Update Package

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Operator's Guide to File System Maintenance

DOC9300-6LA

This Update Package, UPD9300-61A, is Update 1 for the Sixth Edition of the *Operator's Guide to File System Maintenance*, DOC9300-6LA. Pages that have been changed are listed on the next page.

Changes made to this book are identified by vertical bars in the margins.

Update Package, UPD9300-61A

Pages to change:

Replace Pages	*With Pages*
i through xv	i through xv
6-1 through 6-2	6-1 through 6-2
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	Add Pages
	11-1 through 11-24

Operator's Guide to File System Maintenance

Sixth Edition

George W. Gove

This manual documents the software operation of the PRIMOS operating system on 50 Series computers and their supporting systems and utilities as implemented at Rapid Repair Release 23.3.0.R33 and Master Disk Revision Level 23.4 (Rev. 23.4).

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About This Book

About This Series

The Operator's Guide series is designed to help you, as a System Operator or a System Administrator of a Prime® computer, do your job. This preface describes the eight Operator Guides and other Prime documentation that are particularly useful for System Operators and System Administrators. To display an online list of all Prime documentation, use the HELP DOCUMENTS command.

For the System Operator

Before reading this book, you should have some familiarity with Prime systems. A good way to begin is to read the *PRIMOS User's Guide* (DOC4130-5LA), which explains the PRIMOS® file management system and provides introductory and tutorial information about essential commands and utilities. When you read any Prime documentation, be sure to consult the section entitled Documentation Conventions, which follows the preface; this section is essential to understanding how information is presented.

After you are familiar with Prime systems, read the *Operator's System Overview*, which outlines the material in the Operator's Guide series. Then select the other books in the series as they apply to the tasks you must perform.

As you learn more about system operations, you will use the *Operator's Guide to System Commands* as a reference for many of the special system commands and arguments that you, as an Operator, will need to perform your job. The *Operator's Guide to System Commands* documents most of the commands described in the Operator's Guide series.

The Operator's Guide Series

The following books contain detailed information for the System Operator.

- *Operator's System Overview* (DOC9298-3LA) introduces the series and describes computer-room operation of Prime systems.
- *Operator's Guide to System Monitoring* (DOC9299-3LA) describes how to monitor system usage, activity, and messages.
- *Operator's Guide to Data Backup and Recovery* (DOC10324-1LA) and its update documents (UPD10324-11A and UPD10324-21A) describe how to save information on disk or tape and how to restore that information later.
- *Operator's Guide to the Batch Subsystem* (DOC9302-3LA) describes how to set up, monitor, and control the Batch subsystem.
- *Operator's Guide to the Spooler Subsystem* (DOC9303-5LA) describes how to set up, monitor, and control the Spooler subsystem.
- *Operator's Guide to System Commands* (DOC9304-6LA) serves as a reference guide for most of the commands described in the other books in the series.
- *Operator's Guide to Prime Networks* (DOC10114-1LA) and its update package (UPD10114-11A) provide reference information about running network-related programs and monitoring network events.

Other Books for the Operator

- *Operator's Master Index* (DOC10110-5LA) indexes all the Operator and System Administrator Guides. Consulting this index is often the quickest way to find which manual has the information you need.
- The computer handbook for your particular CPU explains such topics as booting the system, shutting down PRIMOS, handling halts and hangs (including warm starts), performing tape dumps, and using the Virtual Control Panel (VCP).
- The *Using Your CPU* guide (available only for office CPUs) is intended for nontechnical users who are acting as System Operators, and covers system startup and shutdown, system backups, troubleshooting, and other day-to-day system management issues.
- *MAGNET User's Guide* (DOC10156-1LA) and its update package (UPD10156-11A) describe the MAGNET utility, used to transfer data by magnetic tape from other operating systems to PRIMOS and vice versa.

For the System Administrator

In addition to the documentation in the Operator's Guide series, be sure to read the System Administrator Guide series, which describes how to set up, configure, and maintain PRIMOS:

- *System Administrator's Guide, Volume I: System Configuration* (DOC10131-3LA) explains how to set up a system and allocate resources.
- *System Administrator's Guide, Volume II: Communication Lines and Controllers* (DOC10132-2LA and RLN10132-21A) explains how to configure communication lines.
- *System Administrator's Guide, Volume III: System Access and Security* (DOC10133-3LA) explains PRIMOS security features and how to prevent unauthorized use of your system.
- *DSM User's Guide* (DOC10061-3LA) explains how to use the Distributed Systems Management (DSM) subsystem, including how to configure and operate DSM.

The System Administrator Guides also provide information about most of the commands necessary to operate your Prime system.

Other Recommended Reading

In addition to the books listed above, you may find the following books useful:

- *New User's Guide to EDITOR and RUNOFF* (FDR3104-101B) is a basic reference for any user of a Prime system and provides information about the Prime text editor and formatter.
- *PRIMOS Commands Reference Guide* (DOC3108-8LA) provides detailed information about user commands.
- *Magnetic Tape User's Guide* (DOC5027-2LA) and the update documents for Rev. 20.1 (UPD5027-21A) and Rev. 20.2 (UPD5027-22A), describe the magnetic tape utility programs for users.
- *PRIMENET Planning and Configuration Guide* (DOC7532-4LA) and its update (UPD7532-41A) describe how to plan, configure, and maintain PRIMENET software for a system.
- *NTS User's Guide* (DOC10117-3LA) explains the Network Terminal Service (NTS).
- *50 Series Technical Summary* (DOC6904-2LA) describes the features of the 50 Series™ systems, including advanced architecture concepts and the software and hardware products the concepts support.

- The *System Architecture Reference Guide* (DOC9473-3LA) describes internal functioning of all 50 Series computers.
- The *Subroutines Reference II: File System* (DOC10081-2LA) describes subroutines that deal with access to and management of the file system.

About This Book

The *Operator's Guide to File System Maintenance* is one of a series of books designed to help you, as an Operator or a System Administrator of Prime computers, to do your job. It discusses the tasks necessary to create and maintain the file system.

The purpose of this book is to provide the information you need to know in order to maintain your file system. The operations you must become familiar with include how to

- Determine physical device numbers for partitions
- Format partitions
- Repair partitions
- Convert the format of a partition from one revision to another
- Decode disk error messages

If you are a System Operator, this book is intended to help you become familiar with the tasks required to keep the file system operating efficiently.

If you are a System Administrator, this book is intended to help you gain insight into some of the tasks required of the Operator to maintain the file system and includes discussions of these topics:

- The file system
- Using and assigning disks
- Robust partitions
- Dynamic badspot handling
- Mirroring
- File system record allocation
- New online FIX_DISK features at Rev. 23.3.0.R33

Organization of This Book

This book is divided into four parts:

- Part I introduces you to the file system and discusses disks, the storage media used to keep files.
- Part II tells you what physical device numbers are and how to construct them. It also explains how to assign and use disks. It describes in detail how to create and format disk partitions and how to repair file structures.
- Part III describes in detail the concepts of robust partitions, dynamic badspot handling, mirroring of partitions, file record allocation and online file system repair.
- The appendices explain the meaning of error messages related to disk operations, summarize the commands and options used for creating and repairing partitions, and include a glossary of terms used in this book. A comprehensive index lists all subjects discussed in this book.

You are expected to have some familiarity with Prime systems before reading this book. If you are not familiar with the PRIMOS operating system, you should read the *PRIMOS User's Guide* (DOC4130-5LA), which explains Prime's file management system and provides introductory and tutorial information about essential commands and utilities.

