri, Mar 24, 2006
      G0021V00   Thu, Mar 23, 2006
      G0020V00   Wed, Mar 22, 2006
```

Figure 14-70 Directory Menu for Dataset Backup Alerts Report

```
REL x.x.x  PTF x                                    D R / X P E R T                                          PROGRAM OTCDB052
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     DATASET BACKUP ALERTS FOR OPENTECH_SYSTEMS,_INC.                          PAGE     01
BACKUP ID: BATCH    CYCLENUM: 00025

*-----------------------------------------------------------------------*
* THIS REPORT CONTAINS A LIST OF FILES FOR WHICH NO BACKUP EXISTS       *
*-----------------------------------------------------------------------*
DATA SET NAME                                      OTHER INFORMATION
+----------------------------------------+         +------------------+
OT.TST.DRXPERT.ALLSCHED
OT.TST.DRXPERT.DCOLLECT
OT.TST.DRXPERT.JMPFILT
OT.TST.DRXPERT.JOBSTHIS
OT.TST.DRXPERT.PRODJOBS
OT.TST.DRXPERT.SJOB
OT.TST.DRXPERT.SMFJOBS
OT.TST.DRXPERT.SMFMERGE
OT.TST.DRXPERT.SNEXTR
OT.TST.DRXPERT.SNXTRACT
OT.TST.DRXPERT.TMPFIL
OT.TST.DRXPERT.TOTACCUM
OT17.TEST.DRXPERT.B.DSISPSMF
OT17.TEST.DRXPERT.COMBTRIG
OT17.TEST.DRXPERT.DEXT
OT17.TEST.DRXPERT.DFILTN
OT17.TEST.DRXPERT.DJXTRACT
OT17.TEST.DRXPERT.DSELEXT
OT17.TEST.DRXPERT.DSIXRACT
OT17.TEST.DRXPERT.EDITED
OT17.TEST.DRXPERT.I025DSNF
OT17.TEST.DRXPERT.JCLMRG
OT17.TEST.DRXPERT.JFILT
OT17.TEST.DRXPERT.MISSINGJ
OT17.TEST.DRXPERT.O.DSISPSMF
OT17.TEST.DRXPERT.ONL
OT17.TEST.DRXPERT.PATINCL
OT17.TEST.DRXPERT.PMFDSN
```

Figure 14-71 Sample output from OTCD1103

OTCD1104 - Dataset Backup Problems Report

The following panel is a directory menu for the Dataset Backup Problems Report. The directory lists DSNERRS Reports by generation data group order with the most recent generation first. Place a non-blank character beside the directory item to display the corresponding report.

```
OTCD1104                              DR/Xpert
                          Dataset Backup Problems Report

 Backup ID: B Base Name: OT.TST.DRXPERT.B.DSNERRS


 Sel   GDG        Creation date
 ---   --------   -----------------
       G0026V00   Wed, Mar 29, 2006
       G0025V00   Tue, Mar 28, 2006
       G0024V00   Sun, Mar 26, 2006
       G0023V00   Sat, Mar 25, 2006
       G0022V00   Fri, Mar 24, 2006
       G0021V00   Thu, Mar 23, 2006
       G0020V00   Wed, Mar 22, 2006
```

Figure 14-72 Directory Menu for Dataset Backup Problems Report

```
REL x.x.x  PTF x                                    D R / X P E R T                                                PROGRAM OTCDB052
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     DATASET BACKUP PROBLEMS FOR OPENTECH_SYSTEMS,_INC.                              PAGE     01
BACKUP ID: BATCH    CYCLENUM: 00025

DATA SET NAME                                      RUN     REASON
+----------------------------------------+     UNIT    +-------------------------------------+
OT.TST.DRXPERT.ALLSCHED                          00000    DATA SET NOT FOUND
OT.TST.DRXPERT.DCOLLECT                         00001    PROBLEM WITH BACKUP
OT.TST.DRXPERT.DFILTD                           09999    PROBLEM WITH BACKUP
OT.TST.DRXPERT.DFILTDI                          09999    PROBLEM WITH BACKUP
OT.TST.DRXPERT.INFOUPD                          00001    PROBLEM WITH BACKUP
OT.TST.DRXPERT.JMPFILT                          00001    PROBLEM WITH BACKUP
OT.TST.DRXPERT.JOBLIST.PERM                     09999    PROBLEM WITH BACKUP
OT.TST.DRXPERT.JOBSTHIS                         00001    PROBLEM WITH BACKUP
OT.TST.DRXPERT.ONLDSNS                          00001    PROBLEM WITH BACKUP
OT.TST.DRXPERT.ONLJTEMP                         09999    PROBLEM WITH BACKUP
OT.TST.DRXPERT.PRODJOBS                         00001    PROBLEM WITH BACKUP
OT.TST.DRXPERT.SJOB                             00000    DATA SET NOT FOUND
OT.TST.DRXPERT.SMFJOBS                          00001    PROBLEM WITH BACKUP
OT.TST.DRXPERT.SMFMERGE                         00001    PROBLEM WITH BACKUP
OT.TST.DRXPERT.SNEXTR                           00000    DATA SET NOT FOUND
OT.TST.DRXPERT.SNXTRACT                         00000    DATA SET NOT FOUND
OT.TST.DRXPERT.SUSPEND                          00001    PROBLEM WITH BACKUP
OT.TST.DRXPERT.TMPFIL                           00000    DATA SET NOT FOUND
OT.TST.DRXPERT.TOTACCUM                         00001    PROBLEM WITH BACKUP
OT17.TEST.DRXPERT.B.BKPCOPY                     00001    PROBLEM WITH BACKUP
OT17.TEST.DRXPERT.B.DSISPSMF                    00001    PROBLEM WITH BACKUP
OT17.TEST.DRXPERT.COMBTRIG                      00000    DATA SET NOT FOUND
OT17.TEST.DRXPERT.DEXT                          00000    DATA SET NOT FOUND
OT17.TEST.DRXPERT.DFILTN                        00000    DATA SET NOT FOUND
OT17.TEST.DRXPERT.DJXTRACT                      00001    PROBLEM WITH BACKUP
OT17.TEST.DRXPERT.DSELEXT                     00000    DATA SET NOT FOUND
```

Figure 14-73 Sample output from OTCD1104

OTCD1105 - Backup Report

The following panel is a directory menu for Backup Reports. The directory lists DFSMSdss SYSPRINT Reports (DSSPRN) and Tape Completion Reports by generation data group order with the most recent generation first. Place a non-blank character beside the directory item to display the corresponding report.

```
OTCD1105                                DR/Xpert
                                      Backup Report

Backup ID: B Base Name: OT.TST.DRXPERT.B.DSSPRN

Sel   Cycle    ID         Creation date
---   -------- --------   -----------------
      026 0002 X0608731   Tue, Mar 28, 2006
      025 9999 Z0608605   Mon, Mar 27, 2006
      025 0001 Z0608605   Mon, Mar 27, 2006
      024 9999 X0608531   Sun, Mar 26, 2006
      024 0001 X0608531   Sun, Mar 26, 2006
      023 9999 X0608431   Sat, Mar 25, 2006
      023 0001 X0608431   Sat, Mar 25, 2006
      022 9999 X0608331   Fri, Mar 24, 2006
      022 0001 X0608331   Fri, Mar 24, 2006
      021 9999 X0608231   Thu, Mar 23, 2006
```

Figure 14-74 Directory Menu for Backup Reports

```
PAGE 0001     5695-DF175  DFSMSDSS V1R3.0  DATA SET SERVICES     2006.087 03:12
 DUMP OUTDDNAME(TAPE1)                -
       CANCELERROR                    -
       OPTIMIZE(4)                    -
       ALLD(*)                        -
       SPHERE                         -
       SHARE                          -
       TOLERATE(ENQFAILURE)           -
       ADMINISTRATOR                  -
       DATASET(FILTERDD(FILTER))
ADR101I (R/I)-RI01 (01), TASKID 001 HAS BEEN ASSIGNED TO COMMAND 'DUMP '
 IF LASTCC LE 8 THEN SET MAXCC EQ 0
ADR101I (R/I)-RI01 (01), TASKID 002 HAS BEEN ASSIGNED TO COMMAND 'IF '
ADR101I (R/I)-RI01 (01), TASKID 003 HAS BEEN ASSIGNED TO COMMAND 'SET '
ADR109I (R/I)-RI01 (01), 2006.087 03:12:34 INITIAL SCAN OF USER CONTROL STATEMENTS COMPLETED.
ADR016I (001)-PRIME(01), RACF LOGGING OPTION IN EFFECT FOR THIS TASK
ADR006I (001)-STEND(01), 2006.087 03:12:34 EXECUTION BEGINS
ADR788I (001)-DIVSM(03), PROCESSING COMPLETED FOR CLUSTER OT12.ADVR.R122.PTF1.ATLDBASE, 200 RECORD(S) PROCESSED, REASON 0
ADR788I (001)-DIVSM(03), PROCESSING COMPLETED FOR CLUSTER OT.RELTEST.RMMZ14.ZOS14.HTTOCXTR, 2 RECORD(S) PROCESSED, REASON 0
ADR788I (001)-DIVSM(03), PROCESSING COMPLETED FOR CLUSTER OT.RELTEST.RMMZ14.ZOS14.VOLCHAIN, 15 RECORD(S) PROCESSED, REASON 0
ADR788I (001)-DIVSM(03), PROCESSING COMPLETED FOR CLUSTER OT12.ADVR.R122.PTF1.VOLCHAIN, 15 RECORD(S) PROCESSED, REASON 0
ADR411W (001)-DTDSC(04), DATA SET OT12.ADVR.R122.PTF1.QUEUEFIL IN CATALOG USERCAT.OPENTECH.SHARED ON VOLUME WORK4A WAS NOT
                         SERIALIZED ON REQUEST
ADR730W (001)-DTDSC(01), CLUSTER OT12.ADVR.R122.PTF1.QUEUEFIL IS OPEN
ADR801I (001)-DTDSC(01), DATA SET FILTERING IS COMPLETE. 13 OF 13 DATA SETS WERE SELECTED: 0 FAILED SERIALIZATION AND 0 FAILED FOR
                         OTHER REASONS.
```

Figure 14-75 Sample output from OTCD1105 (DFSMSdss backup)

```
REL x.x.x  PTF x                                    D R / X P E R T                                          PROGRAM OTCDB070

DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     TAPECOPY COMPLETION REPORT FOR OPENTECH_SYSTEMS                              PAGE      1

INPUT DATA SET                              OUTPUT DATA SET                              RESULT
+-------------------------------------+ +-------------------------------------+ +-------------------------------------
OT18.VTAPE.MOD                              OT18.DRX.V000089.F0001.OT18.VTAPE.MOD        COPIED TO VOLUME 001073  FILESEQ=00002
OT18.VTAPX.MOD                              OT18.DRX.V001004.F0001.OT18.VTAPX.MOD        COPIED TO VOLUME 001073  FILESEQ=00003
```

Figure 14-76 Sample output from OTCD1105 (TAPECOPY backup)

OTCD1106 - Archive Recall Report

The following panel is a directory menu for the Archive Recall Report. The directory lists HSMPRN Reports by generation data group order with the most recent generation first. Place a non-blank character beside the directory item to display the corresponding report.

```
OTCD1106                              DR/Xpert
                                Archive Recall Report

Backup ID: B Base Name: OT18.DRX.NEW.B.HSMPRN


Sel   Cycle    ID         Creation date
---   -------- --------   -----------------
                                                                    More:     +
      004 0001 Y0713602   Wed, May 16, 2007
      002 0001 Y0713534   Tue, May 15, 2007
      001 0002 X0713594   Tue, May 15, 2007
      001 0001 X0713594   Tue, May 15, 2007
```

Figure 14-77 Directory Menu for Archive Recall Report

```
REL x.x.x  PTF x                                   D R / X P E R T                                          PROGRAM OTCDB070

DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     ARCHIVE RECALL REPORT FOR OPENTECH_SYSTEMS,_INC.                          PAGE     01

BACKUP-ID: BATCH      CYCLE: 001   AGGREGATE: 9999   BACKUP-STAMP: B0019999.Y0605945   EXECUTION PHASE: PART 1

DSNAME                                        TIME    DESCRIPTION
+----------------------------------------+  +------+  +-------------------------------------------------------------------------+

OT.TEST.RECALL                            00:00:00  ARC1000I RECALL PROCESSING COMPLETE
OT.TEST.NOT.CATALOGD                      00:00:00  ARC1056I FILE NOT CATALOGGED
OT.TEST.SECURITY.ERROR                    00:00:00  ARC1139I RACF PROBLEM

END OF JOB
```

Figure 14-78 Sample output from OTCD1106

OTCD1107 - Dataset Backup Cycle History Report

The following panel is a directory menu for the Dataset Backup Cycle History Report. The directory lists DSNHIST Reports by generation data group order with the most recent generation first. Place a non-blank character beside the directory item to display the corresponding report.

```
OTCD1107                              DR/Xpert
                       Dataset Backup Cycle History Report

Backup ID: B Base Name: OT.TST.DRXPERT.B.DSNHIST

Sel   GDG        Creation date
---   --------   -----------------
      G0057V00   Mon, Mar 27, 2006
      G0056V00   Sun, Mar 26, 2006
      G0055V00   Sat, Mar 25, 2006
      G0054V00   Fri, Mar 24, 2006
      G0053V00   Thu, Mar 23, 2006
      G0052V00   Wed, Mar 22, 2006
      G0051V00   Wed, Mar 22, 2006
```

Figure 14-79 Directory Menu for Dataset Backup Cycle History Report

```
REL x.x.x  PTF x                                    D R / X P E R T                                                PROGRAM OTCDB070
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     DATASET BACKUP CYCLE HISTORY FOR OPENTECH_SYSTEMS,_INC.                        PAGE      1
BACKUP ID: B        CYCLENUM: 00025 DBRNAME: BKPDBASE.OTSCPUXB
-------------------------------------------------------------------------------------------------------------------------------------
(1) SCHEDULE IDENTIFIER J-JOB TRIGGER, S-SWEEP, T-TIME SCHEDULED
(2) CYCLE NUMBER IS LOOSELY CONNECTED WITH A PROCESSING DAY
(3) CYCLE FAMILY
(4) G-GDG, F-GDG FAMILY, P-PATTERN DATA SET
(5)
(6) ABSOLUTE GENERATION EXTRACTED FROM G0000V00 NUMBER
-------------------------------------------------------------------------------------------------------------------------------------
                                          (1) (2)  (3)      (4)  (5) (6)
DATASET NAME                               S               ----------------     CYCLE DATA       ------     CYCLE DATA       --
------------                               C        CYC  0 / CYC -3             CYC -1 / CYC -4             CYC -2 / CYC -5
                                           H   CYCNO FA# LA# R CTA/C AGEN  CYCNO FA# LA# R CTA/C AGEN  CYCNO FA# LA# R CTA/C AGEN
HSM.MCDS                                   S   00001 01      G 01/01 ...0

ISF.HASPINDX                               S   00020 01   0  G 01/01 ...0  00001 01      G 01/01 ...0

OT.ADVR.FIX0297A.XMITFILE                  T   00020 01   0  M 02/02 ...0

OT.TST.DRXPERT.ALLSCHED                    J

OT.TST.DRXPERT.DCOLLECT                    J   00022 01      P 00/00 ...0  00021 01      P 00/00 ...0  00020 01      P 00/00 ...0
                                               00019 01      P 00/00 ...0  00018 01      P 00/00 ...0  00017 01      P 00/00 ...0
OT.TST.DRXPERT.DFILTD                      J   00021 99  01  P 00/00 ...0  00011 01   0  G 01/01 ...0  00001 01      G 01/01 ...0

OT.TST.DRXPERT.DFILTDI                     J   00021 99  01  P 00/00 ...0  00011 01   0  G 01/01 ...0  00001 01      G 01/01 ...0

OT.TST.DRXPERT.FILTDATA                    J   00001 01      G 01/01 ...0

OT.TST.DRXPERT.INFOUPD                     J   00025 01      P 00/00 ...0  00024 01      G 01/01 0270  00023 01      G 01/01 0269
                                               00022 01      G 01/01 0268  00021 99  01  M 02/02 0267  00020 01      P 00/00 ...0
OT.TST.DRXPERT.JMPFILT                     J   00025 01      P 00/00 ...0  00024 01      P 00/00 ...0  00023 01      P 00/00 ...0
                                               00022 01      P 00/00 ...0  00021 01      P 00/00 ...0  00020 01      P 00/00 ...0
OT.TST.DRXPERT.JOBLIST.PERM                J   00021 99  01  P 00/00 ...0  00001 01      G 01/01 ...0

OT.TST.DRXPERT.JOBSTHIS                   J   00025 01      P 00/00 ...0  00024 01      P 00/00 ...0  00023 01      P 00/00 ...0
```

Figure 14-80 Sample output from OTCD1107

OTCD1108 - Tape Error Report

The following panel is a directory menu for the Tape Error Report. The directory lists TAPERROR Reports by generation data group order with the most recent generation first. Place a non-blank character beside the directory item to display the corresponding report.

```
OTCD1108                                DR/Xpert
                                  Tape Error Report

 Backup ID: B Base Name: OT.TST.DRXPERT.B.TAPERROR


 Sel   GDG        Creation date
 ---   --------   -----------------

       G0057V00   Mon, Mar 27, 2006
       G0056V00   Sun, Mar 26, 2006
       G0055V00   Sat, Mar 25, 2006
       G0054V00   Fri, Mar 24, 2006
       G0053V00   Thu, Mar 23, 2006
       G0052V00   Wed, Mar 22, 2006
       G0051V00   Wed, Mar 22, 2006
```

Figure 14-81 Directory Menu for Tape Error Report

```
REL x.x.x  PTF x                                    D R / X P E R T                                                    PROGRAM OTCDB070
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     TAPE ERROR REPORT FOR OPENTECH_SYSTEMS,_INC.                                        PAGE      1
BACKUP ID: B        CYCLENUM: 00025 DBRNAME: BKPDBASE.OTSCPUXB

-------------------------------------------------------------------------------------------------------------------------------
NO VALID BACKUP COPY EXISTS FOR THESE DATA SETS
-------------------------------------------------------------------------------------------------------------------------------
DSNAME                                          REASON
+----------------------------------------+      +-------------------------------------------------------+