How This Book Is Structured

This book contains 11 chapters and 7 appendices:

- Chapter 1 explains terminology, the preparation and maintenance of disks used by PRIMOS, and concepts related to the file system.
- Chapter 2 describes varieties of disks used on Prime systems, terminology related to these disks, badspots, and equivalence blocks.
- Chapter 3 explains physical device numbers and how to construct them and describes partitioning of disk types supported by PRIMOS.
- Chapter 4 explains the procedures to assign disks to yourself in order to perform maintenance on them and the procedures to make disks available to users.
- Chapter 5 explains how to use the MAKE utility, which formats and partitions disks for use on your system.
- Chapter 6 explains how to use the FIX_DISK utility, which repairs file partitions.

- Chapter 7 describes robust partitions, the file system objects on them, allocation of CAM files, fragmentation, and the use of utilities in conjunction with robust partitions. This chapter also discusses the MAKE_ROBUST utility for creating robust partitions. In addition, this chapter describes the concept of logical file type.
- Chapter 8 explains the concept of dynamic badspot handling introduced at Rev. 21.0, which makes use of intelligent disk controllers and allows partitions to be mirrored.
- Chapter 9 explains the concept of partition mirroring introduced at Rev. 21.0, which allows you to dynamically make duplicate copies of partitions and which depends on dynamic badspot handling by intelligent disk controllers.
- Chapter 10 explains the concepts of reverse and forward sectoring and interleave factors introduced at Rev. 21.0, which provide a method to allow efficient record allocation and use of intelligent disk controllers.
- Chapter 11 explains how to use FIX_DISK for file system repair while the affected partition is mounted on the system. This method is called Online FIX_DISK and replaces assigning a shutdown partition to run FIX_DISK.
- Appendix A explains error messages and other messages from MAKE.
- Appendix B explains FIX_DISK messages.
- Appendix C explains messages related to the mirroring process.
- Appendix D explains error messages related to disk operations.
- Appendix E explains error messages related to the MAKE_ROBUST utility.
- Appendix F summarizes the command syntax for the MAKE and FIX_DISK utilities.
- Appendix G provides summary explanations of terms introduced in the main text.

Prime Documentation Conventions

The following conventions are used throughout this document. The examples in the table illustrate the uses of these conventions.

Convention	*Explanation*	*Example*
Uppercase	In command formats, words in uppercase bold indicate the names of commands, options, statements, and keywords. Enter them in either uppercase or lowercase.	**MAKE**
Italic	Variables in command formats, text, or messages are indicated by lowercase italic.	**MAKE –DISK** *pdev*
Abbreviations	If a command or option has an abbreviation, the abbreviation is placed immediately below the full form.	**–DISK_TYPE** **–DT**
Brackets	Brackets enclose a list of one or more optional items. Choose none, one, or several of these items.	**LD** [**– BRIEF** / **– SIZE**]
Braces	Braces enclose a list of items. Choose one and only one of these items.	**CLOSE** { *filename* / **– ALL** }
Braces within brackets	Braces within brackets enclose a list of items. Choose either none or only one of these items; do not choose more than one.	**BIND** [{ *pathname* / *options* }]
Monospace	Identifies system output, prompts, messages, and examples.	`address connected`
Underscore	In examples, user input is underscored but system prompts and output are not.	`OK, ASSIGN DISK`
Hyphen	Wherever a hyphen appears as the first character of an option, it is a required part of that option.	**FIX_DISK –FIX**
Ellipsis	An ellipsis indicates that you have the option of entering several items of the same kind on the command line.	*pdev-1* [*... pdev-n*]
Subscript	A subscript after a number indicates that the number is not in base 10. For example, the subscript 8 is used for octal numbers.	200_8

Repairing Partitions – FIX_DISK

6

This chapter discusses the FIX_DISK command, the PRIMOS utility for repairing disk partitions. The chapter presents an itemized list of the uses of FIX_DISK, discusses all of the FIX_DISK command-line options, and shows examples of running FIX_DISK.

You should use FIX_DISK under PRIMOS to repair disks of any revision. Rev. 23.3 FIX_DISK can repair Rev. 20.0 and later disk partitions, which have hashed directories, as well as pre-Rev. 20.0 disk partitions, which do not have hashed directories.

Note It is recommended that you delete any pre-Rev. 23.3 versions of FIX_DISK. This is to avoid the possibility of mistakenly invoking a pre-Rev. 23.3 version and thereby getting unexpected results. The Rev. 23.3 version of FIX_DISK resides in CMDNC0 as FIX_DISK.RUN. When you invoke FIX_DISK, a copyright line with the revision stamp is displayed. Previous versions of FIX_DISK reside in CMDNC0 as FIX_DISK.SAVE.

Using FS_RECOVER

This section describes the procedures and considerations for manually running FIX_DISK. If your command device (COMDEV) is damaged, you must repair it by manually running FIX_DISK at the supervisor terminal. For other partitions, you can either manually run FIX_DISK or you can use FS_RECOVER to determine what partitions should have FIX_DISK run on them and to automate the repair process. It is recommended that you routinely use FS_RECOVER whenever PRIMOS indicates that you should run FIX_DISK. For complete details on using FS_RECOVER, see *Using FS_RECOVER*.

What Does FS_RECOVER Do?

The main goal of FS_RECOVER is to reduce file system recovery time following a system crash. FS_RECOVER can assess the general state of your file system and provide an automated interface to FIX_DISK. If your system

did crash and you took a crash dump, you can use FS_RECOVER to read and analyze the crash dump.

You can also use FS_RECOVER without a crash dump. You can use FS_RECOVER to make a generalized assessment of the state of your locally added partitions. If any of these partitions are damaged, you can have FS_RECOVER set up for automated FIX_DISK the same way it does for a crash dump recovery analysis.

FS_RECOVER determines

- Which partitions need to be fixed *immediately*
- Which partitions need fixing that can be *deferred* to a more convenient time
- Which partitions are not damaged or were unaffected by a crash

FS_RECOVER determines which partitions are damaged and which partitions are *clean*, that is, do not cause PRIMOS to generate a warning message at the time the partition is added, or mounted.

FS_RECOVER also determines the correct FIX_DISK options for those partitions that must be fixed and provides an automated facility for running FIX_DISK.

What Is FIX_DISK?

FIX_DISK is an Operator command that

- Reads every physical record that is in use on a disk or partition, including records in files, directories, and segment directories
- Checks the quota information on partitions
- Checks that the information in each record header is consistent with the directory that contains the record
- Checks the DSKRAT file for discrepancies
- Checks ACLs
- Checks file system pointers

When FIX_DISK identifies any error on a partition, FIX_DISK displays an appropriate error message. See Appendix B for an explanation of all FIX_DISK messages.