 OT.ADVR.FIX0297A.XMITFILE                       WHERE SUCCESS IND=MULTIPLE JOBS
 OT.TST.DRXPERT.ALLSCHED                         WHERE SUCCESS IND=INITIAL VALUE
 OT.TST.DRXPERT.DCOLLECT                         WHERE SUCCESS IND=PROBLEM WITH BACKUP
 OT.TST.DRXPERT.DFILTD                           WHERE SUCCESS IND=PROBLEM WITH BACKUP
 OT.TST.DRXPERT.DFILTDI                          WHERE SUCCESS IND=PROBLEM WITH BACKUP
 OT.TST.DRXPERT.INFOUPD                          WHERE SUCCESS IND=PROBLEM WITH BACKUP
 OT.TST.DRXPERT.JMPFILT                          WHERE SUCCESS IND=PROBLEM WITH BACKUP
 OT.TST.DRXPERT.JOBLIST.PERM                     WHERE SUCCESS IND=PROBLEM WITH BACKUP
 OT.TST.DRXPERT.JOBSTHIS                         WHERE SUCCESS IND=PROBLEM WITH BACKUP
 OT.TST.DRXPERT.ONLDSNS                          WHERE SUCCESS IND=PROBLEM WITH BACKUP
 OT.TST.DRXPERT.ONLJTEMP                         WHERE SUCCESS IND=PROBLEM WITH BACKUP
 OT.TST.DRXPERT.PRODJOBS                         WHERE SUCCESS IND=PROBLEM WITH BACKUP
 OT.TST.DRXPERT.SJOB                             WHERE SUCCESS IND=INITIAL VALUE
 OT.TST.DRXPERT.SMFJOBS                          WHERE SUCCESS IND=PROBLEM WITH BACKUP
 OT.TST.DRXPERT.SMFMERGE                         WHERE SUCCESS IND=PROBLEM WITH BACKUP
 OT.TST.DRXPERT.SNEXTR                           WHERE SUCCESS IND=INITIAL VALUE
```

Figure 14-82 Sample output from OTCD1108

OTCD1109 - Critical Tape Report and Volser List

The following panel is a directory menu for the Critical Tape Report and Volser List. The directory lists TAPELIST Reports by generation data group order with the most recent generation first. Place a non-blank character beside the directory item to display the corresponding report.

15 Administration and Utilities

Topics Covered In This Chapter

Maintaining Filter Tables (page 15-2)
Modifying Cycle Start Time (page 15-4)
Adding an LPAR to an Existing Sysplex (page 15-5)
Ad Hoc Maintenance Jobs (page 15-5)

Introduction

There are several functions and utilities needed to properly maintain the DR/Xpert system and maximize its benefit to you and your organization.

Warning You must exercise caution when running these utilities, because they all cause updates to the permanent DR/Xpert files. If you do not fully understand an Administrative function, contact Technical Support for assistance.

This chapter covers the following administrative functions and utilities that may need to be used to change DR/Xpert processes or parameters after installation is complete.

- *Maintaining Filter Tables*
- *Modifying Cycle Start Time*
- *Adding an LPAR to an Existing Sysplex*
- *Removing Obsolete Datasets*
- *Removing Obsolete Jobs*
- *Aggregate Maintenance (Add/Change Aggregates)*
- *Maintaining/Adding BKPDBASE Records*

Maintaining Filter Tables

Filter tables are used by DR/Xpert to include or exclude certain datasets from processing using various dataset filters, volume serial number filters, and/or system attributes. These filters are customized during installation; however, occasional entries are added to the filters to ensure items, such as newly added infrastructure datasets are not selected as candidates by DR/Xpert.

The filters are defined in the DR/Xpert PARMLIB members. The table below lists the PARMLIB member name and the filter it controls. In order to modify the filter, you will need to make the required updates by editing the appropriate PARMLIB member. Unless otherwise specified, the changes will take affect the next time the dataset analysis portion of DR/Xpert is run.

Except where noted, DR/Xpert's filters have INCL and EXCL keywords and masks containing wildcards. From the context of the filters, items matching INCL filters are passed further through DR/Xpert processing while items matching EXCL filters are excluded. Note that the INCL statement is capable of limiting records. For example, INCL=PAY* would include everything beginning with PAY and exclude everything else.

Depending on the filter, information is specified using one statement per line without continuation. Although the number significant character strings (tokens) per line varies with each filter, each member has a fixed number of tokens containing information. Any information beyond the member's required tokens are comments. An asterisk in column one is a comment statement.

Table 15-1 PARMLIB Members and Filters

Filter	PARMLIB Member	Notes
Infrastructure Dataset Filter (such as SYS1 datasets)	*SMFINFRA*	Infrastructure datasets are typically backed up and maintained outside of the DR/Xpert process by other functions. Example: if SYS1 datasets should be excluded from DR/Xpert analysis, the filter should have EXCL=SYS1.*, other datasets and dataset masks should be coded similarly. This filter is applied to the data collection process for New Data collected. To remove data out of DR/Xpert history files, see *Removing Obsolete Datasets*.
Production Job Standard Filter	*JOBNAMES*	This filter is used to include additional production job names from SMF that may not be included in the job name list from the job scheduler (production jobs running outside of the scheduler) or to exclude job names that should not be selected by DR/Xpert. For example, some data centers may start CICS jobs outside their scheduling system. To include these jobs as productions jobs, one might code INCL=CICS*
Filter to identify datasets on mirrored volumes	*MIRRORED*	This filter is used to include or exclude datasets by mirrored devices. The INCL or EXCL parameter can pertain to a UCB, a UCB range, or a volume serial filter.
Volume/Storage Class Filter	*VOLUMES*	This filter is used to exclude datasets by Volume serial number.
Storage Class Filter	*STORCLAS*	This filter is used to exclude datasets by SMS storage class. A storage class filter might be defined to exclude test datasets based on a test storage class when the dataset name might appear to be production.
Dataset Name Filter	*DSNAMES*	This filter is used to exclude specific datasets by dataset name. The contents can be used to exclude datasets that have not yet been excluded by *PROGRAMS* or *SMFINFRA*.
Program Name Filter	*PROGRAMS*	This filter can be used to exclude datasets based on program name. Typically, users will want to exclude datasets accessed by backup utility programs like FDR, HSM, and ADRDSSU.
DD name Dataset Filter	*ONLDDNF*	This filter can be used to exclude datasets by filtering out online datasets by DDNAME. For example, you may wish to exclude datasets referenced by the STEPLIB DDNAME.

Table 15-1 PARMLIB Members and Filters

Filter	PARMLIB Member	Notes
Online Job Name Filter	*ONLJOBS*	This member can be used to define datasets used by an online system by job name so that any dataset used by an online job can be separated from batch datasets. After SMF records are selected by this filter, they are passed to the *ONLPGMS* filter. This allows *ONLPGMS* to take over identifying online jobs.
Online Program Name Filter	*ONLPGMS*	This member is used to define online systems to DR/Xpert by program name. The purpose of this filter is to separate datasets used by an online job from batch datasets. This filter is used in conjunction with the *ONLJOBS* filter to identify online jobs.
System ID Filter	*SYSIDTBL*	This filter is used to identify the SMF system IDs for the systems for which DR/Xpert should collect SMF data.
Final Dataset Filter	*ADDLFILT*	This filter can be seen as the "catch all" filter. It can be used to filter out datasets that were not filtered by previous filters but that DR/Xpert does not need to process/track.
Encrypted File Identification	*CRYPTRUL*	This filter identifies datasets that DR/Xpert will earmark for encrypted enabled backup versus those datasets earmarked for a traditional, unencrypted backup.

Modifying Cycle Start Time

During the installation of DR/Xpert, the data center identifies what is considered the start of the daily cycle from scheduling perspective. This time of day serves as a cutoff point during the analysis process. This time should be carefully chosen as it controls the view of collected datasets in DR/Xpert.

Code the data center's start of cycle cutoff time in *SCHEDULER-TIME*, a parameter in DR/Xpert's USERSETS member.

Adding an LPAR to an Existing Sysplex

The addition of a new LPAR to an existing sysplex requires modifications to the existing DR/Xpert process. Data needs to be collected for the new LPAR. Sizing issues also need to be monitored and adjusted depending on the size of the workload.

1. Modify the daily SMF collection job (*COLLECT*) and concatenate the SMF dataset(s) containing the SMF record types 14, 15, 30, 61, 64, and 65 for the new LPAR to the existing job.
2. The SMF cut off time for the new LPAR should be consistent with the other LPAR's in the sysplex.
3. Space requirements for existing DR/Xpert datasets may need to be adjusted to support the new workload.
4. Monitor the backup aggregates to see if additional aggregates will be needed to support the added workload. Refer to *Aggregate Maintenance (Add/Change Aggregates)* for information on adding aggregates.
5. If any CICS regions belong to this LPAR, you will need to define the online jobs that run using the *ONLJOBS* member of the DR/Xpert PARMLIB.

Ad Hoc Maintenance Jobs

Removing Obsolete Datasets

The *OTCDZDSN* job allows the removal of unwanted dataset references in the DR/Xpert master files. This job is used when a dataset has become obsolete because of changes to your production system, or if you have omitted a dataset in the filtering process (such as, not listing a certain infrastructure dataset in the *SMFINFRA* member) and it was picked up by DR/Xpert as a critical dataset but you do not need or want DR/Xpert to backup the dataset.

Note DR/Xpert does not require removal of obsolete datasets for DR/Xpert to process correctly; however, removal will reduce unnecessary items from critical dataset reports.

To remove a datasets from DR/Xpert, edit the *OTCDZDSN* member of the JCLLIB library and add the dataset name in the INPUT DD statement. Review the JCL comments in *OTCDZDSN* for any additional instructions and then submit the *OTCDZDSN* member JCL.

Removing Obsolete Jobs

The *OTCDZJOB* job allows the removal of unwanted job references in the DR/Xpert master files. This typically occurs when jobs are no longer run in the installation, or when non-production jobs were listed in the job scheduler and picked up by DR/Xpert as critical files.

Note DR/Xpert does not require removal of these datasets for DR/Xpert to process correctly; however, removal will reduce unnecessary items from critical dataset reports.

To remove the datasets associated with an obsolete or non-production job from DR/Xpert, edit the *OTCDZJOB* member of the JCLLIB library and add the job name in the INPUT DD statement. Review the JCL comments in *OTCDZJOB* for any additional instructions and then submit the *OTCDZJOB* member JCL.

Aggregate Maintenance (Add/Change Aggregates)

DR/Xpert's aggregate control blocks are DR/Xpert's basic structure for tracking backup work. During installation, DR/Xpert defines the initial set of aggregate control blocks based on a USERSETS parameter (*SCROLL-JOB-NAMES-FROM*). The default is 50.

Each aggregate control block is assigned sequentially as needed; and if, DR/Xpert runs out of aggregate control blocks, more will be defined in increments of ten.

This utility is also capable of adding aggregates; but more importantly, this utility is useful for correcting aggregates.

The *BACKUP-IDENTIFIER* parameter in the PGMSETS DD specifies which BKPDBASE (B for batch and O for online) the *OTCDBMTA* job should target.

The control cards required to activate or add an aggregate are coded in the MAINTIN DD.

Table 15-2 Column Descriptions

Column(s)	Description
1	A - for aggregate record
2	U - to activate A - to add I - to inactivate
3-7	aggregate number
34-37	Schedule time, format is HHMM or blanks
38-63	Backup Tape's DSNAME prefix

The example below would change the backup tape's DSNAME prefix.

```
//OTCDBMTA JOB CLASS=A,MSGCLASS=A,REGION=0M,NOTIFY=&SYSUID
//MAINT    EXEC PGM=OTCDB055,REGION=7M
//STEPLIB    DD DISP=SHR,DSN=OT05.DRXPERT.LOADLIB
//           DD DISP=SHR,DSN=CEE.SCEERUN
//           DD DISP=SHR,DSN=CEE.SCEERUN2
//OTPRMLIB   DD DISP=SHR,DSN=OT05.DRXPERT.PARMLIB
//PGMSETS    DD *
 BACKUP-IDENTIFIER: B
//MAINTIN    DD *
AU00001AGGREGATE BACKUP #001         NEW.TAPE.PREFIX
AU00002AGGREGATE BACKUP #002         NEW.TAPE.PREFIX
  . . . .
  . . . .
AU00005AGGREGATE BACKUP #005         NEW.TAPE.PREFIX
AU00049AGGREGATE BACKUP #049         NEW.TAPE.PREFIX
AU00050AGGREGATE BACKUP #050         NEW.TAPE.PREFIX
//
```

List Aggregates in a BKPDBASE

To produce a list of all aggregates for a BKPDBASE, use MAINTIN DD DUMMY. The example below will list the aggregates in the batch BKPDBASE.

```
//OTCDBMTA JOB CLASS=A,MSGCLASS=A,REGION=0M,NOTIFY=&SYSUID
//MAINT    EXEC PGM=OTCDB055,REGION=7M
//STEPLIB    DD DISP=SHR,DSN=OT05.DRXPERT.LOADLIB
//           DD DISP=SHR,DSN=CEE.SCEERUN
//           DD DISP=SHR,DSN=CEE.SCEERUN2
//OTPRMLIB   DD DISP=SHR,DSN=OT05.DRXPERT.PARMLIB
//PGMSETS    DD *
 BACKUP-IDENTIFIER: B
//MAINTIN    DD DUMMY
```

Aggregate Record Update Report

```
REL x.x.x  PTF x                                    D R / X P E R T                                                    PROGRAM OTCDB05
DATE:  xx/xx/xxxx   TIME:  xx:xx:xx     AGGREGATE RECORD UPDATE FOR OPENTECH_SYSTEMS,_INC.                                 PAGE     0

BACKUP ID: B

OTBC0500  - NUMBER OF RECORDS ADDED:         0
OTBC0500  - NUMBER OF RECORDS DELETED:       0
OTBC0500  - NUMBER OF RECORDS INACTED:       0
OTBC0500  - NUMBER OF RECORDS UPDATED:       0
OTBC0500  - NUMBER OF RECORDS REJECTED:      0
OTBC0500  - NUMBER OF RECORDS PROCESSED:     1

OTBC0500:
--------------------------------- CONTROL RECORD CONTENTS ---------------------------------
BKPDBASE ID:                      B
BKPDBASE ENQNAME/RNAME:           BKPENQDQ/BKPDBASE.OTSCPUXB
BKPQUEUE ENQNAME/RNAME:           BKPENQDQ/BKPQUEUE.OTSCPUXB
NEXT AVAILABLE GROUP NUMBER:      00001
NEXT AVAILABLE AGGREGATE NUMBER: 00201
CURRENT BACKUP CYCLE NUMBER:      00001
CYCLE OFFSET WITH SYNC:           +1
CURRENT SYNCPOINT NUMBER:         00001
SCHEDULED INPUT BACKUP TIME:      0359
-------------------------------------------------------------------------------------------


OTBC0500  - GROUP NUMBER=00000;ACTIND=A;NAME=DEFAULT DATACENTER GROUP  ;USERDATA=CREATED AT FILE INITIALIZATION TIME
 AGGBK NUMBER=00001;ACTIND=A;NAME=AGGREGATE BACKUP # 1      ;SCHD BKUP TIME=0000;BKUPNAME=OT17.TEST.DRXPERT.B.BKUP
 AGGBK NUMBER=00002;ACTIND=A;NAME=AGGREGATE BACKUP # 2      ;SCHD BKUP TIME=0000;BKUPNAME=OT17.TEST.DRXPERT.B.BKUP
 AGGBK NUMBER=00003;ACTIND=A;NAME=AGGREGATE BACKUP # 3      ;SCHD BKUP TIME=0000;BKUPNAME=OT17.TEST.DRXPERT.B.BKUP
 AGGBK NUMBER=00004;ACTIND=A;NAME=AGGREGATE BACKUP # 4      ;SCHD BKUP TIME=0000;BKUPNAME=OT17.TEST.DRXPERT.B.BKUP
 AGGBK NUMBER=00005;ACTIND=A;NAME=AGGREGATE BACKUP # 5      ;SCHD BKUP TIME=0000;BKUPNAME=OT17.TEST.DRXPERT.B.BKUP
 AGGBK NUMBER=00006;ACTIND=A;NAME=AGGREGATE BACKUP # 6      ;SCHD BKUP TIME=0000;BKUPNAME=OT17.TEST.DRXPERT.B.BKUP
 AGGBK NUMBER=00007;ACTIND=A;NAME=AGGREGATE BACKUP # 7      ;SCHD BKUP TIME=0000;BKUPNAME=OT17.TEST.DRXPERT.B.BKUP
 AGGBK NUMBER=00008;ACTIND=A;NAME=AGGREGATE BACKUP # 8      ;SCHD BKUP TIME=0000;BKUPNAME=OT17.TEST.DRXPERT.B.BKUP
 AGGBK NUMBER=00009;ACTIND=A;NAME=AGGREGATE BACKUP # 9      ;SCHD BKUP TIME=0000;BKUPNAME=OT17.TEST.DRXPERT.B.BKUP
```

Maintaining / Adding BKPDBASE Records

There are two job streams for adding, removing, and updating critical datasets from BKPDBASE. These job streams are used to change results beyond the values stored by DR/Xpert's identification component. So, these jobs are used on an exception basis to make DR/Xpert do something beyond what normal identification would do. The *OTCDBMTD* job executes program OTCDB007 using the elementary syntax for BKPDBASE maintenance.

Using the Elementary Syntax to Update BKPDBASE

The *OTCDBMTD* job uses DR/Xpert's elementary syntax to add or remove critical datasets in the BKPDBASE.

The *BACKUP-IDENTIFIER* parameter in the PGMSETS DD specifies which BKPDBASE (B for batch and O for online) the *OTCDBMTD* should target.

Column(s)	Values	Notes
01-01	• D	Indicates that the control card is for a dataset record
02-02	Action flag: • A - Add a record • D - Delete a record • I - Inactivate a record • U - Update a record	

Column(s)	Values	Notes
03-46	Dataset name	
47-47	unused	
48-52	Group number	
53-53	Media type: • D - DASD • T - TAPE • K - CART	
54-55	DSORG • PS - physical sequential • PO - partitioned organization (PDS or PDS/e) • VS - VSAM • DA - BDAM	
56-56	Dataset Type • G - GDG • N - Non-GDG • M - PDS member • F - GDG family (all generations) • P - Pattern	
57-62	Owning Application ID	TSO id or job name updating
63-67	unused	
68-68	Dataset trigger type • S	
69-72	Backup time (if time triggered)	Use format HHMM for time.
73-75	Pattern GDG Control	3-digit number indicating the number of generations to be backed up for a GDG or pattern dataset, if available.
76-76	Daily sweep indicator • Y	
77-80	Dataset size in KB	Leave blank if unknown.

The JCL example below shows the addition of file a non GDG, PDS named PROD.DATA.FILE1 into the batch BKPDBASE as a sweep dataset.

```
//OTCDBMTD JOB CLASS=A,MSGCLASS=A,REGION=0M,NOTIFY=&SYSUID
//MAINT    EXEC PGM=OTCDB054,REGION=7M
//STEPLIB    DD DISP=SHR,DSN=OT05.DRXPERT.LOADLIB
//           DD DISP=SHR,DSN=CEE.SCEERUN
//           DD DISP=SHR,DSN=CEE.SCEERUN2
//OTPRMLIB   DD DISP=SHR,DSN=OT05.DRXPERT.PARMLIB
//PGMSETS    DD *
 BACKUP-IDENTIFIER: B
//MAINTIN    DD *
DAPROD.DATA.FILE1                                  DPONOT05       S
```

A ABARS Driver Setup

TOPICS COVERED IN THIS APPENDIX

ABARS Setup Job Selection (page A-3)

Introduction

DR/Xpert's ABARS driver requires SMS definitions that correspond to DR/Xpert facilities. To make sure that the SMS definitions are defined correctly, DR/Xpert has a setup routine for ABARS that builds the necessary JCL. The setup routine executes batch TSO belonging to IBM's NaviQuest software.

The NaviQuest library is a JCL library typically named *SYS1.SACBCNTL*, and it uses SMS's CLIST library, *SYS1.DGTCLIB*. Contact OpenTech Systems support if the NaviQuest libraries are not available.

Follow the instructions to start DR/Xpert's ISPF application. Refer to Chapter 14, “ISPF Interface”.

When the DR/Xpert's Main Menu appears, place a character beside the line item (Submit Batch Job to Create ABARS Aggregate Definitions). See the last line in Figure A-1.

```
------------------------------- Main  Menu ---------------------------------

  Backup ID: B

  Identification:
  ---------------
       Critical Dataset Query

  Backup:
  -------
       View Aggregate List
       View Backup Definitions
       View Backup Inventory
       View Volume Backup Data

  Recovery:
  ---------
       Recovery Simulation

  Identification-Reports:
  -----------------------
       Identified Critical Data Sets
       Cross Application Dependencies
       Cross Application Dependencies with Datasets

  Backup-Reports:
  ---------------
       Cycle Completion Report
       Dataset Backup Cross Reference
       Dataset Backup Alerts Report
       Dataset Backup Problems Report
       Backup Reports
       Archive Recall Report
       Dataset Backup Cycle History Report
       Tape Error Report
       Critical Tape Report and Volser List

  Setup:
  ------
       Inquire PARMSUMM
       Invoke Copy Crypt Interface
       Submit Batch Job to create ABARS Aggregate Definitions
```

Figure A-1 DR/Xpert Main Menu

ABARS Setup Job Selection

After the selection to create ABARS Aggregate Definitions, another screen (see Figure A-2) containing three options is presented. This panel provides submission of two JOB streams. The first JOB defines a specified number of ABARS aggregates to SMS; the second defines a management class associated with ABARS and DR/Xpert.

The options from the first panel selection must be filled out and the resulting ABARS Setup JOB 1 must be submitted twice: first for DR/Xpert's batch dataset backup system, and then for DR/Xpert's online dataset backup system.

After both jobs have completed, select the options for ABARS Setup Job 2. Inspect the options presented in the panel, although they should be filled out correctly by the previous panel; then submit ABARS Setup Job 2 once.