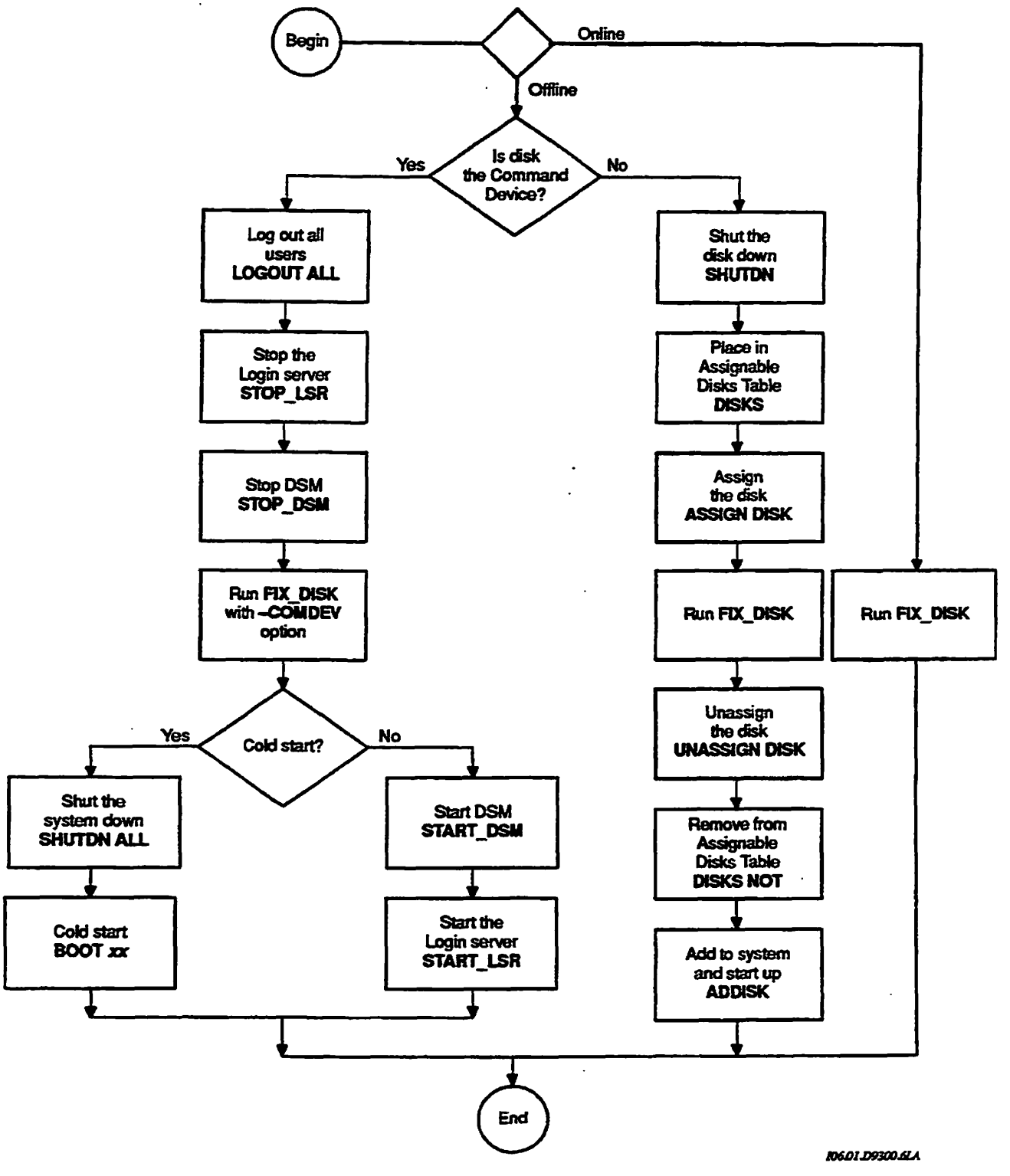


Figure 6-1. Disk Repair Using FIX_DISK

Options Available for Running FIX_DISK

FIX_DISK resides in CMDNC0 as FIX_DISK.SAVE. You invoke FIX_DISK with this command format:

FIX_DISK –DISK *pdev* [*options*]

pdev is the physical device number of the partition you are repairing. See Chapter 3 for directions on constructing physical device numbers. If you are going to repair a partition that is presently running, use the STATUS DISKS command to list the pdevs of all your partitions and to determine the pdev of the partition you want to repair.

Ten categories of command-line options are used with FIX_DISK:

- Options that specify repair tasks and revision conversions
- Options that select capabilities of disk controllers
- An option that checks to see that the system was properly shut down
- An option that specifies the command device as the target
- Options for use with pre-Rev. 22.1 formats
- An option that displays the dynamic badspot (DBS) file
- Options that modify terminal display
- Options that set the size of CAM file extents
- Options that change the method of file record allocation
- An option that gives you online help

Deciding Which Options to Use

Because SCSI disks associated with the Model 7210 disk controller (SDIC) downloaded with ICOP+ software handle badspots within the disk subsystem, no badspot file or dynamic badspot file exists on these disks. Therefore, FIX_DISK ignores the –DBS OFF and –DBS ON options and you should not use any options related to badspot handling on these disks. In addition, sectoring on these disks is forward with an interleave factor of 1 and this cannot be changed, thus FIX_DISK ignores the –SECTOR (–ODI and –RDI) options.

To summarize, do not use the following options on these SCSI disks:

–ADD_BADSPOT –DBS
–DUMP_DBS –LIST_BADSPOT
–SECTOR

A summary of each command-line option is listed below and the options are discussed in detail on the following pages in the same order. Study these items and write down the options that you wish to use. You *must* specify either –DISK pdev or –DISK *pdev* –COMMAND_DEVICE on the command line. The FIX_DISK options are also summarized in Appendix F of this book for your convenience.

–DISK

Specifies the physical device number (pdev) of the partition. See page 6-15.

–FIX –DUFE –SUFE –UFD_COMPRESSION –NUMBER_OF_RETRIES

Specifies the extent of the repair operation. See page 6-15.

–ADD_BADSPOT

Adds new badspots to the badspot file. See page 6-17.

–DBS OFF (–AC) –DBS ON (–IC)

Selects either Nondynamic Badspot Handling or Dynamic Badspot Handling mode on disks that support these modes. See page 6-17.

–AUTO_TRUNCATION –MAX_NESTED_LEVEL

Truncates deeply nested directories. See page 6-19.

–CHECK

Checks to see if the partition needs to be repaired. See page 6-20.

–COMDEV

Repairs or uses the command device. See page 6-20.

–CONVERT_19 –CONVERT_20 –CONVERT_21

Converts partitions created under older revisions forward to Rev. 19.0 from pre-Rev. 19.0, to Rev. 20.0 from pre-Rev. 20.0, and to Rev. 21.0 from pre-Rev. 21.0. See page 6-22.

–CONVERT_22.1

Converts Rev. 22.0 partitions to Rev. 22.1 format standard partitions. See page 6-23.

–DISK_TYPE

Specifies the physical disk type. See page 6-24.

–DUMP_DBS

Displays the DBS file. See page 6-25.

–FAST

Rapidly repairs a partition. See page 6-26.

-HELP

Gets online help with a display of FIX_DISK options. See page 6-27.

-INTERACTIVE

Repairs a defective or missing DSKRAT. See page 6-27.

-LEVEL -LIST_FILE

Specifies the amount of terminal output. See page 6-28.

-LIST_BADSPOTS

Lists badspots from the static badspot file, BADSPT. See page 6-29.

-MAX_EXTENT_SIZE -MIN_EXTENT_SIZE

Sets the maximum and minimum extent sizes for CAM files. See page 6-30.

-NO_QUOTA

Does not convert a pre-Rev. 19.0 partition. See page 6-30.

-ONLINE

Invokes FIX_DISK while the file system object is online, without need to assign the partition. See page 6-30.

-PARTIAL

Requests a partial check or repair of a disk partition. See page 6-30a.

-SECTOR FORWARD (-ODI) REVERSE (-RDI)

Specifies the method of file record allocation. See page 6-30a.

-TRUNCATE

Specifies the disposition of files containing badspots. See page 6-31.

The following options are obsolete but are supported. Their replacements are shown in the right column.

Obsolete Options	*Replacement*
-INTELLIGENT_CONTROLLER (-IC)	-DBS ON
-ALL_CONTROLLER (-AC)	-DBS OFF
-OVERRIDE_DEFAULT_INTERLEAVE (-ODI)	-SECTOR FORWARD
-RESTORE_DEFAULT_INTERLEAVE (-RDI)	-SECTOR REVERSE

After studying the above options, invoke FIX_DISK with the list of options you wish to use. FIX_DISK performs its functions and then returns to PRIMOS. As FIX_DISK executes, it displays messages describing its progress and any problems it encounters.