```
                                        DR/Xpert
   ------------ Submit Batch Job to Setup ABARS Aggregate Definitions ----------
--

   SELECTION ===>

    1  Execute ABARS Setup Job 1
    2  Execute ABARS Setup Job 2
    3  Reset ISPF Variables (used by this function)









   Select a function from list by number press Enter key, Press PFK 3  to end
```

Figure A-2 ABARS Setup Job Selection Panel

ABARS Setup Job 1

The screen in Figure A-3 displays when the selection for “Execute ABARS Setup Job 1” is chosen.

```
                                        DR/Xpert
   ------------ Submit Batch Job to Setup ABARS Aggregate Definitions ----------
--

   Define/Alter: DEFINE

   Jcllib   Dsn: SYS1.SACBCNTL
   Tabl2    Dsn: tsoid.ACB.ISPTABL
   Sysproc  DSN: SYS1.DGTCLIB
   Sysproc2 DSN: @dsprefix.DRXPERT.REXX

   SCDS     DSN: SMS.SCDS

   BKupid:   B  Start: 01  Stopid: 50
   MGMTCLAS: DRXPERT
   DsnPfx:   prefix


   Job Card Images to be used:

   //XXXXXXXX JOB (ACCT1,ACCT2),'PROGRAMMER',REGION=0M,
   //             CLASS=A,MSGCLASS=A,MSGLEVEL=(1,1),NOTIFY=&SYSUID
   //*
   //*
```

Figure A-3 ABARS Setup Job 1

The descriptions of the setup parameters is given in Table A-1.

Table A-1 ABARS Setup Job 1 Parameters

Parameter	Description
Define/Alter	Specify the action for setup. To define new aggregates, specify DEFINE; to change existing aggregates, specify ALTER.
JCLLIB DSN	This variable contains NaviQuest's JCL Library. The library contains catalogued procedures for invoking NaviQuest services. The following name is the file name in which IBM delivers NaviQuest JCL: `SYS1.SACBCNTL`
TABL2 DSN	This is an ISPF Table library used by NaviQuest. This dataset is a PDS file belonging to TSO user under which this ISPF application is running. This dataset is allocated if it does not already exist: `<userid>.ACB.ISPTABL`
SYSPROC1 DSN	This is a CLIST library belonging to SMS. The following file name is the name in which IBM delivers SMS CLISTs: `SYS1.DGTCLIB`
SYSPROC2 DSN	This dataset name is the CLIST library belonging to DR/Xpert and it is the same CLIST library used to start this ISPF application.

SCDS DSN	This is an SMS source control dataset. The name varies significantly from data center to data center. IBM distributes the SCDS name as SMS.SCDS; however, the name can be determined by asking an operator to issue a “D SMS” console command or doing the same through SDSF.
	Supply the dataset name displayed in the line beginning with “SCDS =” for this variable as shown in the following example.
	`D SMS`
	`IGD002I hh:mm:ss DISPLAY SMS 920`
	`SCDS = SMS.SCDS1.SCDS`
	`ACDS = SMS.ACDS1.ACDS`
	`COMMDS = SMS.COMMDS1.COMMDS`
	`DINTERVAL = 150`
	`REVERIFY = NO`
	`ACSDEFAULTS = NO`
	`SYSTEM  CONFIGURATION LEVEL  INTERVAL SECONDS`
	`xxxxxxxx  ---------- --------  N/A`
	`xxxx  yyyy/mm/dd hh:mm:ss  15`

BKUPID	This parameter is specified once as “B” for DR/Xpert's batch backup system and once as “O” for DR/Xpert's for online backup system. The different values for this parameter represent the two instances that ABARS Setup JOB 1 is submitted.
START	This is the first aggregate number that is defined or altered. If this is the initial setup for DR/Xpert and ABARS, the beginning aggregate number must be 01 (for DR/Xpert's batch and online backup systems, respectively).
STOPID	This is the last aggregate number defined or altered. If this is the initial setup for DR/Xpert and ABARS, the last aggregate number must be 50 (for DR/Xpert's batch and online backup systems, respectively).

Table A-1 ABARS Setup Job 1 Parameters

Parameter	Description
DSNPFX	This is the dataset prefix assigned to ABARS selection control file. This file prefix comes from the USERSETS member in DR/Xpert's parameter library. See DYNAMIC-ALLOCATION-DATASET-NAME-PREFIX.
MGMTCLAS	The default management class name is DRXPERT. This name can be changed, but make sure this name is consistently used for every ABARS aggregate associated with DR/Xpert.

ABARS Setup Job 2

Figure A-4 displays when the selection for “Execute ABARS Setup Job 2” is chosen. The variables on this panel will be populated with data from the Setup Job 1 panel, and these values are correct for the purposes of ABARS Setup Job 2.

```
  DR/Xpert
   ------------ Submit Batch Job to Setup ABARS Aggregate Definitions ----------
--

   Jcllib   Dsn: SYS1.SACBCNTL
   Tabl2    Dsn: tsoid.ACB.ISPTABL
   Sysproc  DSN: SYS1.DGTCLIB
   Sysproc2 DSN: @dsprefix.DRXPERT.REXX

   SCDS     DSN: SMS.SCDS

   MGMTCLAS: DRXPERT


   Job Card Images to be used:

   //XXXXXXXX JOB (ACCT1,ACCT2),'PROGRAMMER',REGION=0M,
   //             CLASS=A,MSGCLASS=A,MSGLEVEL=(1,1),NOTIFY=&SYSUID
   //*
   //*



   Press Enter Key to Submit Job, PFK 3 to terminate request
```

Figure A-4 ABARS Setup Job 2

Activating New SMS Definitions through Operator Commands

When the submission of ABARS Setup Job 2 is complete, promote the changes made by the ABARS Setup Jobs. The following operator commands give the syntax for performing a backup of the current ACDS and activating new changes stored in the SCDS, respectively.

Provide the correct dataset names for “backup.acds,” “sms.scds,” and optionally “sms.acds” as shown the following commands:

```
SETSMS SAVEACDS(backup.acds)
```

```
SETSMS SCDS(sms.scds) <ACDS(sms.acds)>
```

If a backup ACDS does not exist, one can be created through TSO by issuing:

```
TSO ALLOC DA('backup.acds') LIKE('sms.acds')
```

Activating New SMS Definitions through ISMF, ISPF Interface

An alternative method of promoting SMS definitions can be performed through SMS's ISPF interface. A TSO user whose ISMF profile is setup as a storage administrator is required.

From ISMF's main menu, enter Option 8 and provide the correct SCDS name; and then enter Option 5. Note that the ISMF menu does not have a backup option.

B Non-GDG Dataset "Patterning"

TOPICS COVERED IN THIS APPENDIX

Automated Pattern Generation (page B-2)

Locating Dataset Candidates for "Patterning" (page B-3)

Adding Unidentified Dataset Patterns to the Backup (page B-4)

Introduction

Most sites use generation datasets (GDG's) to define multiple generations of the same dataset. The use of generation numbers relative to zero identifies what generation the user wants. (+0 for current, -1 for previous, etc.)

DR/Xpert recognizes GDG's and backs up the appropriate number of generations required for recovery. For example if the batch applications only use the current and previous generations in the nightly batch cycle DR/Xpert would back up the 2 most current generations.

Some Sites use a combination of "Pattern List", System, and Scheduler variable names in addition to GDG's when defining datasets in the JCL. These non-GDG formats function similarly to GDG's by allowing information like dates to become part of the dataset name. The problem with these types of JCL definitions is since each entity looks like a unique dataset all versions are backed up when only a subset (usually 2 or 3 generations) of these datasets are needed for recovery. This creates a larger backup pool than is necessary. The need to recognize these types of datasets, as generation-type datasets, may be important in reducing the backup requirements.

Automated Pattern Generation

During customized DR/Xpert processing, JCL can be scanned for dataset names containing any "Pattern List" names, System, or Scheduler supplied variables. When one of these variables is encountered DR/Xpert records it as a pattern. The following criteria are then applied against this list of patterns to determine if it is a critical dataset.

1. Patterns referenced by non-active jobs (jobs that haven't run in the last 13 months) will be eliminated.
2. Patterns referenced by programs in the program exclude filter will be eliminated.
3. A "job-level" analysis will be performed on the remaining patterns. If a job references the pattern for output before it is referenced as input DR/Xpert will eliminate it. The assumption is that if the pattern is truly critical it will be referenced as input in another job.
4. DR/Xpert will drop patterns that are a subset of another pattern. For example, A.B.C*.D* would be dropped if a pattern A.B.C* exists. This is because the datasets would be backed up by pattern A.B.C*.
5. SMF infrastructure datasets will be filtered out of this list.
6. A catalog lookup for each pattern will be done. If no datasets are catalogued for a pattern then the pattern will be eliminated. This should get rid of some obsolete pattern references in the JCL.

Locating Dataset Candidates for "Patterning"

DR/Xpert recognizes pattern variable from production JCL only. Any non-scheduled jobs that reference critical patterns will not be identified in this process. This means that some datasets that could have patterns are not being generated. A need to review the datasets in DR/Xpert and attempt to convert datasets of the aforementioned type into patterns is necessary. The following section discusses a method of doing this.

The types of patterns usually found in the dataset name are some form of a date. The more common formats are "yymmdd", "cyymmdd", and other variations of these types. To find a dataset that might be able to become a patterned dataset follow the following directions:

1. Use the ISPF VIEW function to look at the DR/Xpert extract file. This file contains all the datasets identified in the collection and analysis process. The dataset name of this file is @dsprefix.DRXPERT.MASTER. This dataset is a GDG so select the most current generation.
2. Once the VIEW screen is displayed review the file layout. The most important fields for your purposes are the following:
   - jobname – positions 1-8
   - DD name – positions 19-26
   - dataset name – positions 27-70
3. Using the current year and month issue the FIND primary command:

   ```
   F "0004" 27 70
   ```

   This example is searching for year "00" and month "04" between columns 27 through 70. The column numbers are always 27 and 70 because the dataset name resides in that range.
4. Assuming that a dataset was found look at the dataset and see if the field is actually a date field. If not then repeat the find command until you find what appears to be a date format.

   ```
   APPL1.ABCD.D000401
   ```
5. Use the cut and paste functions of your PC to copy the dataset name up to the character before the date or write it down.

   ```
   APPL1.ABCD.D
   ```
6. Split your ISPF screen and type in 3.4. Paste in the dataset name you copied and add an "*" to the end. Press ENTER.

   ```
   APPL1.ABCD.D*
   ```
7. If the dataset is catalogued you should see one or more lines that match the dataset mask you pasted. Does this look like a dataset that can be "patterned"? If the answer is yes then delete the records from the MASTER (exit ISPF View of the MASTER and re-enter using ISPF Edit) and then add a pattern to PARMLIB member *PATINCL*.

   ```
   APPL1.ABCD.D000401
   APPL1.ABCD.D000402
   APPL1.ABCD.D000403
   ```

In this example you would have noticed that the datasets contain yymmdd data so this is a pattern and APPL1.ABCD.D* would be added to the *PATINCL* member in PARMLIB.

Adding Unidentified Dataset Patterns to the Backup

There are various situations that prevent a "patterned" dataset from being automatically identified by DR/Xpert. One situation is JCL that runs outside of the scheduling software. JCL that is not in a site-specified production job library, will not be analyzed. Another situation is JCL that is prepared at execution time. The JCL is incomplete as analyzed.

The following steps provide a method to add unrecognized "pattern' datasets to the backup.

1. Add the pattern dataset name to the PARMLIB member *PATINCL*. When adding it remember to change the "pattern" part the of dataset name to an "*". For example, dataset A.B.C123101 would be entered as A.B.C*.
2. Using ISPF, EDIT the MASTER file and find/delete all records that reference the dataset.
3. Run the backup maintenance program to delete the datasets in the backup without the pattern. Using the above example you would run a delete against the dataset A.B.C123101. (not A.B.C*)

C JCLLIB Library

TOPICS COVERED IN THIS APPENDIX

JCL Example Conventions (page C-2)

Introduction

This appendix contains an explanation of each member of the DR/Xpert JCLLIB library.

JCL Example Conventions

The DR/Xpert JCLLIB contains JCL and control statement examples. Keep in mind that these examples may not be appropriate for every environment. Most of these examples will require some modification before they will function properly in your particular environment. There may be other fields in the examples that require modification before use. In particular, most dataset names in the JCL examples will need to be changed before the JCL can be used in your data center.

ANALYSIS

This member contains JCL for a job to create the critical dataset list from analysis by merging the job/dataset usage profiles created from SMF data and the JCL master file as created from parsing JCL.

Note See Chapter 3 for more information about DR/Xpert Analysis.

APPLBKUP

APPLBKUP is the second step of DR/Xpert's application sweep. It builds backup JCL and readies the backup database for doing backup work.

Run APPLBKUP after one or more "APPLEND" jobs finish.

When compared to DR/Xpert's end-of-day sweep (OTCDBTAL), APPLBKUP can be considered an intermediate backup. In fact, the combination of APPLEND and APPLBKUP is analogous to the end-of-day sweep job (OTCDBTAL) except these job streams are specific to selected applications.

Consider tape utilization when scheduling APPLBKUP. It may run immediately after APPLEND; or its execution may be delayed to maximize tape utilization. For example, schedule APPLBKUP to run hourly, every three hours, or at the end of an operation's shift; thus, collecting more backup work from several APPLEND jobs with the intent of maximizing the data written to a backup tape.

APPLEND

APPLEND is JCL for the first phase of DR/Xpert's application sweep.

Schedule this job as the last production job belonging to your application or group of applications. This job will sift through DR/Xpert's list of critical files, identify files belonging to the application(s) that just completed, and schedule those files for backup.

The next phase of the application sweep is the execution of APPLBKUP. You may schedule APPLBKUP to run immediately after APPLEND, or you may run several APPLEND jobs to increase the number of files that are scheduled for backup.

The APPLLIST DD-statement limits the applications considered for an application sweep. APPLLIST contains a simple list of application names, only one name is allowed per row. Names can contain wildcard characters. Comments have an asterisk in column 1.

The following statements control which applications are scheduled for backup.

```
//S010     EXEC PGM=OTCDB051
//*
//STEPLIB  DD DISP=SHR,DSN=@DSPREFIX.DRXPERT.LOADLIB
//*
//OTPRMLIB DD DISP=SHR,DSN=@DSPREFIX.DRXPERT.PARMLIB
//*
//APPLLIST DD *
*
  APPLICATION-NAME-ONE
  APPLICATION-NAME-TWO
```

AUDIT

This member contains JCL for the DR/Xpert vault audit report and scratch job.

Note See Chapter 8 for more information about this job.

BKUPPNT

This member establishes a base backup point as the beginning of a period in which DR/Xpert begins supervision of incremental backups.

BLDBVIRD

BLDBVIRD Extracts VTS peer-to-peer, cache, and volume map information from Bulk Volume Information Retrieval data provided by an IBM VTS; then it builds the BVIR database for the TAPECOPY driver.

TAPECOPY uses the BVIR database to efficiently consider file location when processing datasets residing on the VTS back-end tapes.

The following keywords are related to BVIR support. Refer to *DR/Xpert Parameters Guide* for further explanation of these keywords:

- BVIR-JOB-NAME
- BVIR-JOB-NAME-SCROLLING
- BVIR-JOB-NAME-SCROLLING-LIMIT
- DYNAMIC-ALLOCATION-BVIRVSAM-DATA-VOLSER
- DYNAMIC-ALLOCATION-BVIRVSAM-DATASET-NAME-PREFIX
- DYNAMIC-ALLOCATION-BVIRVSAM-INDEX-VOLSER
- MAXIMUM-ACCEPTABLE-BVIR-DB-AGE-IN-DAYS

At a minimum, consider non-default values for BVIR-JOB-NAME, DYNAMICALLOCATION-BVIRVSAM-DASET-NAME-PREFIX, and MAXIMUMACCEPTABLE-BVIR-DB-AGE-IN-DAYS.

BVIRBLDS

BVIRBLDS creates the BVIR database from STK VSM data for the TAPECOPY driver.

This job invokes the STK provided SWSADMIN program to produce the MVCRPT report for STK VSM(s). DR/Xpert will extract data from that report and create the BVIR database for STK VSM devices.

TAPECOPY uses the BVIR database to efficiently consider file location when processing datasets residing on the VTS back-end tapes.

The following keywords are related to BVIR support. Refer to *DR/Xpert Parameters Guide* for further explanation of these keywords:

- BVIR-JOB-NAME
- BVIR-JOB-NAME-SCROLLING
- BVIR-JOB-NAME-SCROLLING-LIMIT
- DYNAMIC-ALLOCATION-BVIRVSAM-DATA-VOLSER
- DYNAMIC-ALLOCATION-BVIRVSAM-DATASET-NAME-PREFIX
- DYNAMIC-ALLOCATION-BVIRVSAM-INDEX-VOLSER
- MAXIMUM-ACCEPTABLE-BVIR-DB-AGE-IN-DAYS

At a minimum, consider non-default values for BVIR-JOB-NAME, DYNAMICALLOCATION-BVIRVSAM-DASET-NAME-PREFIX, and MAXIMUMACCEPTABLE-BVIR-DB-AGE-IN-DAYS.

CA7JOBS

This member is included and executed as part of the first daily job stream (see *COLLECT* for special instructions). It creates a CA7 production job listing report that DR/Xpert uses as a production job list. The member *CA7DATA* in the DR/Xpert parameter library contains control cards for creating the production job list. CA7JOBS refers to *CA7DATA* as SYSIN DD input.

Warning Data centers that use CA7 must uncomment the CA7 specific "INCLUDE" statement in the *COLLECT* JCL to invoke the CA7JOBS JCL.

```
// INCLUDE MEMBER=CA7JOBS
```

CDIXCDEF

This member contains JCL to define a system logger (LOGR) stream for DR/Xpert's SMF Data Collector. This JCL executes the IBM utility IXCMIAPU that is described in more detail in an IBM Document named “Setting Up a Sysplex”.

COLLECT

This member contains JCL for a job that collects daily file access information from your data center's SMF data.

Note See Chapter 3 for more information on the collection process.

CPUID

This member contains JCL for a job that will report the serial number of the CPU on which the job is run, in case you do not already have this information available. The job card must be modified to meet your system's requirements and the dataset name of the DR/Xpert LOADLIB library must be placed in the STEPLIB DD before the job is submitted. After the job completes successfully, the last line of the job output should look similar to this:

```
CPUID=1100403174900000
```

The third through eighth characters (in this example - 004031) will be the 6-digit CPU serial number needed for Technical Support to generate an authorization code that allows DR/Xpert to run on that system. The authorization code is then placed in the *AUTHCODE* member of the DR/Xpert PARMLIB library (normally during installation).

Warning The DR/Xpert LOADLIB library must be APF authorized for this job to run successfully.

DRXBKPDB

DRXBKPDB provides a method of gradually implementing backups for datasets. The method depends on using the first cycle as a placeholder cycle. The contents of the cycle are all critical files registered in the backup database without real backups.

The process of DRXBKPDB looks for files belonging to cycle 001. As each day's work following "day one" is backed up, datasets are moved out of cycle 001. Those datasets that remain in cycle 001 are rarely referenced or are only referenced as input datasets. These datasets can be backed up when your data center has available resources. You may decide to back up datasets that remain in cycle 001 over a period of days.

The placeholder cycle is built when the backup JCL is built with PARM=SIM on the phase-2 backup job. See PARMLIB members DMPMODEL and SIMMODEL.

DRXBKPDB should run after the end-of-day processing for the batch and online backup systems (that is, OTCDBA99 and OTCDOA99).

The output from this job is a set of members in @DSPREFIX.SITEDATA containing members that represent aggregates from cycle 001. The member names in the format of BKPID+"RBK"+AGGNO. For example, BRBK0001 represents a list of datasets that remain in cycle 1, aggregate 1, from the batch system. Use DRXBKPRO in JCLLIB to schedule some or all of the backups generated by DRXBKPDB.

Each time this job is run, the list of datasets it produces should grow smaller; firstly, as a result of backing up active datasets, and secondly, as jobs that backup the back log of read-only datasets (produced by this job).

DRXBKPRO

DRXBKPRO is used in conjunction with the DRXBKPDB member in DR/Xpert's JCL library. For more information regarding this job stream's use, refer to “DRXBKPDB”.

This job adds records to the DR/Xpert’s backup queue for each dataset discovered by DRXBKPDB. The members listed in the //INPUT dataset are members containing file names of file that have never been backed up since the initial placeholder backup.

Examine the contents of members in DR/Xpert’s SITEDATA that begin with "BRBK" and "ORBK". Members in the format of "BRBKnnnn" and "ORBKnnnn" contain dataset names for files that have not been backed up since the day-one placeholder backup.

Evaluate the content of these members and decide how many of these datasets can be backed up within a window you have for backups. The members may be edited accordingly to fit your backup window.

ESPJOBS

This member is included and executed as part of the first daily job stream (see *COLLECT* for special instructions). It creates an ESP production job listing report that DR/Xpert uses as a production job list. The member *ESPDATA* in the DR/Xpert parameter library contains control cards for creating the production job list. ESPJOBS refers to *ESPDATA* as SYSIN DD input.

Warning Data centers that use ESP must uncomment the ESP specific "INCLUDE" statement in the *COLLECT* JCL to invoke the ESPJOBS JCL.

```
// INCLUDE MEMBER=ESPJOBS
```

EODSWEEP

This member is identical to OTCDBTAL.

This member contains JCL performs a batch critical backup for sweep datasets, failed backups, and job-trigger datasets that have not been scheduled. The results of this job stream differ slightly from that of OTCDBSWP, as OTCDBSWP does not backup datasets whose prior backup failed or job-trigger datasets whose trigger have not tripped.

EXTERNAL

This JCL is an optional tool that imports an external or foreign backup into DR/Xpert’s batch database.

In order to determine the content of your external backup file, this JCL parses the listing from a simulated DFDSS restore (TYPRUN=NORUN). See the step name //SEEDUMP.

JCLSCAN

This member contains JCL for a job that will scan JCL libraries and provide detection of new files, files with scheduler variables, and file concatenation.

Note See Chapter 3 for more information on the JCL scan process.

JOBCARD

This member is used as a prototype job card by the NEWNAMES CLIST to replace the job cards in the JCL listed in the JCLLIB library and the PARMLIB library.

Note See Step 5 – Execute first run of NEWNAMES CLIST (Optional) in the Installation Guide instructions for more information on the NEWNAMES CLIST.

KEYDBBK

This member contains the JCL used to backup the CopyCrypt key Database. he job will back up the VSAM key database to a flat file and consolidate all generation of the active key database log to the backup key database log.

Note See Chapter 12 for more information about CopyCrypt and the CopyCrypt Key Database.

KEYDBCMP

This member contains JCL that can be used to compare two CopyCrypt Key Databases to verify that they are “identical” (in that all user keys, master key data, and effective control information is the same). This job is usual for verifying that the home site and DR site copies of the key database are the same to avoid potential errors during recovery.

Note See Chapter 12 for more information about CopyCrypt and the CopyCrypt Key Database.

KEYDBINI

This member contains the JCL used to create and initialize the CopyCrypt encryption key database.

Note See Chapter 12 for more information about CopyCrypt and the CopyCrypt Key Database.

KEYDBMAS

This member contains JCL used to create and/or change the master key for the CopyCrypt key database.

Note See Chapter 12 for more information about CopyCrypt and the CopyCrypt Key Database.

KEYDBMS1

This member contains JCL used to pass random numbers to the key database, as required for creating a master key for the CopyCrypt Key Database.

Note See Chapter 12 for more information about CopyCrypt and the CopyCrypt Key Database.

KEYDBRAN

This member contains JCL that will generate three random numbers, as required for creating a master key for the CopyCrypt Key Database.

Note See Chapter 12 for more information about CopyCrypt and the CopyCrypt Key Database.

KEYDBRST

This member contains JCL that is used to restore the CopyCrypt Key Database.

Note See Chapter 12 for more information about CopyCrypt and the CopyCrypt Key Database.

KEYDBUPD

This member contains JCL that is used to add, expire, rename and delete keys in the CopyCrypt Key Database.

Note See Chapter 12 for more information about CopyCrypt and the CopyCrypt Key Database.

KEYDBVAL

This member contains JCL that can be used to validate the CopyCrypt Key Database and print a list of the keys in the database.

Note See Chapter 12 for more information about CopyCrypt and the CopyCrypt Key Database.

LISTBIND

This member contains JCL to create a Binding Date and Time Report. This report lists all of the modules in the DR/Xpert LOADLIB and the binding date and time of each module. This information is sometimes requested by Technical Support when a problem is reported.

```
BINDING DATE AND TIME REPORT

 INPUT DSNAME                                  VOLSER     MODULE NAME     SECTION NAME     BINDING DATE       TIME
 ---------------------------------------------  ------    -----------     ------------     ------------     --------
 OT.DRXPERT.LOADLIB                            SFTWR2       CATTAPES        CATTAPES         2000/027       00:06:44
                                                            CHECKCAT        CHECKCAT         2000/055       16:11:46
                                                            CHNGBINQ        CHNGBINQ         2000/027       00:07:12
                                                            CTLGDSNS        CTLGDSNS         2000/354       09:49:38
                                                            DELRDS          DELRDS           1998/076       00:00:00
                                                            DUMPEXTR        DUMPEXTR         2000/033       08:33:14
                                                            DUMPMOD         DUMPMOD          1996/319       00:00:00
                                                            FIXMDB          FIXMDB           2000/167       12:40:57
                                                            LISTASMD        LISTASMD         2001/037       09:34:49
                                                            LISTBIND        LISTBIND         2001/037       15:37:05
                                                            LISTIDR         LISTIDR          2000/334       15:30:54
                                                            MAKEJCL         MAKEJCL          2000/027       00:08:45
                                                            MAKETAPE        MAKETAPE         2000/027       00:09:18
                                                            MTAPEUND        MTAPEUND         1997/160       00:00:00
                                                            MTAPEVB         MTAPEVB          1997/162       00:00:00
                                                            OTEX0001        OTEX0001         2001/029       08:56:19
                                                            OTEX0002        OTEX0002         2001/029       08:55:53
                                                            OTEX0003        OTEX0003         2001/030       15:35:17
                                                            OTEX0004        OTEX0004         2001/029       08:55:45
                                                                 .  .            .                .
                                                               .               .                .              .
                                                            TESTC           TESTC            2000/327       07:40:59
                                                            TESTDATE        TESTDATE         1998/248       00:00:00
                                                            TESTDCB         TESTDCB          1997/225       00:00:00
                                                            TESTDCB1        TESTDCB1         1998/296       00:00:00
                                                            TESTDCB2        TESTDCB2         1998/296       00:00:00
                                                            TESTEXCP        TESTEXCP         1999/296       07:37:29
                                                            TESTSTAE        TESTSTAE         1998/054       00:00:00
                                                            TESTVSAM        TESTVSAM         1999/068       00:00:00
                                                            TEST0003        TEST0003         1997/157       00:00:00
                                                            TEST0354        TEST0354         1998/289       00:00:00
                                                            TEST1           TEST1            2000/335       17:09:25

                                          VMFEXTR2       VMFEXTR2       1999/097       13:59:07
```

Figure C-1 Example

LISTIDR

This member contains the JCL used to create a Maintenance Level Report which shows which zaps have been applied to the specified DR/Xpert LOADLIB. The Maintenance Level Report is also created whenever DR/Xpert abends. This report lists all of the “zap” maintenance that has been applied to the specified LOADLIB library, the date the maintenance was applied, as well as the module that was affected.

```
MAINTENANCE LEVEL REPORT

 INPUT DSNAME                                  VOLSER     MODULE NAME     SECTION NAME     DATE APPLIED     MAINT ID
 ---------------------------------------------  ------    -----------     ------------     ------------     --------
 OT.DRXPERT.LOADLIB                            SFTWR1       OTTC0002        OTTC0002         2000/203       PTF02Z15
                                                            OTTC0003        OTTC0003         2000/173       PTF02Z13
                                                            OTTC0004        OTTC0004         2000/123       PTF02Z01
                                                            OTTC0004        OTTC0004         2000/147       PTF02Z09
                                                            OTTC0008        OTTC0008         2000/146       PTF02Z06
                                                            OTTC0008        OTTC0008         2000/146       PTF02Z06
                                                            OTTC0009        OTTC0009         2000/173       PTF02Z13
                                                            OTTC0009        OTTC0009         2000/203       PTF02Z20
                                                            OTTC0011        OTTC0011         2000/173       PTF02Z13
                                                            OTTC0012        OTTC0012         2000/173       PTF02Z13
```

Figure C-2 Example

NEWAPPLS

The NEWAPPLS job stores recompiled application rules into DR/Xpert's job start history dataset. The intent of this job is to allow the customer to make large scale application name changes after the product has been installed.

This job is run as needed, but changes in the owning application are not reflected until after ANALYSIS and OTCDBIN1 are run.

NEWNAMES

This member contains an optional CLIST to convert the default prefix for DR/Xpert's libraries to a user-specified dataset name prefix. It also updates the job cards in the DR/Xpert jobs in the JCLLIB and PARMLIB libraries using the job card defined in the *JOBCARD* member of JCLLIB.

Note See "*Step 5 – Execute first run of NEWNAMES CLIST (Optional)*" in the Installation Guide instructions for more information on the NEWNAMES CLIST.

OPCJOBS

This member is included and executed as part of the first daily job stream (see *COLLECT* for special instructions). It creates an OPC production job listing report that DR/Xpert uses as a production job list. The member *OPCRPT01* in the DR/Xpert parameter library contains control cards for creating the production job list. OPCJOBS refers to *OPCRPT01* as SYSIN DD input.

Warning Data centers that use OPC must uncomment the OPC specific "INCLUDE" statement in the *COLLECT* JCL to invoke the OPCJOBS JCL.