Specify the Physical Device Number: You must use –DISK to specify the physical device number (pdev) of the partition on which FIX_DISK is to operate. (See Chapter 3 for information on determining physical device numbers or use the STATUS DISKS command to see the pdev if the partition is presently running.) Follow –DISK with the physical device number. –DISK and the physical device number are required *must* be specified on the command line in this format:

```
OK, FIX_DISK -DISK 61260
```

Unless you specify –COMMAND_DEVICE (–COMDEV, as explained on page 6-20), FIX_DISK responds as if you have already shut down and assigned the partition you are repairing. If you have not assigned the partition, FIX_DISK displays a message to that effect and aborts:

```
DISK pdev NOT ASSIGNED
ER!
```

If you do not include the pdev, FIX_DISK aborts with this message:

```
Bad Physical Device Number.   (cl_par)
FIX_DISK aborted
ER!
```

Caution Do not forget to include –DISK *preceding* the pdev on the command line. If the –DISK option is inadvertently omitted or entered after the pdev, unpredictable behavior occurs. If this happens, press Ctrl–P to stop the program. If you have assigned only one disk (the one to be repaired) to your terminal, there is little chance that any harm has occurred. (The chances are greater if you have assigned two or more disks.) Issue the command RELEASE_LEVEL –ALL (RLS –ALL), then invoke FIX_DISK again. Include –DISK on the command line in the correct place, followed immediately by the pdev. It is not necessary to use –DISK with the –HELP option if you only want help.

Specify the Extent of the Repair Operation: If you do not want FIX_DISK to attempt repairs, do not specify the –FIX option. FIX_DISK then reports inconsistencies, but does not attempt to rectify them. Messages from FIX_DISK concerning bad file pointers, record addresses, and file structures indicate that files or directories may be deleted or truncated if you do specify –FIX.

Caution Do not use the –FIX option if you suspect that the disk drive itself is faulty. First run FIX_DISK without using the –FIX option. If no unrecoverable disk read-errors or write-errors are reported at the supervisor terminal, run FIX_DISK again, using the –FIX option. If FIX_DISK encounters unrecoverable disk read-errors or write-errors and you used the –FIX option, FIX_DISK may delete or truncate files.

If you do want FIX_DISK to make repairs or changes, you must include the –FIX option on the command line. You probably want to include the –UFD_COMPRESSION option (abbreviation –CMPR) and the option –DUFE (delete unknown file entries) or –SUFE (save unknown file entries) as well. For example:

```
OK, FIX_DISK -DISK 61260 -FIX -UFD_COMPRESSION -DUFE
```

This command line tells FIX_DISK to

- Make all needed repairs (–FIX)
- Compress unused space in directory records (–UFD_COMPRESSION)
- Delete all unrecognizable file entries (–DUFE)

You cannot use both –DUFE and –SUFE on the same command line; if you do, FIX_DISK aborts with this error message:

```
Both -DUFE and -SUFE can not be specified at the same time.
```

Caution If you run a version of FIX_DISK older than the revision of the partition you are repairing (not recommended), use the –SUFE option because there may be new file types on the more recent revision of the file system that are unrecognizable to the older version of FIX_DISK. The –SUFE option results in saving any unrecognizable file entry. If you do not use the –SUFE option, the default is –DUFE (delete unknown file entries). Be sure that you are running Rev. 23.3 or later FIX_DISK.

Note that the default is –DUFE (delete unknown file entries). Be sure that your partition is recently backed up before running FIX_DISK and that you are using Rev. 23.3 or later FIX_DISK.

You can specify the number of times that FIX_DISK is to attempt to read a record with the –NUMBER_OF_RETRIES option (abbreviation –NUMRTY). FIX_DISK normally makes nine physical adjustments to attempt to read a record and does this two times; that is, the default is two retries. You can change the default with the –NUMRTY option. A practical maximum may be four retries. With an intelligent disk controller, FIX_DISK displays one error message for each retry. With a nonintelligent disk controller, FIX_DISK displays nine error messages with each retry.

You must specify the –FIX option if you want FIX_DISK to make changes to the partition. An error message is displayed and FIX_DISK aborts if you do not use –FIX with the following options.

–ADD_BADSPOT	–DBS (–IC, –AC)
–CONVERT_19	–MAX_EXTENT_SIZE
–CONVERT_20	–MIN_EXTENT_SIZE

–CONVERT_21	–SECTOR
–CONVERT_22.1	–INTERACTIVE
–UFD_COMPRESSION	

If you do not specify –FIX with other options, FIX_DISK reports any errors encountered but does not attempt to repair the errors.

Add New Badspots to the Badspot File: Use the –ADD_BADSPOT option (abbreviation –ADBADS) to add new badspots to the static badspot file (BADSPT) if the partition is in –DBS OFF mode or to the dynamic badspot (DBS) file if the partition is in –DBS ON mode. Use a command line like this:

FIX_DISK –DISK ***pdev*** **–FIX –ADD_BADSPOT** ***record_1 . . . record_16***

Enter record numbers (*record_1 . . .*) in octal. A maximum of 16 badspots may be entered on a command line with the –ADD_BADSPOT option. If you attempt to enter more than 16 badspots on a command line or if you enter a number that is not octal, an error message is displayed and FIX_DISK aborts. The –FIX option must be specified with the –ADBADS option. You must use the –ADBADS option to add uncorrectable errors that occur on paging partitions.

The badspot file is updated by FIX_DISK after you enter badspots with the –ADBADS option. When you cold start the system or when you add the partition to the system with the ADDISK command, the DSKRAT is changed appropriately so that PRIMOS does not use the records marked as badspots in the case of a –DBS OFF mode partition or PRIMOS is directed to use RMA records in the case of a –DBS ON mode partition.

Set the Partition's Disk Controller Mode: In order to have Dynamic Badspot Handling or mirroring on Rev. 21.0 and later partitions, the disk drive on which the partition's spindle is located must be connected to an intelligent disk controller (IDC1) and the spindle (all partitions on the spindle) must be in Dynamic Badspot Handling (–IC) mode.

Note For a complete discussion of Dynamic Badspot Handling, see Chapter 8. For a discussion of mirroring and the mirroring commands, see Chapter 9.

To switch the controller mode of a Rev. 21.0 or later partition on a spindle that supports Dynamic Badspot Handling, use the options **–DBS ON** (–IC) and **–DBS OFF** (–AC). For example, to switch the mode of a Rev. 22.1 format partition from Nondynamic Badspot Handling (–DBS OFF) to Dynamic Badspot Handling (–DBS ON) so that the partition is capable of being mirrored, use a command line like this:

```
OK, FIX_DISK -DISK 7462 -DT MODEL_4845 -FIX -DBS ON
```

In order to switch the DBS mode from OFF to ON, the spindle must be capable of Dynamic Badspot Handling and must be connected to a downloaded Model 6580 intelligent disk controller (IDC1). In addition, all partitions on the spindle must be in the same DBS mode.

The following disk types are capable of Dynamic Badspot Handling:

SMD (300 and 80MB)

68MB	MODEL_4475
158MB	MODEL_4735
160MB	MODEL_4845
600MB	MODEL_4860

In order to switch the mode of any partition, the head zero partition of that spindle must be in the mode to which you wish to switch the other partitions. If it is not, an error message is displayed and FIX_DISK aborts:

```
OK, FIX_DISK -DISK 172462 -DT 600MB -FIX -DBS ON
[FIX_DISK Rev. 23.3 Copyright (c) 1992, Prime Computer, Inc.]
Date: 06/28/92.  Time: 15:32.
Partition name is SWTPEA

First partition must be in same mode as the conversion on this partition
FIX_DISK aborted
ER!
```

To switch the mode of a Rev. 21.0 or later partition to allow the partition to be used with nonintelligent disk controllers (4005), use the –DBS OFF argument. The partition can then be used on a disk drive connected to a nonintelligent disk controller or an intelligent disk controller in 4005 mode but it cannot be mirrored unless it is connected to an intelligent disk controller and is in Dynamic Badspot Handling (–DBS ON) mode. Use a command line like this to select Nondynamic Badspot Handling (–DBS OFF) mode:

```
OK, FIX_DISK -DISK 141020 -FIX -DBS OFF
```