```
// INCLUDE MEMBER=OPCJOBS
```

OTCDBIN1

This member contains JCL which maintains the contents of the backup database (BKPDBASE) and queue files (BKPQUEUE). This job runs after the weekly *ANALYSIS* job is complete.

Note See Chapter 5 for more information on the DR/Xpert Backup component.

OTCDBMTA

This member contains JCL to add new aggregates or change information in existing aggregates. DR/Xpert adds and formats aggregates dynamically so this JCL is used primarily to repair aggregates according to direction of Technical Support personnel.

OTCDBMTD

This member contains JCL that is used to perform maintenance (add, remove, and update) on dataset records inside the backup database (BKPDBASE).

OTCDBMTE

This member contains JCL that constructs control cards for *OTCDBMTD* using a simplified syntax.

OTCDBONL

This member contains JCL to backup online files that are ready for backup when the CICS is shutdown. This job is specifically intended for files that are not updated by batch jobs, but may be used as input for batch jobs.

OTCDBSWP

This member contains JCL that performs batch critical backup for sweep datasets. The results of this job stream differ slightly from that of *OTCDOA99*, as *OTCDOA99* will also backup datasets whose prior backup failed and job-trigger datasets whose trigger has not tripped.

OTCDBSYN

This member contains JCL that will synchronize the online and batch databases to make sure they are in the same cycle.

OTCDBTAL

This member contains JCL performs a batch critical backup for sweep datasets, failed backups, and job-trigger datasets that have not been scheduled. The results of this job stream differ slightly from that of *OTCDBSWP*, as *OTCDBSWP* does not backup datasets whose prior backup failed or job-trigger datasets whose trigger have not tripped.

OTCDBXRF

This member contains JCL to create a dataset name cross reference report, backup exceptions report and dataset backup alerts report from information in the backup database.

OTCDC020

This member contains JCL for unloading the LOGR dataset used by the SMF Data Collector.

Note See "Offloading the LOGR Dataset" in Chapter 4 for more information on the SMF LOGR dataset.

OTCDOA99

This member contains sample JCL for the “final sweep” online aggregate job that unloads any remaining records from DR/Xpert’s backup queue and creates the final aggregate backup job to perform the backup.

OTCDOTAL

This member contains JCL for a job to perform the end-of-day sweep.

OTCDOXRF

This member contains JCL that will create a dataset name cross reference report, backup exceptions report and dataset backup alerts report from the current online backup copy dataset.

OTCDTASK

This member contains the procedure that is used to execute the backup trigger control task. It can run as a batch job, but running it as a started task is recommended.

The *TRIGGERS* job provides input for OTCDTASK. For new installations, *TRIGGERS* must run before OTCDTASK is started.

Note See Chapter 6 for more information on this task/job.

OTCDZCYC

This member contains JCL to force the cycle numbers between the batch and online backup databases (BKPDBASE) to be synchronized.

OTCDZDSN

This member contains JCL to remove obsolete datasets from the INFOUPD and SMFMERGE datasets so that they are no longer managed by DR/Xpert.

OTCDZJOB

This member contains JCL to remove datasets associated with jobs that are obsolete so that they are no longer managed by DR/Xpert.

OTCDZQUE

This member contains JCL for a job that will clear records form the DR/Xpert backup queues.

OTSMFDC

This member contains the procedure that is used to execute DR/Xpert's SMF Data Collector started task. It can run as a batch job, but running it as a started task is recommended.

Note See Chapter 4 for more information on this task/job.

RCVYCOMP

The Recovery Complete Job prepares DR/Xpert's backup database at the new data center. Run this job if the new data center is to become your production data center and DR/Xpert is supposed to continue daily DR backups after the recovery is complete.

RECOVERY

This member contains JCL for a job to build and populate one or more recovery JCL libraries.

Note See Chapter 7 for more information on the recovery process.

RECYCLE1

This member contains JCL that forces the backup of read-only files in order to consolidate read-only backups that span several cycles and aggregates. DR/Xpert does not backup datasets for which there is valid backup. However, over time the utilization of volume(s) on which valid backups reside becomes less and less efficient. The purpose of this utility is to schedule read-only datasets for backup into newer aggregates.

In order to recycle older but still active data along with other backup data, schedule this job stream before DR/Xpert's end-of-day sweep. When DR/Xpert's end-of-day sweep runs, recycled datasets are assigned to aggregates along with DR/Xpert's regular end-of-day backup work. If segregating recycled datasets from other backups is desired, consider using the RECYCLE2 job stream instead of RECYCLE1.

RECYCLE1 can be submitted with PARM=SIM to forecast aggregates that will be released and to view the contents (that is, the datasets that are backed up by each aggregate).

RECYCLE2

This member contains JCL that forces the backup of read-only files in order to consolidate read-only backups that span several cycles and aggregates. DR/Xpert does not backup datasets for which there is valid backup. However, over time the utilization of volume(s) on which valid backups reside becomes less and less efficient. The purpose of this utility is to schedule read-only datasets for backup into newer aggregates.

In order to recycle older but still active data separately from other backup data, schedule this job stream anytime backup tape resources are available. This job will assign recycled datasets to aggregates different from end-of-day sweep's aggregates.

REPORTS

This member contains JCL for a job that selects data from the file access attributes database and reports the dataset according to those attributes.

Note See Chapter 13 for more information on the reporting process.

RESET

This member contains JCL that provides recovery for either DR/Xpert's BKPDBASE or BKPQUEUE VSAM files. The RESET job stream can restore these VSAM files to a time that you know is stable.

Note See "Recovering BKPDBASE or BKPQUEUE" in Chapter 5 for more information on restoring the DR/Xpert databases.

SETUP

This member contains JCL for DR/Xpert's Automated Setup program. This JCL is typically used during installation, but may need to be used if new hardware is added or if esoteric names have changed.

Note See the *DR/Xpert Installation Guide*.

SETUPATL

This member contains JCL for a job that will create the contents for the *IOCNTLTB* member in the DR/Xpert PARMLIB and populate the member with known tape device units and automatic tape libraries.

Note See the *DR/Xpert Installation Guide*.

SHOWEXIT

This member contains a job stream that reports system exit definitions and helps identify SMF exits that are defined at your data center, as well as identify exits that the SMF Data Collector task may have to add dynamically to your system.

Note See Chapter 4 for more information on the SMF Data Collector.

TLMSSTEP

This member contains the JCL for a job step that TLMS users will need to run prior to their TLMS daily maintenance job. This JCL can be scheduled to run “stand alone” (a valid job card will need to be added to the JCL to run as a stand alone job) or the step can be added to the TLMS daily maintenance job.

Warning This JCL step must run prior to the CATTRS step on a daily basis to ensure proper tape expiration is set on tapes processed by the DR/Xpert Backup Auditing and Scratch process.

TRIGGERS

This member contains JCL which loads the job trigger dataset (JDTFILEX). This job should run as DR/Xpert's first job in each cycle. When this job runs for the first time, this job may be run after *ANALYSIS*; thereafter, it should be scheduled to run after *OTCDBSYN*.

Warning This job provides data for *OTCDTASK*'s function; be sure to run this job at least once before *OTCDTASK* is run.

UIXITAPC

This member contains sample JCL for performing an SMP/E “APPLY CHECK” of the DSSUXIT USERMOD (the ADRUIXIT installation exit). This is required for CopyCrypt users only.

Note See “*Step 17 - Install/Update/Link the ADRUIXIT Exit*” in DR/Xpert Installation Guide for more information on the ADRUIXIT exit.

UIXITAPP

This member contains sample JCL for performing an SMP/E “APPLY” of the DSSUXIT USERMOD (the ADRUIXIT installation exit). This is required for CopyCrypt users only.

Note See “*Step 17 - Install/Update/Link the ADRUIXIT Exit*” in DR/Xpert Installation Guide for more information on the ADRUIXIT exit.

UIXITLNK

This member contains sample JCL that can be used to link the ADRUIXIT installation exit into the ADRDSSU load module (which will be written into the DR/Xpert LOADLIB library). This is required for CopyCrypt users only.

Note See “*Step 17 - Install/Update/Link the ADRUIXIT Exit*” in DR/Xpert Installation Guide for more information on the ADRUIXIT exit.

UIXITRCV

This member contains sample JCL used to receive the ADRUIXIT installation exit (in the form of a USERMOD). This is required for CopyCrypt users only.

The USERMOD is named DSSUXIT by default, but the name can be changed to suit the user's installation or data center standards.

Note See "*Step 17 - Install/Update/Link the ADRUIXIT Exit*" in DR/Xpert Installation Guide for more information on the ADRUIXIT exit.

UIXITRST

This member contains sample JCL to perform an SMP/E restore should the user need to remove the ADRUIXIT installation exit from their system after it has been installed.

If the USERMOD was named something other than the default of "DSSUXIT" during installation, the user will need to update the control cards to specify the appropriate USERMOD name to remove.

Note See "*Step 17 - Install/Update/Link the ADRUIXIT Exit*" in DR/Xpert Installation Guide for more information on the ADRUIXIT exit.

UIXITSRC

This member contains JCL and SOURCE for building the DFSMSdss User Installation Options Exit. This is required for CopyCrypt users only.

Note See "*Step 17 - Install/Update/Link the ADRUIXIT Exit*" in DR/Xpert Installation Guide for more information on the ADRUIXIT exit.

UNCMPRUL

This member is provided as implementation of OpenTech tape processing tools within DR/Xpert. Changing the contents of this member would cause unpredictable results. Do not change this member without the direction of OpenTech Systems support personnel.

UPFROM

UPFROM is a REXX script stored in DR/Xpert's INSTALL and JCLLIB libraries. This script is a tool for migrating from one release of DR/Xpert to the next.

UPFROMJ

UPFROMJ provides JCL to restore a new version of DR/Xpert prior to an upgrade. This member is used in conjunction with the UPFROM REXX script, which is used to migrate PARMLIB and JCLLIB members to a new release of DR/Xpert.

VDRCFIRM

VDRCFIRM provides confirmation that VDR has performed backups for DR/Xpert. This program converts DR/Xpert's success indicator for files serviced by VDR from "VDR-PEND" status to "GOOD" status.

This job stream requires the VDR inventory report file. Please refer to VDR literature regarding the inventory file. JCL must be updated with the inventory file name created by your VDR environment.

This job may run anytime after VDR has backed up files for DR/Xpert and after the VDR inventory report is available. The job can run before or after DR/Xpert's cycle has ended (aggregate 9999); however, it may not run during DR/Xpert's end-of-cycle processing. Recovery does not depend on this job completing.

Generally, this job has very loose runtime requirements and is completely rerunable. The main benefit of this job is to verify that the VDR INCLDSNS created by DR/Xpert is used by VDR.

Customers who do not use the VDR driver need not run this job.

VDRCLEAN

VDRCLEAN removes extra entries from the VDR INCLDSNS file created by DR/Xpert.

This job stream scans DR/Xpert's backup database making note of files serviced by VDR. Any files that have become obsolete are dropped from the INCLDSNS.

This job can run with DR/Xpert's end-of-day processing; however, the best time to run this job stream is after AUDIT.

Customers who do not use the VDR driver need not run this job.

ZAP

This member contains the JCL that can be used to apply maintenance zaps to the DR/Xpert LOADLIB. Maintenance zaps are sent directly from Technical Support, if you report a problem; or obtained as currently published zaps found on OpenTech Systems' Support website at:

http://www.opentechsystems.com/support.php

D PARMLIB Library

TOPICS COVERED IN THIS APPENDIX

PARMLIB Library Members (page D-2)

PARMLIB Library Members

This appendix contains an explanation of each member of the DR/Xpert PARMLIB library.

In addition to the information listed here, the comment section of each PARMLIB library member contains a list of the applicable PARMLIB statement coding rules for that member. Also, the functions of the USERSETS PARMLIB member and the hierarchy of the DR/Xpert parameters are described in more detail in "Parameter Hierarchy".

ADDBKUP

This member contains dataset names or patterns used to identify "demand backup" files. This member is used by job *OTCDBMTE* to create control cards that can be used as input to the backup database maintenance job *OTCDBMTD*. *OTCDBMTD* can be used to manually add records to the backup database for datasets that the collection and path analysis process does not identify as critical because they run outside of the job scheduler, etc.

Format record layout:

1st field	INCL= for include statements
	EXCL= for exclude statements
2nd field	1 to 44 character dataset name or pattern

Statement coding rules:

- Only one dataset name per line
- The INCL= or EXCL= keywords may begin in any column
- The dataset name or pattern must immediately follow INCL= or EXCL=.
- Anything beyond the second field will be treated as comments.
- An asterisk (*) in column 1 indicates a comment.
- Statement continuation is not allowed.
- Wildcards (? for single character mask and * for multiple character mask) are permitted.

ADDLFILT

This member is the Additional Filters Table. This member contains additional datasets you want DR/Xpert to filter during DR/Xpert's collection and analysis process. The content of this member is typically datasets that DR/Xpert found during weekly JCL analysis, but the file had no rule to filter it as an infrastructure dataset. Adding items to this list gives you an opportunity to specifically exclude items from consideration for backup.

Generally, INCL and EXCL filters are applied before the final critical dataset list is produced. INCL passes those items already selected to the critical list, and then EXCL statements are applied to prevent remove items from that list.

Format record layout:

1st field	1 to 44 character dataset name

Statement coding rules:

- Only one dataset name per line
- The dataset name may start in any column
- Anything beyond the first field will be treated as comments
- An asterisk (*) in column 1 indicates a comment.
- Statement continuation is not allowed.
- Wildcards are not allowed.

APPLDSNS

APPLDSNS allows the user to override application names assigned through APPLRULE's application to job assignment. This member is useful for customers whose dataset naming convention reflects the application system to which a dataset belongs.

Note See Chapter 10 for more information regarding the coding and strategic use of APPLDSNS member.

APPLNAME

This member is a computer generated member. It contents are an association table for *APPLRULE*.

Warning This member should not be modified by the user, unless directed by technical support.

APPLRULE

This member allows the user to assign group names to JOB streams and implicitly to the datasets these JOB streams access. The group name is normally an application, but its name can represent hierarchical groupings like company-department-application.

Format record layout:

1st field	RULE or VERB- This is the rule logic modifier column.
2nd field	COMPARE FIELD - This field must be set to on of the following compare fields: JOBNAME, SYSTEM, USERID, ACCT1, ACCT2, ACCT3, ACCT4, or ACCT5.
3rd field	OP - This is the comparison operand and may contains values EQ, NE, GT, LT, GE, or LE.
4th field	COMPARE DATA - This field is the data that will tested against production job information. Accepted values are strings compatible with the COMPARE FIELD, with or without wildcard characters; or a table of these strings.

Statement coding rules:

- An asterisk (*) in column 1 indicates a comment.
- Statement continuation is not allowed.

Note See Chapter 10 for more information on application groups.

ARCHNAME

This member identifies the pseudo-VOLSER names used by DASD archival products.

Warning This member should never be modified by the user.

ATLDRVRS

This member is used to identify the supported robotic tape library systems drivers.

Warning This member should never be modified by the user.

AUTHCODE

An authorization code is required for each CPU on which DR/Xpert will execute. This member is where the authorization code(s) should be placed.

Format record layout:

1st field	A 16-character string generated by Technical Support.

Statement coding rules:

- Only one authorization code per line
- The authorization code must start in column 1 of the record.
- Anything beyond the first field will be treated as comments.
- An asterisk (*) in column 1 indicates a comment.
- Statement continuation is not allowed.
- Wildcards are not allowed.

If you are not sure of the CPU serial number you can issue the MVS command D M=CPU to obtain the information, or you can use the job that has been provided to identify it for you. The JCL for that job is located in the DR/Xpert JCLLIB library in the *CPUID* member and will require job card modification.

To acquire your authorization code please contact your DR/Xpert representative, call the OpenTech Technical Support number at 469-635-1500 or send an e-mail to productkey@opentechsystems.com. Please have the 6 digit CPU serial number and the CPU model (for example: 9672-R75) available.

BADMEDIA

This table is used for tracking bad media. The entries in this table are added by the DR/Xpert jobs when a media error is detected during the data transfer process, or when a bad condition code is returned from the copy engine. The EXCLUDE-ABENDING-TAPE-VOLSERS parameter must be set to YES (it is set to YES by default) for this information to be recorded. These volsers will be excluded from further DR/Xpert processing unless the volser is removed from the BADMEDIA member by the user, or as the result of the volser having a dataset create-date greater than the date listed in the BADMEDIA parmlib entry.

Format record layout:

1st field	Volser
2nd field	Abend Code
3rd field	Reason Code
4th field	Date of the media error
5th field	Time of the media error

BKUPJOBS

DR/Xpert uses the BKUPJOBS member to control backup job count and backup file size.

DR/Xpert controls the number of backup jobs in the folowing ways:

- DR/Xpert can create the exact number of backup jobs needed to satisfy backup requirements; or,
- DR/Xpert can limit backup jobs to a fixed number.

DR/Xpert controls the aggregate (backup file) size in the following ways:

- Using DR/Xpert's "THRESHOLD" strategy, a maximum size for each backup aggregate is specified. When each aggregate's threshold is met, DR/Xpert will create the next backup aggregate. This continues until all files are assigned to an aggregate.

The backup file size can be specified as a fixed size (e.g., in megabytes or gigabytes), or as a percentage of a backup media.

- Using "BALANCED" strategy, DR/Xpert backup work will be roughly the same size across a fixed number of backup jobs.

The following are considerations when using the "THRESHOLD" strategy:

- When zero (0) is specified for the number of backup jobs, DR/Xpert creates the exact number of backup jobs to service all backup aggregates.
- When more backup jobs are specified than backup aggregates, some DR/Xpert backup jobs will execute; indicating there is nothing to do, create a status report, and quit.
- When fewer backup jobs are specified than aggregates, some DR/Xpert backup jobs will service more than one backup aggregate.

The following considerations are specified for the "BALANCED" strategy:

- Specify a fixed number of jobs (zero (0) jobs is not allowed for the "BALANCED" strategy).
- There will be the same number of backup jobs as backup aggregates.
- Depending on total backup size requirements, a backup aggregate may need more than one backup tape volume.

Format record layout:

The format for BKUPJOBS' detail is one row with five tokens. Contained within each row is information dictating how DR/Xpert will divide backup work.

1st token — Acts like a keyword; it is the criterion by which DR/Xpert collects and separates work for backup job streams. The keyword is a constant; supply either "MEDIA" or "DRIVER" based on your requirements.

2nd token — Specifies the type within the first token. This token is either a driver name or a media type respective to "DRIVER" or "MEDIA".

"TAPE", "DISK", or "ALL" may follow MEDIA.

If "DRIVER" is used, one of the driver names from the following list may follow the DRIVER keyword.

DFDSS	DMS
CRPTDSS	RECALL
TAPECOPY	DUMMY
ABARS	ALL

3rd token

Specifies the strategy for assigning backup work by job. There are three strategies: THRESHOLD, BALANCED and BALANCEX.

What does THRESHOLD mean?

THRESHOLD means each backup aggregate will be limited to a set accumulated backup size; and each time the threshold is met, DR/Xpert will create a new backup aggregate.

The thresholds for each “MEDIA” or “DRIVER” are considered independently. For example, each TAPECOPY backup job will reach its threshold without consideration of DFDSS thresholds.

What does BALANCED mean?

BALANCED means DR/Xpert will limit the number of backup jobs to a fixed, user specified number. The total accumulated backup size is balanced across the specified number of jobs.

Similar to THRESHOLD, the number of jobs is considered within media and driver.

What does BALANCEX mean?

BALANCEX is similar to the BALANCED strategy except the number of job streams increments until the average aggregate size is below the specified threshold.

4th field

This field is the number of backup jobs created by DR/Xpert within a media and driver.

THRESHOLD

When the “THRESHOLD” strategy is used, this field may be zero (0). When zero is specified, DR/Xpert will create a backup job for each aggregate; note that the number of aggregates can be more some days than other days.

If a non-zero value is specified along with THRESHOLD, DR/Xpert will service a set number of bytes per backup aggregate; and then, proceed to the next backup aggregate. Note the number of backup aggregates may be more or less than the configured number of jobs.

- If more jobs are specified than needed, some backup jobs will execute without doing any backup work.
- If fewer jobs are specified than needed, there will be some backup jobs that service more than one backup aggregate.

Thus, DR/Xpert’s backup jobs can be placed into a scheduling system and the same backup jobs can be run day-in and day-out without consideration to larger or smaller backup requirements.

BALANCED

When BALANCED is specified, the number of jobs must be non-zero. Each job contains, more or less, an equal share of the backup work. That is, the total size to be backed up by a media and driver is divided by the specified number of drives. Each job will service a relatively equal piece of work.

BALANCEX

When BALANCEX is specified, the specified number of jobs is a job increment and it must be non-zero. BALANCEX will create enough backup jobs for the average aggregate backup size to be less than the specified threshold. The number of generated backup jobs is a multiple of the job count field.

5th field — Specifies the target threshold when THRESHOLD is specified. This parameter may be specified in bytes, kilobytes, megabytes, gigabytes, or percentage of output devices.

Examples:

100000KB

1000MB

1GB

25%

If a percentage is specified, then the threshold is a percentage of the device specified in BACKUP-MEDIA-TYPE keyword found in USERSETS.

This field is meaningless when BALANCED is specified.

Some Coding Examples:

```
KEYWORD MEDIA
       OR DRIVER  STRATEGY JOBS THRESHOLD
+------+ +------+ +------+ +------+ +--------+
DRIVER   DFSDS    BALANCED        5        0
DRIVER   TAPECOPY BALANCED        4        0
```

DR/Xpert will create five backup jobs using DFDSS as the driver, each job servicing one-fifth of the new critical disk files. Similarly, four TAPECOPY backup jobs are created servicing a quarter of new critical tape files.

```
KEYWORD MEDIA
       OR DRIVER  STRATEGY JOBS THRESHOLD
+------+ +------+ +------+ +------+ +--------+
DRIVER   DFSDS    THRESHOLD       5       100GB
DRIVER   TAPECOPY THRESHOLD       4       100GB
```

DR/Xpert will create five backup jobs using DFDSS as the driver. Each backup job will assigned critical files to backup until the accumulated file size reaches 100 gigabytes. If the data center has, for example, 200 gigabytes to backup; only two backup jobs will create aggregate backup files, the remaining three will run without servicing any work.

```
KEYWORD MEDIA
       OR DRIVER  STRATEGY JOBS THRESHOLD
+------+ +------+ +------+ +------+ +--------+
DRIVER   DFSDS    BALANCED        5       250GB
DRIVER   TAPECOPY THRESHOLD       5         1K
```

The previous example makes sense for data centers that have small capacity tapes and their objective is to create copies of each critical tape file to be shipped to an offsite vault.

In this example, the TAPECOPY driver will service one file per aggregate. Assuming there are several hundred critical tapes, the five backup jobs will each service more than one aggregate.

BKUPPDS

The BKUPPDS member describes the rules for naming a partitioned dataset (PDS) in which backup JCL is stored. One might use this member to direct backup for tape files to one JCL PDS and backups for disk files to another JCL PDS.

Likely Use of BKUPPDS:

A simple use for this member might be, for example, to specify a JCL library for tape backups and a JCL library for disk backups. The following is an example code for describing two libraries:

```
IF MEDIA EQ TAPE
THEN &PREFIX..TAPEBKUP
DEFAULT &PREFIX..DISKBKUP
Or
DEFAULT &PREFIX..&MEDIA.BKUP
```

The purpose of the previous example is to place tape backups and disk backups into separate JCL libraries for scheduling backup jobs around available resources. Specifically, you may want to isolate tape-to-tape backup jobs and schedule them because of their increased use of tape devices.

Some Coding Conveniences:

In the current release, the destination JCLLIB can be any valid dataset name, but to simplify the specified PDS name, the partitioned dataset name can be specified with some symbolic parameters. The use of these symbolic parameters can reduce redundant coding of rules. These are the symbolic parameters supported by this rule set. The rules for coding a dataset name using these symbolic parameters follows the same rules as coding JCL; for example, a period indicates the end of a symbol, two periods may be necessary when the symbol ends a node.

&BKPID	Backup identifier, as from BACKUP-IDENTIFIER in USERSETS; the value is either "B" or "O"
&MEDIA	The media Having a specific media (DISK or TAPE)

&GROUP	Belonging to a specific collocation group from the COLOCTBL. The collocation string is a four-token, period separated string. The first token is the group name; the second is the driver name.
&DRIVER	One of DR/Xpert's supported drivers
&PREFIX	DYNAMIC-ALLOC-DATASET-NAME-PREFIX, from USERSETS.

Backward Compatibility:

In previous releases, DR/Xpert's backup JCL libraries were limited to “prefix.B.BKPJOBS” and “prefix.O.BKPJOBS”. There was a backup JCL library for batch and one for online. The prefix part of the dataset was limited to the value coded in DYNAMIC ALLOC DATASET NAME PREFIX. To continue to use these JCL datasets, this BKUPPDS should contain a single statement:

```
DEFAULT &PREFIX..&BKPID..BKPJOBS
```

Format record layout:

1st field	RULE or VERB - This is the rule logic modifier column.
2nd field	COMPARE FIELD - This field must be set to on of the following compare fields: MEDIA, DRIVER, GROUP, BKPID
3rd field	OP This is the comparison operand and may contains values EQ, NE, GT, LT, GE, or LE.
4th field	COMPARE DATA This field is the data that will tested against production job information. Accepted values are strings compatible with the COMPARE FIELD, with or without wildcard characters; or a table of these strings.

Statement coding rules:

- An asterisk (*) in column 1 indicates a comment.
- Statement continuation is not allowed.

The DRIVER field and symbolic parameter can have one of the following values:

DFDSS	IBM's DFSMSdss utility
CRYPTDSS	encryption used along with DFDSS
TAPECOPY	OpenTech Systems' intrinsic tape driver
ABARS	utility for copying DFSMShsm archived files
DMS	CA-DMS (a.k.a. CA-Disk)
FAVER	CA-Faver
RECALL	a recall-only driver for DFSMShsm and CA-DMS

The MEDIA field and symbolic parameter can have one of the following values:

TAPE

DISK

BVIRBASE

This member is not currently used by DR/Xpert.

Warning This member should never be modified by the user.

CA7DATA

This member contains control statements to produce production jobs list from CA7 and is referred to by the SYSIN DD in the *CA7JOBS* JCL, which is called by daily job *COLLECT*. DR/Xpert uses the scheduler's production job list as the primary identification of production jobs. Change the object of the logon statement to include a CA7 USERID known at your data center.

Warning This member is shipped with comment cards for instructional purposes, but the user should remove these comments before using this member because CA7's batch terminal interface does not support comments.

CDBROW00

This member is used by internal processes and should not be deleted or changed.

Warning This member should never be modified by the user.

CLEANUP

This member identifies datasets DR/Xpert's vault audit Report and Cleanup program uses to identify files that are removed when an aggregate backup becomes obsolete.

Warning The contents of this member should not be modified, unless directed by Technical Support.

CNVABEND

This member provides a means for the user to selectively control the actions that DR/Xpert jobs perform during most abend recovery processing. Entries in this table will determine if volume serial numbers are to be recorded in the *BADMEDIA* member for specified abend codes. Entries will also control the tape-to-tape termination processing for most abends. Certain termination conditions can not be over-ridden by entries in this table. Default termination and *BADMEDIA* recording is described in the table processing paragraphs below.

Format record layout:

1st field	abend code in the IEC message format Sxxx-rr or Uxxxx.
2nd field	record input volser in BADMEDIA member Y OR N

3rd field	stop tape-to-tape if move process Y OR N
4th field	stop tape-to-tape if move/stack process Y OR N
5th field	stop tape-to-tape if copy process Y OR N
6th field	stop tape-to-tape if copy/stack process Y OR N

Statement coding rules:

- Fields may begin in any position. They must be separated by at least one blank.
- Anything beyond the sixth field will be treated as comments.
- An asterisk (*) in column 1 indicates a comment.
- Statement continuation is not allowed.
- A question mark may be used as the first character of an abend code or as both characters of the reason code. Other wildcards are not allowed.

This table is processed in the order that the entries appear in the member The first matching entry determines the actions taken.

BADMEDIA entries are controlled by the 2nd field value, Y or N. When the Abend Code-reason code does not match a table entry the VOLSER or the first VOLSER will be recorded if the DCB Abend Exit was invoked and the abend was not ignored.

Termination actions are controlled by the 3rd through 6th fields, Y or N, for the different types of tape-to-tape processes. They are honored for any abend codes other than the following:

- **Sx22** - MVS or operator cancellation codes.
- **S213** - DASD dataset abend codes.
- **S0Cx** - Execution exception abend codes. Continuation is supported for abend code S0C7 only.
- **Sx13** - Dataset open close abend codes. Termination will occur when two consecutive Sx13 abends are detected

Continuation of the tape-to-tape process will be attempted for the next volset following the one causing the failure when an action is not specified by a table entry or the exceptions listed above.

Warning This table should be modified only when recommended by technical support. This member must not be deleted or be empty, it must contain at least one valid entry.

CNVDRVRS

This member is used to identify the tape conversion engine drivers.

Warning This member should never be modified by the user.

COLOCTBL

This member contains the rules for creating a Collocation Table.

Format record layout:

1st field	RULE - This is the rule logic modifier column.
2nd field	COMPARE FIELD - This field must be set to one of the following compare fields: DSNAME (or DSN), DSORG, MEDIA, STORCLAS, APPLNAME (or APPL).
3rd field	OP - This is the comparison operand and may contain EQ, NE, GT, LT, GE, or LE.
4th field	COMPARE DATA - This field is the data that will tested against the content of the backup database. Accepted values are strings compatible with the COMPARE FIELD, with or without wildcard characters; or a table of these strings.

Statement coding rules:

- An asterisk (*) in column 1 indicates a comment.
- Statement continuation is not allowed.

Warning See Chapter 11 for complete information on the Collocation facility and building a Collocation table.

CONTROLM

This member contains control statements for extracting data from Control-M production JOB List reports.

Warning This member should never be modified by the user.

CRYPTRUL

This member allows the user to specify whether a file should be encrypted. The format of the record layout is a RULE predicate followed by a THEN verb. The final statement is a DEFAULT verb.

Format record layout:

1st field	RULE or VERB- This is the rule logic modifier column.
2nd field	COMPARE FIELD - This field must be set to one of the following compare fields: DSNAME (or DSN), MEDIA, TOKEN, DRIVER, DUMP, RESTORE, APPLNAME (or APPL)
3rd field	OP - This is the comparison operand and may contain EQ, NE, GT, LT, GE, or LE.

4th field	COMPARE DATA - This field is the data that will be tested against the backup queue records. Accepted values are strings compatible with the compare field, without or without wildcard characters, or a table of these strings (located contained in a DR/Xpert PARMLIB member).

Statement coding rules:

- An asterisk (*) in column 1 indicates a comment.
- Statement continuation is not allowed.

Note See Chapter 12 for more information on encryption.

DDNAMES

This member filters specific datasets for consideration during DR/Xpert Identify component's critical file analysis.

The intent of this member is to eliminate certain datasets by DDNAME as criteria for critical analysis because some files skew analysis results. For example, as a class of dataset, STEPLIB datasets can span several applications linking these applications as co-dependent because of the STEPLIB. This is usually a false co-dependency because of the recovery of STEPLIB datasets can be done early without regard to the other applications that use these datasets.

Format record layout:

1st field	INCL= (to include DDNAMES)
	EXCL= (to exclude DDNAMES)
2nd field	1 to 8 character DDNAME name or pattern

Statement coding rules:

- Only one INCL= or EXCL= with DDNAME pattern per line.
- The INCL= or EXCL= keyword may start in any column
- The DDNAME pattern immediately follows the INCL= or EXCL= keyword.
- An asterisk (*) in column 1 indicates a comment.
- Anything beyond the second field will be treated as comments.
- Statement continuation is not allowed.
- Wildcards are permitted. (? for single character mask and * for multiple character mask)

DMPMODEL

This member contains prototype JCL for the phase-2 portion of DR/Xpert's backup component. DR/Xpert uses this JCL to programmatically generate backup JCL. All backup drivers use the same JCL model.

DR/Xpert uses this member when it encounters its name as the first in a pair of members specified by the *JCL-MODEL-STATEMENTS-MEMBER* parameter.

To use this member, a phase-1 job would execute with the following in USERSETS or PGMSETS:

```
JCL-MODEL-STATEMENTS-MEMBER: DMPMODEL.XXXXXXXX
```

DMSDUMP

This member contains the DMS/CA-DISK statements used to backup files to a DR/XPERT managed DMS/CA-DISK backup tape.

This member must include a DMS/CA-DISK BACKUP control card to tell DMS to perform the backup. The FIND DSN= control cards are suppled by DR/Xpert from the filter file.

Statements that begin with “*” in Column 1 are ignored.

Statements that follow “XXSYSPARMS” in Column 1 are passed to DMS through the SYSPARMS DD.

DMSRESTR

This member contains the DMS/CA-DISK statements used to restore files to a DR/XPERT managed DMS/CA-DISK backup tape.

The RESTORE control card for each file to be restored is supplied by DR/Xpert from the filter file. This member is available to allow extra control cards to sysparms to be specified.

Statements that begin with “*” in Column 1 are ignored.

STATEMENTS THAT BEGIN WITH '*' IN COLUMN 1 WILL BE IGNORED.

Statements that follow “XXSYSPARMS” in Column 1 are passed to DMS through the SYSPARMS DD.

DSNALLOC

This member is used to override new file allocations for DR/Xpert. Its purpose is to give the user limited allocation control over datasets dynamically allocated by OpenTech Software.

Overall Logical Statement Layout:

- A dataset name or a dataset name pattern (dataset name with wildcard characters)
- One or more keyword and value pairs

Logical Transaction Format Details:

- Each statement within DSNALLOC’s data is a dataset name or dataset pattern, followed by subordinate keyword and value clauses.
- The dataset name pattern can be a specific dataset name or a dataset name with OpenTech’s wildcard characters.
- Statements are free form in the sense that keyword position and order do not matter.
- Statements can be continued from one row to the next, using a dash (-). A statement ends when a given row is not continued.

- The overrides are limited to NEW datasets; you cannot override a preexisting dataset.

Statement coding rules:

- Every statement begins with a dataset name. The dataset name must match a dataset belonging to DR/Xpert. A mistyped dataset name renders the statement useless.
- The dataset name may begin in any column.
- The dataset name may contain wildcard characters.
- The first entry in DSNALLOC that matches a given DR/Xpert dataset name is used for overriding the allocation. Thus, when duplicate entries exist, the first occurrence is used.
- An entry with wildcards should not be too generic; otherwise, it could unintentionally match an allocation request other than for what that wildcard pattern was intended.
- If the file being overridden is a generation dataset, specify the generation dataset base name (that is, do not wildcard the G0000V00).
- Keyword and value pairs are separated by one or more blanks. The keyword, equal sign, and keyword value do not contain blanks between them; e.g., KEYWORD=VALUE. A given keyword and its value must begin and end on one statement.
- An asterisk (*) in column 1 is a comment.
- Errors are reported in a report DD //ALLOCDSN.

Useful Applications:

- During the AUDIT and SETUPATL job streams, OpenTech hard codes TMCDUMP allocation for RMM users to 600 Cylinders. Using this facility, you can reduce the TMCDUMP space allocation.
- During the RECOVERY job stream, the recovery PDS is allocated with 200 directory blocks. Using this facility, you can increase the number of directory blocks the RECOVERY job will allocate for the target PDS.

Examples:

- Override TMCDUMP space allocation

  OT.DRXPERT.TMCDUMP ALLOC=CYL PRIMARY=100 SECONDARY=50

- Override RECOVERY PDS' directory block allocation

  OT.DRXPERT.RECOVERY DIRBLKS=450

Table D-2 Supported Keywords

ALLOC=	Change the default allocation type to TRK or CYL.
PRIMARY=	Specify a different primary allocation.
SECONDARY=	Specify a different, or nullify a secondary space allocation.
DIRBLKS=	Specify a different quantity for PDS directory blocks.
RLSE=	Release space when a dataset is closed; or stop releasing space when a dataset is closed.

Table D-2 Supported Keywords

VOLCOUNT=	Specify the maximum number of volumes to which a dataset can extend.
FREE=CLOSE	De-allocate the dataset when a file is closed; or cease freeing the dataset at close time.
PREEXIST=	Scratch a preexisting data set; or stop scratching a preexisting data set.
DATACLAS=	Specify SMS Data Class. OpenTech allocates data class using DYNAMIC ALLOCATION DATA CLASS; this parameter granularly specifies a different data class. DATACLAS=NONE causes the parameter to be ignored.
STORCLAS=	Specify SMS Storage Class. OpenTech allocates data class using DYNAMIC ALLOCATION STORAGE CLASS; this parameter granularly specifies a different storage class. STORCLAS=NONE causes the parameter to be ignored.
MGMTCLAS=	Specify SMS Data Class. OpenTech allocates data class using DYNAMIC ALLOCATION MANAGEMENT CLASS; thus this parameter granularly specifies a different data class. MGMTCLAS=NONE causes the parameter to be ignored.
VOLSER=	Specify one target volume serial number. OpenTech specifies volume serial based on DYNAMIC ALLOCATION VOLSER; thus, this parameter can granularly specify a different volume serial number. VOLSER=NONE causes the parameter to be ignored.
UNIT=	Specify values like UNIT=3390 or UNIT=SYSDA. OpenTech allocates UNIT using DYNAMIC ALLOCATION UNIT; thus this parameter can granularly specify a different UNIT.
LRECL=	Specify a different record length than that specified by DR/Xpert.
BLKSIZE=	Specify a different block size than that specified by DR/Xpert.
DSORG=	Specify DSORG value different from those used by OpenTech.
RECFM=	Specify RECFM values different from the ones used.

Table D-3 Examples and Limitations

Keyword and example	JCL Equivalent	Limitations
ALLOC=CYL or ALLOC=TRK	SPACE=(CYL,…)	If specified, must be CYL or TRK
PRIMARY=10	SPACE=(CYL,(10))	Can be a number up to 16,777,215. Space must be available.
SECONDARY=5	SPACE=(CYL,(10,5))	Same limitations as PRIMARY; in some circumstances it may be useful to specify 0.
DIRBLKS=50	SPACE=(CYL,(10,5,50)) RLSE=YES or RLSE=NO SPACE=(CYL,(10,5,50), RLSE)	If OpenTech's allocation contains RLSE, using RLSE=NO can nullify that.
VOLCOUNT=3	VOLUME=(,,,3)	UNIT=(SYSDA,3) and VOLUME=(,,,3) are functionally equivalent.
FREE=CLOSE or FREE=NONE	FREE=CLOSE	FREE=NONE can be used to nullify OpenTech's specification of FREE=CLOSE.
PREEXIST=SCRATCH PREEXIST=NOSCRATCH	DISP=(MOD,DELETE, DELETE) preceding NEW allocation	
DATACLAS=DATACLAS	DATACLAS=DATACLAS	Object should be a valid SMS data class
STORCLAS=STORCLAS	STORCLAS=STORCLAS	Object should be a valid SMS storage class
MGMTCLAS=MGMTCLAS	MGMTCLAS=MGMTCLAS	Object should be a valid SMS management class
VOLSER=V00001	VOL=SER=V00001	Limited to one volume
UNIT=3390	UNIT=3390	
LRECL=999	Same	Limit is 32760
BLKSIZE=999	Same	Limit is 32760; can be 0, in which case block size is determined when dataset is opened and closed.
DSORG=PS or DSORG=PO	Same	
RECFM=FB	Same	F,V,U,B,A,M are supported

DSNAMES

This member filters specific datasets for consideration during the file selection phase of DR/Xpert's daily collection phase. The intent of this member is to provide more granular inclusion or exclusion than provided by the *SMFINFRA* table. Use *SMFINFRA* to filter a broad set of datasets. Then use DSNAMES to filter those datasets not addressed through the use of *SMFINFRA*.

Format record layout:

1st field	INCL= for include statements
	EXCL= for exclude statements
2nd field	1 to 44 character dataset name

Statement coding rules:

- Only one dataset name per line
- The INCL= or EXCL= keywords may begin in any column
- The dataset name or pattern must immediately follow INCL= or EXCL=.
- Anything beyond the second field will be treated as comments.
- An asterisk (*) in column 1 indicates a comment.
- Statement continuation is not allowed.
- Wildcards (? for single character mask and * for multiple character mask) are permitted.

DUMP

This member contains the control statements used to dump data to a DR/Xpert managed DFSMSdss backup tape. DR/Xpert managed DFSMSdss backup tape. DUMP is the name in the third token of DR/Xpert's collocation string (see *COLOCTBL* for more information).

If the data center is using DFSMSdss Encryption Services, DR/Xpert will copy the control statements to a temporary dataset and insert ENCRYPT, KEYPASSWORD, and RSA keywords as determined from the encryption string (refer to the *CRYPTRUL* member description). DR/Xpert does not insert the ICOUNT keyword.

Generally, the statements within this member should not be modified without first consulting Technical Support with the exception of including the ICOUNT keyword.

Warning This member is should not be modified without first consulting Technical Support.

EDITRTNS

This member is obsolete.

ESPDATA

This member contains control statements to produce production jobs list from EPS and is referred to by the SYSIN DD in the *ESPJOBS* JCL, which is called by daily job *COLLECT*. DR/Xpert uses the scheduler's production job list as the primary identification of production jobs.

Warning This member contains the exact fields DR/Xpert needs from ESP; therefore, the order and arrangement of the statements are critical to DR/Xpert operation. The client should not change the remainder of these statements unless directed by OpenTech Systems support personnel.

ESPPARMS

This member contains special instructions for data centers that use ESP for their production job scheduler.

Warning ESP users need to review the comments in this member for further details on updates to this member.

EXCLVOLS

This member is provided as an implementation of OpenTech tape processing tools within DR/Xpert. This member's functions are superseded by the VOLUMES member. Please use the VOLUMES member instead of this one.

FACTSETS

This member is obsolete, its contents have been incorporated into a DEFAULTS load module. The values in the *USERSETS* member will override the DEFAULTS values. See the DR/Xpert Parameter Reference Guide for a list of all DR/Xpert parameters and their valid values.

Warning This member should never be modified by the user.

FDRDUMP

This member is a prototype member for FDRABR control statements to backup datasets. These control statements will be used when DR/Xpert manages a backup using FDRABR.

- The DUMP TYPE=APPL statement is required.
- DR/Xpert programmatically adds, replaces, or removes ARCBDSN1 and ARCBDSN2 keywords depending on their appropriateness. Note that DR/Xpert controls duplex backups through DUPLEX-MEDIA-TYPE and that parameter affects ARCBDSN2.
- Statements that begin with "*" in Column 1 are treated as comments.
- All keywords added by the user will be honored and passed to FDRABR as they were coded.

- DR/Xpert will supply "SELECT CATDSN" statements based on contents of the aggregate's filter file.

FDRREST

This member contains the FDRABR statements used to restore files from a DR/Xpert managed FDRABR backup tape.

- The RESTORE TYPE=APPL,RECAT,VRECAT statement is required.
- DR/Xpert programmatically adds, replaces, or deletes the COPY keyword depending on its appropriateness.
- Statements that begin with “*” in Column 1 are treated as comments.
- All keywords added by the user will be honored and passed to FDRABR as they were coded.
- DR/Xpert will supply "SELECT CATDSN" statements based on contents of the aggregate's filter file.

FVRESTOR

This member contains the prototype statements for a Faver restore operation. The statements are used to restore data from a DR/Xpert managed CA-Faver backup tape.

FVRXPORT

This member contains the prototype statements for Faver export operation. The statements are used to back up data to a DR/Xpert managed CA-Faver backup tape.

GDGMODEL

This member contains model JCL used for various IDCAMS functions during recovery. This member is the name specified by *JCL-IDCAMS-STATEMENT-MEMBER* in the DEFAULTS load module. This member is used as a model if you want to delete datasets before doing a recovery and to build sets of GDG definitions for a running log of recovery report files during recovery.

GENFILE

This member contains a list of program generated exclude lists that DR/Xpert uses to filter the final critical dataset list. This member provides a means of customizing DR/Xpert's final exclusion list.

This member can be used to customize DR/Xpert's control over the backup of PDS files. DR/Xpert's normally excludes PDS files from being part of DR/Xpert managed backups on the basis that PDS files are likely backed up as part of infrastructure, non-production backups. If you want DR/Xpert to manage backups for PDS files, you would remove the entry that contains "PDSFILT" from this member.

HELP0044

This member contains the help text displayed in response to a HELP console command.

Warning This member should never be modified by the user.

INITRTNS

This member is used to identify the program to be run when setup and initialization requests are made.

Warning This member should never be modified by the user.

INPUT

This member identifies an input member for DR/Xpert's internal naming purposes. This member is used by two utility scripts (JCLLIB members *OTCDZDSN* and *OTCDZJOB*) that delete dataset names and job names from DR/Xpert's repositories.

IOCNTLBK

This member is a backup of the *IOCNTLTB* member and is created by the *SETUPATL* program.

Warning This member should never be modified by the user.

IOCNTLTB

This member is to determine device characteristics of the data center's tape devices. This member is built by the *SETUPATL* program. If you need to modify this member because hardware has been updated or removed, please rerun *SETUPATL*.

Warning This member should never be modified by the user.

JCLLIBS

This member identifies the JCL libraries that DR/Xpert will scan to identify scheduler variables, concatenated datasets, and early detection of production JCL changes. This library will be scanned for JCL changes and is intended for production JCL libraries only. Ideally, this member should contain JCL libraries known to your scheduler system because DR/Xpert will be looking for scheduler variables in dataset names.

Format record layout:

1st field	1 to 44 character dataset name
2nd field	1 to 8 character JCL library identifier. All JCL libraries that are to be grouped in a JCL scan should have the same token value. Keep all same-named tokens together. The JCL libraries will be concatenated in the same order as they are listed in this member.

Statement coding rules:

- Only one dataset name and JCL library ID per line.
- There must be at least one blank space between the first and second fields.
- The dataset name may start in any column
- Anything beyond the second field will be treated as comments.
- An asterisk (*) in column 1 indicates a comment.
- Statement continuation is not allowed.
- Wildcards are not allowed.

JDTMODEL

This member contains JCL for DR/Xpert's queue maintenance program, which is called and submitted by DR/Xpert's started task (*OTCDTASK*). It passes the list of critical datasets that are available for backup.

Note See Chapter 6 for more information on use of the JDTMODEL member.

JOBNAMES

This member identifies supplemental list of production job names. This list is supplemental to DR/Xpert's use of scheduler production job lists as the primary identification of production jobs. You would use this member to identify production jobs that are not managed by your scheduling system. For example, some data centers submit their online systems outside the control of a scheduler. In this case, the online system would be included using this member.

Format record layout:

1st field	INCL= for include statements
	EXCL= for exclude statements
2nd field	1 to 44 character job name or pattern

Statement coding rules:

- Only one INCL= or EXCL= with job name pattern per line
- The INCL= or EXCL= keywords may begin in any column
- The job name pattern immediately follows the INCL= or EXCL= keyword.
- Anything beyond the second field will be treated as comments.
- An asterisk (*) in column 1 indicates a comment.

- Statement continuation is not allowed.
- Wildcards (? for single character mask and * for multiple character mask) are permitted.

JOBSTMTS

This member contains the JCL job card for the ABAR AGGREGATE JOB. This may be altered to meet your data center requirements.

KNOWBKUP

The KNOWBKUP member gives DR/Xpert a mechanism to identify foreign backup files that have been imported into the DR/Xpert's backup database. DR/Xpert can force these files into scratch status as DR/Xpert gradually acquires control over the file set backed up by non-DR/Xpert backup utilities.

This member and its rules are used by DR/Xpert's AUDIT program.

These backup files can be identified by:

- DSNAME
- Tape management system's OUTCODE
- Job name
- Program name
- Step name
- DD name
- Tape management system's accounting information
- Tape management system's owner information

LIBRYDEF

This member is used as a way to differentiate between a real automated tape library and a virtual tape library environment by listing all robotic tape library names (both real and virtual) along with the tape library's identifying characteristics.

Format record layout:

1st field — LIBRARY INTERFACE - This is the name of the tape library software interface and release level. Valid options are:

IBM-LCS/R1.4	HDS-LCS/R1.4	IBM-LCS/R1.5
HDS-LCS/R1.5	IBM-LCS/R2.10	HDS-LCS/R2.10
IBM-LCS/Z1.*	HDS-LCS/Z1.*	STK-HSC/R1.2
MEMOREX-LMS	STK-HSC/R2.0	SUTMYN-LMS
STK-HSC/R2.1	COMPAREX-LMS	STK-HSC/R4.0
STK-HSC/R4.1	STK-HSC/R5.0	STK-HSC/R5.01
STK-HSC/R6.0	VTAPE/R2.0	VTAPE/R11.0

(where * is the z/OS version number)

2nd field Additional parameters - This field supports two keyword parameters.

LOADLIB= specifies the load library name where the API load module resides. If the load library is in the linklst, LINKLIST may be specified rather than the actual load library name. If this parameter is omitted, LINKLIST is assumed.

DATABASE= specifies the name of the tape database used by the library API. Usually the API dynamically knows the name of this database so this parameter may not be required.

If both of these parameters are required, the library interface name (from the 1st field) must be repeated in the first column of both records in order to tie the two statements together.

Statement coding rules:

- An asterisk (*) in column 1 indicates a comment.
- Statement continuation is not allowed.
- Wildcards are not allowed.

LOSTVOLS

This table is used for tracking missing tape volumes. If a tape is selected for processing by candidate selection but cannot be located, the volser can be added to this member before the tape-to-tape job is released. The volsers in this member will be excluded from further processing. If the missing tape is part of a multi-volume chain, you will only need to enter the missing volser.

Format record layout:

1st field Volser

Statement coding rules:

- The volser must look exactly the way it does in the tape management system database.
- The volsers may start in any statement column of the record.
- Anything beyond the first field will be treated as comments.
- An asterisk (*) in column 1 indicates a comment.
- Wildcards are allowed.

MIRRORED

This member contains a filter for mirrored volumes and mirrored unit addresses. Use this member to filter datasets during DR/Xpert's daily collection phase. DR/Xpert will associate DASD devices as mirrored if their volume names are included by this list. If the volume is not included by this list, DR/Xpert will assume the volume is not mirrored.

This member can be divided into volume and/or UCB sections. Section headers describe the data that follows.

- When a section name "VOLUMES:" appears, the INCL/EXCL statements that follow are volumes or volume patterns.

- When the section name "UCBS:" appears, the INCL/EXCL statements that follow are either UCB ranges or UCB patterns.

Warning INCL/EXCL statements that appear before a "VOLUMES:" or "UCBS:" section header cause an error.

Format record layout:

1st field	INCL= for include statements
	EXCL= for exclude statements
2nd field	1 to 44 character job name or pattern

Statement coding rules:

- Only 1 volume pattern per statement.
- The INCL= or EXCL= keywords may begin in any column
- The job name pattern immediately follows the INCL= or EXCL= keyword.
- An asterisk (*) in column 1 indicates a comment.
- Anything beyond the first blank delimited field will be treated as comments.
- Wildcards (? for single character mask and * for multiple character mask) are permitted unless coding a range.

NEWNAUTO

This member is used to select tape datasets for auto newname processing and to specify the datasets newname prefix to be assigned.

Format record layout:

1st field	Current Dataset name (original dataset name) or pattern
2nd field	Prefix to be used when generating automatic newname

Statement coding rules:

- Only one set of prefix specification criteria may be listed per line.
- The fields may begin in any column of the record.
- Anything beyond the second field will be treated as comments.
- An asterisk (*) in column 1 indicates a comment.
- Wildcards are allowed.
- Statement continuation is allowed using the ‘-’ character (X’60’)

NEWNDPLX

This member is used to select tape datasets for auto newname processing and to specify the datasets newname prefix to be assigned to duplex backup copies.

Format record layout:

1st field	Current Dataset name (original dataset name) or pattern
2nd field	Prefix to be used when generating automatic newname for the duplex copy

Statement coding rules:

- Only one set of prefix specification criteria may be listed per line.
- The fields may begin in any column of the record.
- Anything beyond the second field will be treated as comments.
- An asterisk (*) in column 1 indicates a comment.
- Wildcards are allowed.
- Statement continuation is allowed using the '-' character (X'60')

NOTIFY

This member is used to define which user ids should be alerted when any/all DR/Xpert jobs complete.

Format record layout:

1st field	Any valid user id.

Statement coding rules:

- Only one user id may be listed per line.
- The user ids may begin in any column of the record.
- Anything beyond the first field will be treated as comments.
- An asterisk (*) in column 1 indicates a comment.
- Wildcards are not allowed.

ONLDDNF

This member is used to filter files for DR/Xpert analysis based on the DD name under which it is accessed. The intent of this table is to identify datasets (1) whose backup is managed by the owning application; or (2) the importance of the backup is negligible. This member is similar to the *DDNAMES* member, but pertains to online dd names only.

Format record layout:

1st field	INCL= (to include dd names)
	EXCL= (to exclude dd names)
2nd field	1 to 8 character ddname or pattern

Statement coding rules:

- Only one INCL= or EXCL= with dd name pattern per line.

- The INCL= or EXCL= keyword may start in any column
- The dd name pattern immediately follows the INCL= or EXCL= keyword.
- An asterisk (*) in column 1 indicates a comment.
- Anything beyond the second field will be treated as comments.
- Statement continuation is not allowed.
- Wildcards are permitted. (? for single character mask and * for multiple character mask)

ONLJOBS

This member is used in conjunction with the *ONLPGMS* filter to identify CICS job names encountered in SMF data. After SMF records are selected by this filter, they are passed to the *ONLPGMS* filter. Thus *ONLPGMS* further identifies online job streams. DR/Xpert's use of two filters allows you to identify online jobs using two different strategies. You can either identify specific job names as online; or you can identify any job that uses a specific program name as online.

Format record layout:

1st field	INCL= (to include job names)
	EXCL= (to exclude job names)
2nd field	1 to 8 character job name or pattern

Statement coding rules:

- Only one INCL= or EXCL= with job name pattern per line.
- The INCL= or EXCL= keyword may start in any column
- The job name pattern immediately follows the INCL= or EXCL= keyword.
- An asterisk (*) in column 1 indicates a comment.
- Anything beyond the second field will be treated as comments.
- Statement continuation is not allowed.
- Wildcards are permitted. (? for single character mask and * for multiple character mask)

ONLPGMS

This member is used in conjunction with the *ONLJOBS* filter to identify CICS job names encountered in SMF data. After SMF records are selected by the *ONLJOBS* filter, they are passed to this filter. Thus *ONLPGMS* further identifies online job streams. DR/Xpert's use of two filters allows you to identify online jobs using two different strategies. You can either identify specific job names as online; or you can identify any job that uses a specific program name as online.

Format record layout:

1st field	INCL= (to include program names)
	EXCL= (to exclude program names)
2nd field	1 to 8 character program name or pattern

Statement coding rules:

- Only one INCL= or EXCL= with program name pattern per line.
- The INCL= or EXCL= keyword may start in any column
- The program name pattern immediately follows the INCL= or EXCL= keyword.
- An asterisk (*) in column 1 indicates a comment.
- Anything beyond the second field will be treated as comments.
- Statement continuation is not allowed.
- Wildcards are permitted. (? for single character mask and * for multiple character mask)

OPCRPT01

This member is used to control the output for production job lists for OPC scheduler users. OPC users may need to update this member to define the OPC report/extract jobname and the “time of run” data. Contact Technical Support for more details, if needed.

OTCDBA01

This member contains the sample JCL for the phase-1 portion of a dynamic aggregate. DR/Xpert uses this member when the started task has gathered enough job triggers to satisfy a threshold value.

OTCDBA99

This member contains sample JCL for the batch track's "final sweep" aggregate job that unloads any remaining records from DR/Xpert's backup queue and creates the final aggregate backup job.

OTCDOA99

This member contains sample JCL for the “final sweep” online aggregate job that unloads any remaining records from DR/Xpert’s backup queue and creates the final aggregate backup job to perform the backup.

OTMSGID

This member is used to override the issuance of most WTO messages and/or the condition code associated with them and/or the WTO routing and descriptor codes.

Format record layout:

1st field	Message ID
2nd field	Condition code for the message
3rd field	Suppression indicator
4th field	Routing codes
5th field	Descriptor codes

Statement coding rules:

- An asterisk (*) in column 1 indicates a comment.
- Only one message ID may be listed per line.
- Fields are delimited by blanks and can begin anywhere.
- The first three fields are required. The fourth and fifth fields are optional.
- The message ID must be one to eight characters, including wild cards. Only the first eight characters of the message ID are matched. The first entry that matches the message ID is used.
- The condition code must be a decimal value from 0 to 4095 or an asterisk (*) to indicate no override. For a message that is suppressed, an asterisk is the same as specifying 0. The condition code will be set regardless of the suppression indicator.
- The suppression indicator can be Y or YES, indicating that the message is to be suppressed; or N or NO, indicating that the message is to be written.
- Entries for a message that result in an immediate ABEND will be ignored.
- Routing codes are optional. If specified, it must be an asterisk (*), indicating no override or a list of comma separated routing codes from 1 to 16.
- Descriptor codes are optional. If specified, it must be an asterisk (*), indicating no override or a list of comma separated descriptor codes from 1 to 16.
- The routing and descriptor code fields are ignored when the suppression indicator is Y or YES.

OUTCODE

This member contains the vault audit outcode message rules.

Note See Chapter 8 for more information on outcode message rules.

PATDSNS

This member is not currently used by DR/Xpert.

Warning This member should never be modified by the user.

PATEXCL

This member is used to exclude files after pattern maintenance commands are generated for the backup system. Assuming pattern selection is very broad, the PATEXCL member can remove files from consideration even though it falls within a pattern (that is, wildcard) generated by DR/Xpert or specifically specified via *PATINCL*.

Format record layout:

1st field 1 to 44 character dataset name.

Statement coding rules:

- Only one dataset name may be listed per line.
- The dataset name may begin in any column of the record.
- Anything beyond the first field will be treated as comments.
- An asterisk (*) in column 1 indicates a comment.
- Wildcards are not allowed.

PATINCL

This member is used to supplement the pattern lists built by production JCL scans where the scan did not find a pattern. DR/Xpert limits itself to replacing scheduler variables with wildcard characters so this member is intended to handle dates superimposed on dataset names generated by the scheduler. PATINCL allows you to specify wildcards for things other than scheduler variables.

Format record layout:

1st field 1 to 44 character dataset name.

Statement coding rules:

- Only one dataset name may be listed per line.
- The dataset name may begin in any column of the record.
- Anything beyond the first field will be treated as comments.
- An asterisk (*) in column 1 indicates a comment.

- Wildcards permitted are:
  - '*' an asterisk matches any number of characters
  - '%' A percent sign matches a single character
  - '**' Double asterisks matches any number of nodes

PGMSETS

This member is intended to serve as a default PARMLIB member, when the PGMSETS DD name has not been specified in DR/Xpert JCL to provide parameter values that should override the *USERSETS* parameter settings and the DEFAULTS load module. This member can be used to pass parameter values to programs that do not have a PGMSETS DD name listed in the JCL (allocated to a TSO user).

PRODRULE

The PRODRULE member is an alternative method DR/Xpert uses to identify production jobs. The rules in this member will determine production status based on the following criteria:

- Job name
- Job class
- Job accounting information
- Security User ID
- Security Group ID
- Job task type (STC, TSO, or JES2)

Implementation of PRODRULE requires the following update to the USERSETS member:

```
USE-PRODRULE: YES
```

PROGRAMS

The PROGRAMS member contains the names of programs whose output you want DR/Xpert to ignore for backup consideration. This member normally contains programs that either performs their own backup and recovery or they are inappropriate as critical data. Use this member to exclude datasets from DR/Xpert's analysis when they are created by special programs (like FDR or DFDSS).

Format record layout:

1st field	INCL=program name (to include program names)
	EXCL=program name (to exclude program names)
2nd field	1 to 8 character program name or pattern

Statement coding rules:

- Only one INCL= or EXCL= with program name pattern per line.
- The INCL= or EXCL= keyword may start in any column
- The program name pattern immediately follows the INCL= or EXCL= keyword.

- An asterisk (*) in column 1 indicates a comment.
- Anything beyond the second field will be treated as comments.
- Statement continuation is not allowed.
- Wildcards are permitted. (? for single character mask and * for multiple character mask)

RDOBKUP

The RDOBKUP member is a list to override DR/Xpert's usual practice of depending on prior backups when datasets have not been rewritten or updated since the backup was made. Datasets listed in this member are backed up daily regardless of changes or need.

The syntactical content of this member is a simple dataset name list:

- The dataset name can appear anywhere in a row.
- Wildcards are not allowed.
- Anything beyond the first field will be treated as comments.
- Rows with an asterisk (*) in column 1 are comments
- Statement continuation is not allowed.

RECOVERY

This member controls the generation of recovery JCL. This member can be used to recreate recovery sets and allows the user to manage tiered recoveries. The format of the record layout is a RULE predicate followed by a THEN verb. The final statement is a DEFAULT verb.

Format record layout:

1st field	RULE - This is the rule logic modifier column.
2nd field	COMPARE FIELD - This field must be set to one of the following compare fields: COLOCATE, APPLNAME (or APPL), DSNAME (or DSN), or BACKUP
3rd field	OP - This is the comparison operand (EQ,NE, GT, LT, GE, LE).
4th field	COMPARE DATA - This field is the data that will tested against the content of the backup database. Accepted values are strings compatible with the COMPARE FIELD, with or without wildcard characters; or a table of these strings.

Statement coding rules:

- An asterisk (*) in column 1 indicates a comment.
- Statement continuation is not allowed.

Note See "Defining RECOVERY Rules" in Chapter 7 for more information on this use of this member.

REPORTS

This member allows the user to generate reports according to content of DR/Xpert's reporting database and the attributes of that file's entries. The format of the record layout is a RULE predicate followed by a THEN verb. The final statement is a DEFAULT verb.

Format record layout:

1st field	RULE - This is the rule logic modifier column.
2nd field	COMPARE FIELD - This field must be set to one of the following compare fields: APPLNAME (or APPL), BKIP, DSNAME (or DSN), MEDIA, SPECIAL, DETAILS, CRITICAL)
3rd field	OP - This is the comparison operand (EQ,NE, GT, LT, GE, LE).
4th field	COMPARE DATA - This field is the data that will tested against the DR/Xpert reporting database. Accepted values are strings compatible with the COMPARE FIELD, with or without wildcard characters; or a table of these strings.

Statement coding rules:

- An asterisk (*) in column 1 indicates a comment.
- Statement continuation is not allowed.

Note See Chapter 13 for more information on this use of this member.

REQUIRED

This member contains a list of overrides to DR/Xpert's analysis. datasets specified in this list are always critical regardless of filter or production job access. DR/Xpert will ignore any filter that excludes (this) dataset from being critical; and, DR/Xpert will ignore any user access that may make (this) dataset non-critical.

Read only status is a separate issue to this list, meaning that this list has no affect on DR/Xpert's normal decision to backup or refrain from backing up datasets based on output file activity in the past 24 hours.

The dataset must be catalogued.

Statement Coding Rules:

- An asterisk (*) in column 1 indicates a comment
- Only 1 detail item per row.
- dataset name is the only required parameter.
- dataset name may start in any column, but it must be the first token in the line.
- Additional keywords/tokens may appear any order and they are optional.
- Continuations are not supported

Format Record Layout is dataset name, file type, DSORG, and media type. Each of these are represented in the following:

DATA.SET.NAME	[NONGDG]	[SEQUENTIAL]	[DISK]
	[GDG] [nnnn]	[PDS]	[TAPE]
	[PATTERN] [nnnn]		[VSAM]

Defaults are NONGDG, SEQUENTIAL, and DISK

- "nnnn" is the number of generations applicable to GDG-type or pattern-type datasets. If either GDG or PATTERN is specified, a number can be provided to indicate the number of generations that are restored during recovery.
- The default DSORG is SEQUENTIAL. Note that DSORG is typically a reporting field, but it can be used can be used in collocation rules. If DSORG is used as the object of a collocation rule, the VSAM specification of this field could be important; otherwise, this is optional and informational.
- MEDIA in this context is informational. DR/Xpert always uses the correct driver based on where the catalog's says the datasets resides. Thus critical files can be on disk one day, and tape the next; DR/Xpert will use the correct driver.
- Wildcards are not allowed for this table.

RESMODEL

This member contains prototype JCL for DR/Xpert's restore component and specifically relates to a non-encrypted, standard restore model. DR/Xpert uses this JCL to programmatically generate restore JCL.

DR/Xpert uses this member when it encounters its name as the second in a pair of members specified by the *JCL-MODEL-STATEMENTS-MEMBER* parameter.

To use this member, a phase-1 job would execute with the following in USERSETS or PGMSETS:

```
JCL-MODEL-STATEMENTS-MEMBER: xxxxxxxx.RESMODEL
```

RESTORE

This member contains the restore statements to restore data from a DR/Xpert managed backup tape. DR/Xpert does not insert the ICOUNT keyword. However, the backup can specify dump and restore members with the appropriate ICOUNT keyword, e.g., a collocation string can specify a different dump and restore pair if ICOUNT is needed:

```
GROUP.DFDSS.DUMPX1.RESTORX1
```

RMONITOR

The RMONITOR member contains rules to direct Recovery Status information to different report files. DR/Xpert uses this member during file recovery only. The information in this member causes the Recovery Status Reporter program to spawn different report files; each report accommodating information related to file attributes and status of the recovery.

Purpose

The intent of the different report files is to reduce the visual noise related to a full recovery. For example, if disk recovery occurs before tape recovery, separating disk and tape status information to different report files allows the customer to focus on the disk report during the disk file recovery, followed by the tape report during the tape file recovery.

Another use of this member is to select application related datasets when a disaster recovery drill is focused on recovering a single application.

Distributed Version

The distributed version of RMONITOR directs report data to two reports related to two DDNAMEs: //TAPE contains recovery status for critical tape files, and //DISK contains to report recovery status for critical disk files.

For purposes of further example, the following is the distributed rule set for RMONITOR:

```
IF      MEDIA     EQ TAPE
THEN    TAPE-TAPE_FILE_RECOVERY_STATUS
DEFAULT DISK-DISK_FILE_RECOVERY_STATUS
```

Report Assignment

The rule set language contained in RMONITOR returns a string to the Recovery Status Reporting program giving two pieces of information. The first piece of information is the DDNAME for reports of a given type, the second piece of information is a report heading associated with the DDNAME.

The DDNAME and the report title are separated by any delimiter. The DDNAME is eight characters; or in the case of a shorter ddname, up through the first character that cannot be part of a DDNAME. The delimiter can be almost any non-character, non-numeric, non-national character.

The first blank character terminates the report title. The report title is limited to fifty (50) characters.

For purposes of example, consider the preceding rule set. There are two strings, identified by the THEN and DEFAULT verbs. The strings are assigned based on the media type for each dataset. Each string has a left-half and a right-half separated by a dash (-). The left-half is the DDNAME; the right-half is the associated report title.

Thus, there are two report DDNAMEs: TAPE and DISK.

Additional Comments

NONE is a special value for the DDNAME. NONE is never allocated as a report file; it is a convenient way to throw away report information that is of no interest.

Selectable Information

The selectable information is

```
MEDIA 'DISK' or 'TAPE'
STATUS The status value can be one of the following
```

- GOODBKUP; the file is in good backup status.
- PROBLEM; there was a problem with the original backup

- NOTFOUND; the dataset not found (not catalogued) during backup
- RESTORED; the dataset has been recovered.

APPLNAME	contains the owning application name
APPL	synonym for APPLNAME
GROUP	contains the group name comes from assigned collocation string found in the COLOCTBL. The collocation string is made up of four nodes separated by periods. The group name is the first node, the second node is the driver name.
DRIVER	contains the name of the driver that originally backed the up dataset.
CYCLE	contains the cycle number under which the file is registered as a backup.
AGGR	contains the aggregate number under which the file is registered as a backup.
DSNAME	a fully qualified dataset name.
DSN	synonym for DSNAME
DSORG	'PS', 'VS', 'PO'

RMONITOR Coding Rules

- An '*' in column one indicates a comment.
- Continuations are not allowed.
- The 'rule' column is the rule logic modifier column.
  - NEW, IF, or 'blank' begins a new rule group
  - OR indicates that either the previous “or” the current statement must be "true" for a candidate to be selected by this rule group
  - AND indicates that the previous “and” the current statements must be "true" for a candidate to be selected by this rule group
- The 'compare field' column is the name of the field that will be tested against the specified criteria. The compare fields were described earlier in detail, they are: MEDIA, STATUS, APPLNAME, APPL, DRIVER, GROUP CYCLE, AGGR, DSNAME, DSN, and DSORG
- The 'OP' column is the comparison operand.

  EQ - Equal

  NE - Not Equal

  GT - Greater Than

  LT - Less Than

  GE - Greater Than or Equal

  LE - Less Than or Equal
- The 'COMPARE DATA' column is the data that will be tested against the backup queue records.

CHARACTER	alphanumeric data used to compare against dataset names, application names, etc. Using, for example, an application name, IF APPLNAME EQ GENERAL-LEDGER
PATTERN	character pattern data used to compare dataset names, application names, and other fields, generically. Using, for example, an application name, IF APPLNAME EQACCOUNTS-*

RPTALLOC

This member is used to specify a list of DR/Xpert programs and DDNAMEs for which the SYSOUT files are redirected to either DASD or to SYSOUT datasets with some sort of allocation attribute changed.

The structure of this table is field-oriented as tokens separated by blanks. Invalid entries are displayed via WTO MSG on the console and ignored.

There are two basic entry formats: one for changing the SYSOUT attributes assigned to a report file, and the other for redirecting the SYSOUT file to a disk dataset.

- The format for changing SYSOUT attributes has the SYSOUT= keyword as the fourth positional field. These entries are limited to four fields.
- The format for directing output to a disk file has ten positional fields.

General rules for coding the table are:

- An asterisk ('*') in column 1 indicates a comment.
- Statement continuation is not permitted.
- The fields can start in any column. Each field can be separated by one or more blanks.

COMMON TOKENS

The first three fields (or tokens) are common to both formats. These tokens qualify the job, program, and DDNAME combination for the overridden file. Each of these tokens can contain wildcards, but the override is programmatically limited to files that are originally SYSOUT files. For product information regarding wild card characters, see the *DR/Xpert Users Guide*.

FIELD 1 –	is the job name for which SYSOUT will be redirected. The job name may have wildcard characters to permit job name scrolling.
FIELD 2 -	Program name, this field can contain wildcards.
FIELD 3 -	DDNAME

OVERRIDING TO DISK

If tokens 4 through 10 are present, the override is related to disk allocation.

FIELD 4 -	Specify zero (“0”) to indicate sequential dataset; or, 1 - 255 to indicate GDG. In the case of a generation data set, the numeric value is the GDG limit used to build the GDG.

FIELD 5 - is the primary allocation in cylinders. The primary allocation value may be from 1 to 9999.

FIELD 6 - is the secondary allocation in cylinders. The secondary allocation value may be from 0 to 9999.

FIELD 7 - is the volume count for the allocation. The volume count can be 1 to 59. Specifying a value greater than 1 will cause Z/OS to extend the allocation to more volumes when the current volume becomes full (up through the number of volumes specified).

FIELD 8 - is the SMS DATA Class or NONE

FIELD 9 - is the SMS MANAGEMENT CLASS or NONE

FIELD 10 - is the SMS STORAGE CLASS or NONE

Note Each cylinder allocated will hold 6300 print lines or 105 pages @ 60 lines per page.

OVERRIDING SYSOUT ATTRIBUTES

When the SYSOUT for the job name, program name, and DDNAME combination is to be redirected to SYSOUT; FIELD 4 is a SYSOUT keyword coded as a parenthetical value with comma separated sub-values.

The first parameter is the SYSOUT class. It must be present; and may be one of the following: A through Z, 0 through 9, asterisk (*), or dollar sign ($). Form name and writer must conform to names supported by your data center.

SYSOUT=(x) CLASS

SYSOUT=(x,YYYY) CLASS & FORM NAME

SYSOUT=(x,,ZZZZZZZZ)CLASS & WRITER

SYSOUT=(x,YYYY,ZZZZZZZZ) CLASS FORM NAME & WRITER

Note When SYSOUT=* is specified, no redirection occurs because SYSOUT=* is the default class.

Examples

```
*
*JOB      PROGRAM  DD       GDG  PRI  SEC VOL DATA     MGMT     STOR
*NAME     NAME     NAME     LIM  CYL  CYL CNT CLASS    CLASS    CLAS
*======== ======== ======== === ==== ==== === ======== ======== ========
*
OT?????? OTTCCAND CANDRPT   007 0001 0001 001 NONE     NONE     NONE
OT?????? OTTCCAND CEXPDTRP  007 0001 0001 001 NONE     NONE     NONE
OT?????? OTTCCAND FCASTDTL  007 0001 0001 001 NONE     NONE     NONE
OT?????? OTTCCAND REJRPT    007 0001 0001 001 NONE     NONE     NONE
OT?????? OTTC0023 DCINVRPT  007 0001 0001 001 NONE     NONE     NONE
*
OT?????? OTTC0023 RULESRPT SYSOUT=A
```

SCHSOFTW

This member is used by internal processes to identify the supported scheduling products and should not be deleted or changed.

Warning This member should never be modified by the user.

SIMMODEL

This member contains prototype JCL that DR/Xpert backup component can use to do a simulated backup. This prototype JCL is very similar to DMPMODEL, except it invokes DFSMSdss with TYPRUN=NORUN, so that utility will not write datasets to its backup file.

SIMMOD99

This member is obsolete.

SMFINFRA

This member identifies a generic list of datasets that DR/Xpert should be filtered before consideration as before DR/Xpert's collection component processes the dataset. The intent of this member is to list infrastructure datasets that you want excluded from DR/Xpert's collection phase, such as SYS1.* datasets. Although, those infrastructure datasets are important, they are not application datasets and are typically backed up by volume and recovered separately from production application files.

Format record layout:

1st field	INCL= for include statements
	EXCL= for exclude statements
2nd field	1 to 44 character dataset name.

Statement coding rules:

- Only one dataset name may be listed per line.
- The INCL= or EXCL= keywords may begin in any column
- The dataset name or pattern must immediately follow INCL= or EXCL=.
- Anything beyond the second field will be treated as comments.
- An asterisk (*) in column 1 indicates a comment.
- Wildcards are permitted. (? for single character mask and * for multiple character mask)

SMFSPRES

This member directs the SMF Data Collector to suppress or write records to SMF MANx files after it examines the records.

Format record layout:

1st field	Three digit SMF record type
2nd field	'W' to write the record, or
	'S' to suppress writing the record

Statement coding rules:

- Only one record may be listed per line.
- Information may start in any column.
- Anything beyond the 2nd field will be treated as comments.
- An asterisk (*) in column 1 indicates a comment.
- Wildcards are not allowed.

Note See "Configuring SMFSPRES to Suppress Writing SMF Data" in Chapter 4 for more information on the use of this member.

STATTRIG

This member is used to define DR/Xpert's static triggers.

Format record layout:

1st field (col 1)	B - for batch datasets
	O - for online datasets
2nd field (col 2)	1 to 44 character dataset name
3rd field (col 46)	Backup time (in hhmm format)
4th field (col 55)	1 to 8 character Modifier ID

Statement coding rules:

- Only one record may be listed per line.
- The record format is fixed length and column dependent.
- Anything beyond the 4th field will be treated as comments.
- An asterisk (*) in column 1 indicates a comment.
- Wildcards are not allowed.

STORCLAS

This member provides a mechanism for including or excluding datasets from consideration for DR/Xpert Identification based on SMS storage class. If this member is empty or contains only comments, then datasets from all storage classes are considered for analysis by DR/Xpert.

Format record layout:

1st field	INCL= for include statements
	EXCL= for exclude statements
2nd field	1 to 8 character storage class name or pattern

Statement coding rules:

- Only one storage class may be listed per line.
- The INCL= or EXCL= keywords may begin in any column
- The storage class or pattern must immediately follow INCL= or EXCL=.
- Anything beyond the second field will be treated as comments.
- An asterisk (*) in column 1 indicates a comment.
- Wildcards are permitted. (? for single character mask and * for multiple character mask)

SYSIDTBL

This member identifies a list of SMF system IDs used by DR/Xpert to limit the selection of data from the daily SMF data file to only the specified SMF system IDs. One possible use for limiting the SMF system IDs may be to list only production SMF IDs so that test SMF data is not included in DR/Xpert's collection process.

Format record layout:

1st field	INCL= for include statements
	EXCL= for exclude statements
2nd field	1 to 4 character system ID name or pattern

Statement coding rules:

- Only one system ID may be listed per line.
- The INCL= or EXCL= keywords may begin in any column of the record.
- Anything beyond the second field will be treated as comments.
- An asterisk (*) in column 1 indicates a comment.
- Wildcards are permitted. (? for single character mask and * for multiple character mask).

Note If this member is empty or contains only comments, then SMF data from all systems is processed.

TABLEDEF

This member contains table definitions.

Warning This member should never be modified by the user.

TAPENAME

This member is contains the tape media capacity calculation table.

Warning This member should not be modified by the user unless directed by Technical Support.

TMSDRVRS

This member contains the supported tape management systems drivers table.

Warning This member should never be modified by the user.

UCBDTYPE

This member allows users to specify their UCB device types and the associated generic names for their EMC devices. (Several default values are specified.)

Format record layout:

1st field	UCB device type (e.g. 78048081)
2nd field	Catalog generic name (e.g. 3490)

Statement coding rules:

- The device type must be 8 hexadecimal characters as displayed by IDCAMS LISTCAT.
- The generic can be from 1 to 8 characters in length.
- Anything beyond the second field will be treated as comments.
- An asterisk (*) in column 1 indicates a comment.
- Wildcards are not allowed.

USERSETS

This member allows users to override DR/Xpert's default settings.

Format record layout:

1st field	DR/Xpert parameter, followed immediately by a colon (:).
2nd field	Valid parameter value

Statement coding rules:

- Parameter names must appear exactly as they appear in the PARAMETER SUMMARY REPORT.
- Parameter value listed must be valid for the parameter. Valid values for each parameter can be found in the DR/Xpert Parameter Reference Guide.
- Anything beyond the second field will be treated as comments.
- An asterisk (*) in column 1 indicates a comment.
- Wildcards may or maybe not be allowed (based on valid values for the parameter).

VOLMEDIA

This member will permit the user to override the Opentech provided values for tape media.

Each record in this member specifies a volser, volser with wildcard characters or a volser range and a tape media value to be applied to the volser info specified.

Format record layout:

OPRND 1	VOLSER, VOLSER PATTERN, OR VOLSER RANGE
OPRND 2	TAPENAME VALUE (AS DEFINED BY COLUMN 2 IN TAPENAME TBL)

Statement coding rules:

- An asterisk (*) in column 1 indicates a comment.
- Only 1 volser or volser range per statement
- The volser or volser range must start in statement column 1
- Anything beyond the 2nd OPRND will be treated as comments
- Volser ranges must be delimited by a single - between the first volser and the second volser
- The minimum lenth of a single volser is 1 and the maximum length is 6
- For volser ranges each volser must be 6 bytes in length
- The volser and tapename data fields should be separated by one of more blanks.
- The tapename value length up to 8 bytes in length at least 1 blank

Note Wildcard characters are permitted for SINGLE VOLSERS but not VOLSER RANGES.

VOLUMES

This member is used to filter datasets that may reside on certain DASD volumes from the DR/Xpert identification phase. Datasets residing on volumes listed in this member are either included or excluded. This table can be used to prevent production datasets names on test volumes from consideration as critical datasets.

Format record layout:

1st field	INCL= for include statements
	EXCL= for exclude statements
2nd field	1 to 6 character volume ID or pattern

Statement coding rules:

- Only one volume ID or pattern entry per statement.
- The INCL= or EXCL= statements may start in any column
- The volume ID or pattern must immediately follow INCL= or EXCL=.
- Anything beyond the second field will be treated as comments.
- An asterisk (*) in column 1 indicates a comment.
- Statement continuation is not allowed.
- Wildcards are permitted. (? for single character mask and * for multiple character mask)

WSNAMES

This member identifies the scheduler system names and SMF IDs and relates them to DR/Xpert's path-ID under which DR/Xpert analyzed datasets and job streams.

Format record layout:

1st field	SYSID configured for your data center's scheduler product OR the SMF ID that the scheduler product is running under
2nd field	4 character SYSID defined in the CA7DATA member of DR/Xpert's PARMLIB library

Statement coding rules:

- Only one entry per line.
- The statement may start in any column
- Anything beyond the second field will be treated as comments.
- An asterisk (*) in column 1 indicates a comment.
- Statement continuation is not allowed.
- Wildcards are not allowed.

Note See Chapter 6 for more information.

WTOAGGOK

This is an example member that can be used when issuing a write-to-operator message when a threshold is met for a dynamic backup. DR/Xpert's started task keeps track of the file sizes for files as they become ready for backup. When a collection files' sizes reach the value specified by *TRIGGER-BACKUP-ON-FILE-SIZE* and the *AT-THRESHOLD-MESSAGE* is set to "WTOAGGOK", the message defined in this member will be issued.

Note WTOAGGOK is an example; its contents may be changed according to your data center's requirements.

Instructions for creating the WTO message member:

- The member may contain one or two rows. It can not be empty.
- Enter LEN=nn in columns 1 through 6. 'nn' represents the character text length that follows on that row.
- The text begins in column 8.
- The maximum value specified for the LEN keyword is 73. That would be a string beginning in column 8 and ending in column 80.
- The combined length of the two records, that is, sum of the LEN keyword values cannot be greater than 125.
- You do not have to use all 73 characters in the first row. It can be shorter than 73. For example, you could have two rows with LEN=40 for a combined message length of 80.

```
BROWSE OT.WTO.MESSAGE(WTOTEXT) - 01.01                Line 00000000 Col 001 080
Command ===>                                                   Scroll ===> CSR
----+----1----+----2----+----3----+----4----+----5----+----6----+----7----+----8
******************************** Top of Data ********************************
LEN=40,YOUR0004I - DR/XPERT DYNAMIC TRIGGER READY
LEN=22, for creating a backup
****************************** Bottom of Data ******************************
```

Figure D-1 Example

The resulting WTO issued will be:

```
YOUR0004I – DR/XPERT DYNAMIC TRIGGER READ for creating a backup
```

WTOA99B

This member provides an example member in PARMLIB for issuing a write-to-operator message when the last batch end-of-day sweep has completed. WTOA99B is an example member if *CDIBR-NEXT-PHASE-MESSAGE* is coded in OTCDBTAL's PGMSETS DD.

```
CDIBR-NEXT-PHASE-MESSAGE:                WTOA99B
```

DR/Xpert will use the contents of the WTOA99B to signal that it the final batch aggregate is ready for execution (OTCDBA99).

Note WTOA99B is an example; its contents may be changed according to your data center's requirements.

Instructions for creating the WTO message member:

- The member may contain one or two rows. It may not be empty.
- Enter LEN=nn in columns 1 through 6. 'nn' represents the character text length that follows on that row.
- The text begins in column 8.
- The maximum value specified for the LEN keyword is 73. That would be a string beginning in column 8 and ending in column 80.
- The combined length of the two records, that is, sum of the LEN keyword values cannot be greater than 125.
- You do not have to use all 73 characters in the first row. It can be shorter than 73. For example, you could have two rows with LEN=40 for a combined message length of 80.

```
BROWSE OT.WTO.MESSAGE(WTOTEXT) - 01.01                Line 00000000 Col 001 080
Command ===>                                                    Scroll ===> CSR
----+----1----+----2----+----3----+----4----+----5----+----6----+----7----+----8
********************************* Top of Data ********************************
LEN=60,YOUR0001I - DR/XPERT BATCH TOTAL SWEEP COMPLETED, OK TO START
LEN=18,BATCH AGGREGATE 99
******************************** Bottom of Data ******************************
```

Figure D-2 Example

The resulting WTO issued will be:

```
YOUR0001I - DR/XPERT BATCH TOTAL SWEEP COMPLETED, OK TO START
BATCH AGGREGATE 99
```

WTOA99O

This member provides an example member in PARMLIB for issuing a write-to-operator message when the last online end-of-day sweep has completed. WTOA99B is an example member if *CDIBR-NEXT-PHASE-MESSAGE* is coded in OTCDOTAL's PGMSETS DD.

```
CDIBR-NEXT-PHASE-MESSAGE:                    WTOA99O
```

DR/Xpert will use the contents of the WTOA99B to signal that it the final online aggregate is ready for execution (OTCDOA99).

Note WTOA99O is an example; its contents may be changed according to your data center's requirements.

Instructions for creating the WTO message member:

- The member may contain one or two rows. It may not be empty.
- Enter LEN=nn in columns 1 through 6. 'nn' represents the character text length that follows on that row.
- The text begins in column 8.
- The maximum value specified for the LEN keyword is 73. That would be a string beginning in column 8 and ending in column 80.

- The combined length of the two records, that is, sum of the LEN keyword values cannot be greater than 125.
- You do not have to use all 73 characters in the first row. It can be shorter than 73. For example, you could have two rows with LEN=40 for a combined message length of 80.

```
BROWSE OT.WTO.MESSAGE(WTOTEXT) - 01.01                Line 00000000 Col 001 080
Command ===>                                                   Scroll ===> CSR
----+----1----+----2----+----3----+----4----+----5----+----6----+----7----+----8
********************************* Top of Data ***********************************
LEN=60,YOUR0001I - DR/XPERT ONLINE TOTAL SWEEP COMPLETED, OK TO START
LEN=18,ONLINE AGGREGATE 99
******************************** Bottom of Data *********************************
```

Figure D-3 Example

The resulting WTO issued will be:

```
YOUR0001I - DR/XPERT ONLINE TOTAL SWEEP COMPLETED, OK TO START
ONLINE AGGREGATE 99
```

WTOTALB

This member provides an example member in PARMLIB for issuing a write-to-operator message when the first batch end-of-day sweep has completed. WTOTALB is an example member if *CDIBR-NEXT-PHASE-MESSAGE* is coded in OTCDBSWP's PGMSETS DD.

```
CDIBR-NEXT-PHASE-MESSAGE:                WTOTALB
```

DR/Xpert will use the contents of the WTOTALB to signal that it the last end-of-day batch sweep is ready for execution (OTCDBTAL).

Note WTOTALB is an example; its contents may be changed according to your data center's requirements.

Instructions for creating the WTO message member:

- The member may contain one or two rows. It may not be empty.
- Enter LEN=nn in columns 1 through 6. 'nn' represents the character text length that follows on that row.
- The text begins in column 8.
- The maximum value specified for the LEN keyword is 73. That would be a string beginning in column 8 and ending in column 80.
- The combined length of the two records, that is, sum of the LEN keyword values cannot be greater than 125.
- You do not have to use all 73 characters in the first row. It can be shorter than 73. For example, you could have two rows with LEN=40 for a combined message length of 80.

```
  BROWSE OT.WTO.MESSAGE(WTOTEXT) - 01.01                Line 00000000 Col 001 080
  Command ===>                                                   Scroll ===> CSR
  ----+----1----+----2----+----3----+----4----+----5----+----6----+----7----+----8
  ********************************* Top of Data ********************************
  LEN=58,YOUR0003I - DR/XPERT BATCH SWEEP HAS COMPLETED, OK TO START
  LEN=14,BATCH OTCDBTAL
******************************** Bottom of Data ******************************
```

Figure D-4 Example

The resulting WTO issued will be:

```
LEN=58,YOUR0003I - DR/XPERT BATCH SWEEP HAS COMPLETED, OK TO
START BATCH OTCDBTAL
```

ZEKERX

This member is used to extract data from ZEKE production job reports and it is provided for internal purposes for DR/Xpert customers who use ZEKE to schedule production work.

Warning This member should never be modified by the user.

E Wildcard Characters

TOPICS COVERED IN THIS APPENDIX

Wildcard Characters (page E-2)

Wildcard Characters

These rules describe the data masking that can be used for data selection by generic criteria. Not all DR/Xpert library members and parameters will accept wildcards. Read the member/parameter description to see if wildcarding is permitted. In the following table, a data string can mean a dataset name, volder or text string.

Table E-1 Wildcard Characters

Wildcard	Description
/	Causes the remainder of the data string to be bypassed. **Example:** OTTC./ will select all dataset names that have OTTC as the first node.
*	Allows a variable number of characters to be skipped within a data string. The number of characters skipped is dependent upon when the substring following the * is matched. **Example:** OTTC.*.DATA will select all dataset names that have OTTC as the first node and DATA as the last node. Note: Do not use a * in column 1 except to signify a comment.
!	Allows a single numeric character to be skipped in a data string. **Example:** PRODJOB! will select jobs matching PRODJOB 0 through 9
%	Allows a single alphabetic character to be skipped in a data string. **Example:** OTTC.DATA.FILE% will select datasets that have OTTC.DATA as the first two nodes, then have third node that is the word FILE followed by a letter. (OTTC.DATA.FILEA, but not OTTC.DATA.FILE2).
?	Allows a single character (alphabetic or numeric) to be skipped in a data string. **Example:** OTTC.DATA?.FILE will select datasets that have OTTC as the first node, a second node of DATA and a numeric or alphabetic character, then have third node of FILE. (OTTC.DATA3.FILE and OTTC.DATAX.FILE).