When you use the FIX_DISK –DBS ON argument to switch a Rev. 22.1 format partition to Dynamic Badspot Handling (–DBS ON) mode, the head zero partition on that spindle must be in –DBS ON mode and the head zero partition must be assigned to you. This is because remapped records must be retrieved by FIX_DISK from the head zero partition without interference from another process. The only way to do this is to have the head zero partition shut down and assigned. If you are switching or using the command device, use the –COMDEV option (see page 6-20).

```
          MODEL_4714        84 megabyte fixed media
          MODEL_4711        60 megabyte fixed media
          MODEL_4715        120 megabyte fixed media
          MODEL_4735        496 megabyte fixed media
          MODEL_4719        258 megabyte fixed media
          MODEL_4845        770 megabyte fixed media
          MODEL_4721        328 megabyte fixed media
          MODEL_4860        817 megabyte fixed media
          MODEL_4729        673 MB fixed media
          MODEL_4730        215 MB fixed media
          MODEL_4731        421 MB SCSI fixed media
          MODEL_4732        1.34 GB SCSI fixed media

FIX_DISK aborted
ER!
```

Select a valid type from the left column above and reenter the command line, specifying the disk type with the –DISK_TYPE option.

Display the DBS File: You may wish to display the dynamic badspot (DBS) file and save the display in a COMO file. This may be useful if the DBS file is somehow damaged. You can then use FIX_DISK or MAKE to manually reenter the badspots.

To display the DBS file, use the FIX_DISK option –DUMP_DBS (abbreviation –DDBS). The format of the display is shown here; a detailed display is shown in the section Examples of Running FIX_DISK, later in this chapter.

```
OK, FIX_DISK -DISK pdev -DUMP_DBS

DBS file version version_number.
DBS file has number_of_records records.
Number of badspots = number_of_badspots.
File last modified by Primos/controller.

Badspot                          Remap Record
Cyl,   Head,  Sector             Cyl,   Head,  Sector
 ----------------                 ----------------
a,      b,      c                  r,      s,      t
d,      e,      f                  u,      v,      w
```

pdev in the command line is the pdev of the head zero partition on which the DBS file is located. If the file has not been modified, the line `File last modified by` is not displayed. The fields in the other lines are filled in appropriately. The letters a, b, c, and so on represent cylinder, head, and sector numbers of the badspots and their remapped records.

In order to display the DBS file of a spindle, you must have the head zero partition of that spindle assigned to you. If the first partition is the command

device, use the –COMDEV *pdev* option in a command line like the following, where *pdev* is the pdev of the command device, in this case 460:

```
OK, FIX_DISK -DISK 10460 -DUMP_DBS -COMDEV 460
```

Use of this option will shut down the command device and assign it to you as explained under the discussion of the –COMDEV option on page 6-20. Remember to stop and start DSM, the Login server, and any other phantoms when you use the –COMDEV option or cold start the system when FIX_DISK finishes.

You can have the DBS file displayed while you are repairing some other partition on the disk. The DBS file is displayed when FIX_DISK finishes the repair operation. To display the DBS file without specifying the –FIX option, use the pdev of the head zero partition where the DBS file resides. If the disk is in Nondynamic Badspot Handling (–DBS OFF) mode, the DBS file is displayed but it may not be up-to-date; it is updated in Dynamic Badspot Handling (–DBS ON) mode.

Rapidly Repair a Partition: If the partition you wish to repair with FIX_DISK is a robust partition (described in Chapter 7), you can use the –FAST option to speed up processing by FIX_DISK. You can also use –FAST on a standard partition.

Running FIX_DISK with the –FAST and –FIX options is referred to as fast FIX_DISK and running FIX_DISK with the –FIX option but without the –FAST option is referred to as full FIX_DISK.

The purpose of the –FAST option is to save time in repairing a robust partition that has experienced a system halt and was thus improperly shut down. Specifying the –FAST option tells FIX_DISK to check directory entries, including CAM file extent maps, available space (the DSKRAT), and the quota system on robust partitions. When you specify the –FAST option, FIX_DISK uses the extent maps to determine which records are in use in order to rebuild this information if necessary. Since FIX_DISK does not read each record header in this case, it is much faster than a full FIX_DISK. Thus, if it is more important to access data as soon as possible after a halt and have the partition available, use fast FIX_DISK. You may use full FIX_DISK to ensure the integrity of all record headers at a more convenient time.

The –FAST option is applicable to DAM files. FIX_DISK uses the DAM index records to determine which records are in use in order to rebuild this information (the DSKRAT) if necessary. If a problem is found with a DAM file, then the complete DAM file is checked and repaired if necessary.

The –FAST option is not applicable to SAM files, since, by definition, SAM files are built sequentially and FIX_DISK must access them by reading every record of a SAM file in sequence. Thus, no time is saved.

Note Do not confuse the –LEVEL option with the –MAX_NESTED_LEVEL option. –LEVEL affects how much information is displayed at your terminal, but does not otherwise affect FIX_DISK. –MAX_NESTED_LEVEL, followed by a decimal number, specifies the maximum allowable nested level of directories (see page 6-19).

If you wish FIX_DISK to display all the filenames of the files in all of the directories to the level you specify or to the default level, include the **–LIST_FILE** option (abbreviation **–LF**) on the command line. The filenames are included under the names of their parent directories. (See the example on page 6-47.)

List Badspots: Normally, the only information FIX_DISK prints concerning badspots is the number of lost records they represent. If you would like to see more information on badspots on an –DBS OFF mode partition or a partition that was formerly a –DBS OFF mode partition and that has a BADSPT file, include the **–LIST_BADSPOTS** option (abbreviation **–LB**) on the command line, as follows:

```
OK, FIX_DISK -DISK 1060 -LIST_BADSPOTS
```

FIX_DISK then lists all known badspots from the BADSPT file, followed by a listing of any equivalence blocks, in a display before the BEGIN MFD message. For each known badspot, the track, head, and sector are listed. For each equivalence block, the record numbers of both the badspot and the remapped (alternate) record are listed. In addition, the track, head, and sector numbers are also listed for the badspots and their equivalence blocks. For example:

```
OK, FIX_DISK -DISK 4422 -LIST_BADSPOTS
[FIX_DISK Rev. 23.3 Copyright (c) 1992, Prime Computer, Inc.]
Date: 06/01/92.  Time: 16:48.
Partition name is TEMP1

This is a revision 22 partition.
Disk uses reverse sectoring with -DBS OFF.
The BADSPT file has 38 entries.

Track = 39 Head = 11 Sector = 5
Track = 79 Head = 6 Sector = 5
Track = 146 Head = 9 Sector = 7
Track = 160 Head = 23 Sector = 8
 .  .  .
 .  .  .
 .  .  .
```

For disks having many badspots, listing of all of the badspots may take a considerable amount of time, particularly at a low-speed supervisor terminal.

Set or Change the Maximum and Minimum Extent Sizes for CAM Files: At Rev. 22.0, you can set the maximum and minimum extent sizes for CAM files. An extent size is the number of contiguous 2048-byte records in one extent of the CAM file. (See Chapter 7 for a discussion of setting extent sizes.) FIX_DISK has two options to allow you to change or set the extent sizes: the –MAX_EXTENT_SIZE option (abbreviation –MAXSIZ) and the –MIN_EXTENT_SIZE option (abbreviation –MINSIZ).

You can initially set these sizes when you create the partition with MAKE by using similar MAKE options. If you do not use those MAKE options, PRIMOS uses the default number of records shown in Table 6-2 to set the extent sizes, depending on whether the partition is a robust partition or a standard partition.

Table 6-2. Default Maximum and Minimum Extent Sizes

	Robust Partition	*Standard Partition*
Maximum	256	32
Minimum	64	16

If you decide to change these extent sizes after the partition is created, use the FIX_DISK options in this format:

FIX_DISK –DISK ***pdev*** **–MAXSIZ** ***size*** **–MINSIZ** ***size*** **–FIX**

size is a decimal number representing the minimum or maximum extent size (number of contiguous records in an extent) to be used by the algorithm that PRIMOS uses to extend CAM files. The minimum size cannot be zero (0) and cannot be greater than the maximum. The maximum size can be any value up to 32767.

Do Not Convert a Pre-Rev. 19.0 Partition: To run FIX_DISK on a partition made as a pre-Rev. 19.0 partition without converting it, include the –NO_QUOTA option (abbreviation –NQ) on the command line:

```
OK, FIX_DISK -DISK 1060 -FIX -NO_QUOTA
```

Disabling of quota checking is necessary because pre-Rev. 19.0 partitions have no quota information, and error messages are displayed if FIX_DISK is run on a pre-Rev. 19.0 partition without the –NO_QUOTA option.

Repair a File System Object While the Partition Is Online: At Rev. 23.4, the –ONLINE option allows a partition to be brought online after a crash, and file system objects to be repaired while the partition is online. This allows access to file system objects on the partition while other objects are being repaired. See Chapter 11, Online File System Repair, for complete information.

Check or Repair a Sub-tree or a Single File: The –PARTIAL option is supported at Rev. 23.4 and following revisions. It is used by the FS_RECOVER utility, for checking or repairing a subdirectory or a single file within a partition. This option applies both to assigned and online disk partitions. –PARTIAL requires an argument with the pathname of the subdirectory or file, but the pathname cannot include the partition name.

This option can be used on a segment directory, but not on a subfile of a segment directory; if a subfile of the segment directory is specified, the entire segment directory is checked or repaired.

You can not use the –PARTIAL option with the following options:

- –CMPR
- –CONVERT_19
- –CONVERT_20
- –CONVERT_21
- –CONVERT_22.1
- –DBS (–IC/–AC)
- –AUTO_TRUNCATION
- –ADD_BADSPOT
- –SECTOR (–ODI/–RDI)
- –MIN_EXTENT_SIZE
- –MAX_EXTENT_SIZE

Set the Record Allocation Direction and Interleave Factor: The recommended method of file record allocation for Rev. 20.0 and later standard partitions depends on the combination of CPU and disk controller in your system. The interleave factor is 3 with forward sectoring for all pre-Rev. 20.0 partitions and for Rev. 22.1 robust partitions. (See Chapter 10 for an explanation of sectoring and interleave factors.) Reverse sectoring with an interleave factor of 1 is supported starting at PRIMOS Rev. 20.0.

```
FIX_DISK finished
OK, UNASSIGN DISK 460
OK, UNASSIGN DISK 10460
OK, DISKS NOT 460 10460
OK, ADDISK 460 10460
OK,
```

First the disk is assigned to the user and FIX_DISK is invoked. The first partition on this physical disk was not assigned to the user and FIX_DISK aborts. The first partition must be available to FIX_DISK in order to have the DBS file available. The first partition is then assigned and FIX_DISK is invoked again. This time the mode switching cannot take place because the first partition must be in the same mode to which the user is switching the second partition. The user then switches the mode of the first partition and then that of the second partition. When FIX_DISK finishes, the user unassigns the two partitions and adds them to the system. These partitions can be added, or started, on this system because they are associated with an intelligent disk controller.

Example of the DBS File Display

The following example shows the display of the DBS file when the –DUMP_DBS option is used. In this case, the DBS file is on the first partition of a file system disk that is not the command device; therefore it is not necessary to use the –COMDEV option. The display is generated during the normal course of repairing the partition. The first partition must be assigned to you or FIX_DISK displays the message `Cannot access RAT on disk 0` at the end of its normal display.

```
OK, ASSIGN DISK (2460 12460)
OK, FIX_DISK -DISK 12460 -DUMP_DBS -FIX -LEVEL 0
[FIX_DISK Rev. 23.3 Copyright (c) 1992, Prime Computer, Inc.]
Date: 04/03/92.  Time: 18:42.
Partition name is TPLAB

This is a revision 22.1 partition
Disk uses forward sectoring with -DBS OFF.
The DBS file has 5 entries.

The BADSPT file has 5 entries.

BEGIN MFD
END   MFD  2345
74070 records in partition
 2345 records used
   18 records lost
71707 records left
    0 records compressed
DSKRAT UPDATED!
```

```
DBS file version 1
DBS file has 1 record
Number of badspots = 5
File last modified by PRIMOS.

Badspot                  Remap Record
Cyl, Head, Sector      Cyl, Head, Sector
713,   7,   0           0,   0,   8
778,   1,   4           0,   1,   8
806,   6,   7           0,   1,   1
807,   1,   1           0,   1,   2
810,   1,   3           0,   1,   3
FIX_DISK finished
OK,
```

The user specifies the –LEVEL 0 option to suppress display of directories under the MFD. Use of the –FIX option causes the record allocation information in the DSKRAT to be corrected. The DBS file is listed when FIX_DISK finishes repair tasks; the file contains information for five badspots. It was last updated by PRIMOS since the disk is associated with a nonintelligent disk controller. The badspots and their remapped records are listed by cylinder, head, and sector addresses.

Invoking FIX_DISK From Magnetic Tape

If the command device or the CMDNC0 directory becomes damaged so that the FIX_DISK utility is inaccessible, you can invoke FIX_DISK from magnetic tape using the MTRESUME command. Remember to assign the tape drive first. MTRESUME is fully documented in the *Operator's Guide to System Commands*.

When you invoke FIX_DISK from magnetic tape, use the MTRESUME option –COMMAND_LINE_OPTIONS (abbreviation –CMDOPT) to specify to FIX_DISK the details of the repair. For example, to repair a damaged command device while deleting all unknown file entries and compressing directories, use a command line like this:

```
OK, MTRESUME MT1 FIX_DISK.RUN -CMDOPT -DISK 1060 -COMDEV -FIX -DUFE -CMPR
```

The output then appears as follows:

```
This is a revision 20 MAGSAV tape.
Date: 04-04-88
Revision: 20
Reel: 1
Name: REPAIR

[FIX_DISK Rev. 23.3 Copyright (c) 1992, Prime Computer, Inc.]
Date: 06/05/92.  Time: 02:37
          .  .  .
          .  .  .
          .  .  .
```

In this case, FIX_DISK.RUN is run from magnetic tape. After the dialog from the tape portion of the procedure, the FIX_DISK messages appear as they normally do. The –COMDEV option shuts down and assigns the partition.

Note When you boot PRIMOS from tape and then invoke FIX_DISK with the MTRESUME command, you cannot repair a disk in dynamic badspot handling (–DBS ON) mode. This is because intelligent disk controllers are downloaded from disk when PRIMOS is booted from disk. Therefore you must use the –DBS OFF option if you are repairing a –DBS ON mode partition. You can convert back to –DBS ON mode after you repair the partition and reboot PRIMOS from disk.

If you

- Use MTRESUME and FIX_DISK in the above manner and you boot PRIMOS from tape to do this and
- Have a CPU that does not have a diagnostic processor or that has a VCP III or earlier virtual control panel

you must also use the PRIMOS SETIME command to set the date and time before invoking FIX_DISK.

Example of Invoking FIX_DISK.RUN From Tape

FIX_DISK may be invoked from magnetic tape by using the MTRESUME command and specifying the pathname of FIX_DISK as it was saved by MAGSAV on the tape. In this example, FIX_DISK is invoked from magnetic tape on tape drive MT0 while PRIMOS is running. FIX_DISK is instructed to repair the partition, compress directories, delete unknown file entries, and display directories down to the tenth level and list all files in those directories.

```
OK, MTRESUME MT0 FIX_DISK.RUN -CMDOPT -DISK 30662 -FIX -DUFE -CMPR -LEVEL
-LIST_FILE
```

```
This is a revision 20 MAGSAV tape.
Date:     04-04-88
Revision: 22
Reel:     1
Name:     REPAIR

[FIX_DISK Rev. 23.3 Copyright (c) 1992, Prime Computer, Inc.]
Date: 06/05/92.  Time: 16:49.
Partition name is SWTPEA
This is a revision 22 partition.
Disk uses forward sectoring with -DBS ON.
BEGIN MFD
        SWTPEA
        BOOT
        DAISY
        MAYFLOWER
  BEGIN FLOWER
          DAISY
    BEGIN IRISES
            PETALS
      BEGIN ROSES
              PISTILS
        BEGIN PEONY
                SEPALS
          BEGIN TULIP
                  YELLOW
                  MAGENTA
                  FUCHSIA
            BEGIN CFOILS
                    YELLOW
            END   CFOILS  340
          END   TULIP  1680
        END   PEONY  3361
      END   ROSES  5384
    END   IRISES  7740
  END   FLOWER  10517
END   MFD  10592


14814 records in partition
10592 records used
    0 records lost
 4222 records left
    0 records compressed
DSKRAT OK
FIX_DISK finished
OK,
```

The FIX_DISK display lists all of the files in directories down to the subdirectory CFOILS and lists the records used in each directory.

Online File System Repair

11

This chapter discusses using FIX_DISK for file system repair while the affected partition is mounted on the system. This method is called Online FIX_DISK, and replaces assigning a shutdown partition to run FIX_DISK. Online FIX_DISK allows access to information that is on that partition during the repair procedure. You should be familiar with the information in Chapter 6, Repairing Partitions – FIX_DISK, before reading this chapter.

This chapter discusses why and when you should use online repair; how it works; the new FIX_DISK options –ONLINE and –PARTIAL; procedures; and PRIMOS-level commands, program interfaces, and operator commands that identify in-repair partitions.

Why Use Online Repair?

After a system crash or disk corruption, the only way to ensure the validity of your data is to run FIX_DISK. Prior to the introduction of online repair capability, many sites delayed the repair until they could conveniently shut down the corrupt partitions without impacting the running of their business. In this situation, they would often bring the system back up and defer the repair for an indefinite amount of time. Using various tools such as Resident Forced Shutdown (RFS), which reduces the number of partitions needing repair, and FS_RECOVER, which reports the partitions that do need repair, the relative danger of deferring FIX_DISK could be assessed.

Other sites might not take the risk of running corrupt partitions, but would shut down immediately, assign the partitions, and complete the FIX_DISK processing before allowing users access to the system.

With the advent of online repair, both types of sites can be assured that their file system data integrity is not impaired, and can allow their users to continue business.

Caution If you have any suspicion that your disk problems could be due to hardware failure, do not attempt to execute online file system repair before eliminating the possiblity of hardware problems, or before fixing the hardware problems.

File System Corruption

When a system crashes, the file system is potentially corrupted. Since data passes through buffers before being written to disk, the timing of the crash could mean that particular file system information does not get written to disk. The most important file system data structure, the Record Availability Table (RAT or DSKRAT), which defines the in-use and available records, could be affected.

Two particular situations can arise that make deferring file system repair dangerous. These are the:

- **Doubly allocated record.** This record is considered part of more than one file system object. This can happen when a recently allocated record was written to disk with other records pointing to it, but a system failure occurred before an updated RAT could be written to disk. Thus the RAT has different allocation information about that record than the other record pointers to that record. The RAT considers that record an available (free) record. This situation could eventually lead to data loss if processing continues without repair, and another transaction allocates the same record.
- **Orphaned record.** This is a record that the RAT flags as in-use, but the record does not belong to a file system object. This can happen when an updated RAT was written to disk but a system failure occurred before other records pointing to a newly allocated record could be written to disk. While this does not result in potential data loss, it does result in inconsistencies in the file system.

At Rev. 23.4 and later, FIX_DISK alerts you to these two problems, and eliminates the inconsistencies.

Advantages Over Assigned Disk Repair

The distinct advantage to repairing your disks while they are online is the amount of shutdown time you can eliminate. In other words, your application and data are available for much of the time that Online FIX_DISK is repairing the corrupted file system objects.

Also, an important difference is that you *can* run Online FIX_DISK on the COMDEV while using the system. Because of the locking scheme, the system remains available while the COMDEV is in repair. See the section Directory Locking on page 11-5.

New Recommendation for –FIX Option

With this online capability comes a change in the philosophy of when to use the –FIX option. Executing without the –FIX option is analogous to window shopping to see which items to buy. Previously, Prime recommended omitting the –FIX option as a method of determining which file system objects were in

need of repair. While this ate up extra time in the recovery process, it provided a safety factor. However, with the use of the utilities now available, and especially for online repair, this effort becomes redundant. Furthermore, it could be risky to run without –FIX with the partition online, since file system objects on that partition could be modified while FIX_DISK is executing. Prime recommends that you use the –FIX option to FIX_DISK after a system crash unless there are hardware problems with the disk or controller.

Who Can Run Online File System Repair

Online FIX_DISK can be executed by only the following privileged users:

- User 1
- A phantom of the system console
- The System Administrator
- A member of the .RAS$ ACL group

FIX_DISK is a registerable EPF. The System Administrator should configure the privileged users with sufficient dynamic segments to run FIX_DISK (about three segments at Rev. 23.4).

The Route to Fast Recovery and Reliability

Prior to Rev. 23.1, it was not possible to tell which part of the file system was corrupted, and thus it was necessary to run FIX_DISK on all partitions. Additional utilities were added at Rev. 23.1 and following revisions to allow you to determine the corrupted partitions and to quickly recover from the crash. The SYSTEM_RECOVER command configures the system to allow the use of these utilities automatically in the event of a crash. These utilities are:

- Crash Dump to Disk (CDD)
- Resident Forced Shutdown (RFS)
- FS_RECOVER

Both CDD and RFS are run through the maintenance processor (MP). The INIT_RECOVER.CPL command line, which runs FS_RECOVER, is added to PRIMOS.COMI for execution after the system starts. You can allow users to log in when the system is started; you have minimized down time, and Online FIX_DISK can check and repair corrupted partitions, either automatically from FS_RECOVER or manually at your discretion, while users access their data.

See the *RAS Guide for 50 Series System Administrators* for a full discussion of these utilities; a brief discussion follows:

Crash Dump to Disk (CDD)

This utility allows the crash dump to be written automatically to disk. The dump can be accessed directly by FS_RECOVER for analysis or analyzed by your Service representative.

Resident Forced Shutdown (RFS)

RFS executes after a crash, halt, or hang, and before booting PRIMOS, providing your system is configured to use it. RFS can detect whether or not a transaction was in progress at the time of the failure. RFS flushes LOCATE buffers if it can (that is, if there is still power and the disk has not been removed). If

- The flush is successful
- A transaction was not in progress at the time of the crash
- The partition was clean at the time of the crash (no prior unrepaired corruption)

RFS can then mark the disk partition as clean (not in need of repair). If any of these conditions is not met, the partition needs repair. Using RFS can significantly decrease the number of partitions that need repair by FIX_DISK.

FS_RECOVER

This utility analyzes the crash dump disk and produces FIX_DISK recommendations. It also creates CPL scripts that will perform the recommendations, at your discretion. FS_RECOVER identifies, when possible, specific file system objects to repair, potentially allowing less than the full partition to be repaired. See page 6-1 in this book and *Using FS_RECOVER* for more details on FS_RECOVER.

FS_RECOVER is the vehicle for performing automatic analysis and checking/repairing of partitions. However, if you do not choose to execute FIX_DISK directly from FS_RECOVER, you can execute FIX_DISK manually. Optionally, you can mark identified objects as needing repair, as a reminder and for user information, by using the SET_TO_BE_REPAIRED (STBR) command discussed on page 11-9.

Online FIX_DISK

Running Online FIX_DISK allows users to access their applications and data on the in-repair partition while only the specific file system object being checked or repaired is locked against users. While FIX_DISK execution takes a comparable amount of time whether run online or against an assigned disk, the difference is the availability to the user because the partition is not shut down.

How Online FIX_DISK Works

Online FIX_DISK requires exclusive access to the specific file system object as it checks and potentially repairs that object. It gets that access through a lock at the start of an operation on that object; the lock is released when the object has been checked or repaired.

Concurrency With Applications

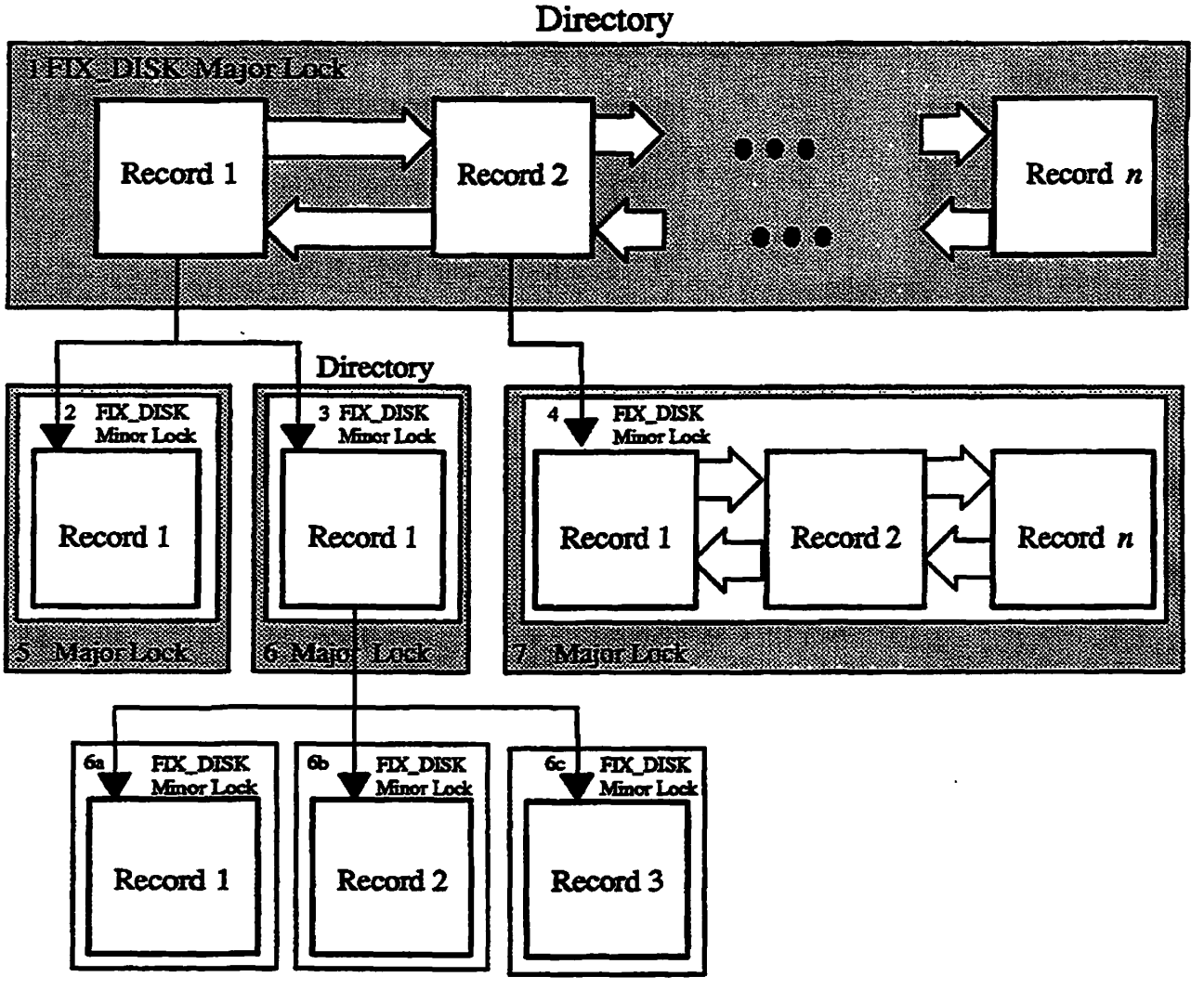
An application can have the same file system object open that is in repair; the application applies a lock at the start of a PRIMOS operation (for example, reading or writing) on the file system object. If FIX_DISK is checking or repairing the same file system object on which the application is operating, then the application waits until FIX_DISK releases its lock. Conversely, if an application has a lock on a file system object, FIX_DISK waits for that operation to complete before getting its lock.

The time a file system object is locked is related to the size of the object. For example, if an application has a very large file that must be accessed by each user of the application, all users will be locked out of that large file for a relatively long time. If a large file is preallocated, the need for repair of that large file will be rare. However, if the disk partition has other problems, a partial repair of the partition could be used to repair those problems without requiring the large file to be checked or repaired.

Directory Locking

A directory is a file system object treated as a special file by Online FIX_DISK. The subfiles and subdirectories of the directory are only checked for consistency with record addresses in the directory itself. The lock FIX_DISK applies at the beginning of an operation on the directory is applied to the directory itself; this can be thought of as a **major lock**. An application waits on the directory only while the directory itself is being checked or repaired.

While the major lock is on the directory, FIX_DISK reads only the first record of each subfile or subdirectory, producing a message for any problems detected, (see *Figure 11–1*). A **minor lock** is applied to a subfile or subdirectory until its first record is read. This minor lock is released and the next subfile or subdirectory is locked in turn for reading of the first record. When the last minor lock is released, the major lock is released and the application can access the directory structure. Each subfile and subdirectory is then completely checked and repaired as necessary.



Locks locked at any given time:

- No. 1
- No. 1 and 2
- No. 1 and 3
- No. 1 and 4 (Note: Time to read first record only)
- No. 5
- No. 6 with 6a, then 6b, then 6c
- No. 7

Legend:

- A square represents a disk record
- Arrows from sides indicate same file system object
- Arrows from bottom point to first record of children

Figure 11–1. Locking System for FIX_DISK Major and Minor Locks

Note If the check on the first record of a file system object produces an error message, you may see that error again when the entire object is checked. You should not be concerned about the double error reporting. See the example on page 11-20.

FIX_DISK uses the same locking scheme on segment directories.

New Options for the FIX_DISK Command Line

At Rev. 23.4, two new options are supported to allow use of FIX_DISK on a mounted partition. These are –ONLINE and –PARTIAL. The –ONLINE option is available only to the privileged users defined earlier.

The –ONLINE Option

The –ONLINE option is required on the FIX_DISK command line if the partition is mounted on the system when repair is to take place. Appropriate messages display if the partition is online and the option is omitted, or if the option is used and the partition has not been mounted.

–ONLINE Option Restrictions

Use of –ONLINE precludes use of any of the following options:

- –AUTO_TRUNCATION (–AT)
- –COMMAND_DEVICE (–COMDEV)
- –CONVERT_19
- –CONVERT_20
- –CONVERT_21
- –CONVERT_22.1
- –DBS (and the options it replaced: –INTELLIGENT_CONTROLLER (–IC), and –ALL_CONTROLLER (–AC))
- –FAST
- –INTERACTIVE (–INT)
- –MAX_NESTED_LEVEL (–MAX)
- –UFD_COMPRESSION (–CMPR)

The –DUMP_DBS option can only be used with –ONLINE if the disk partition is the head zero partition. That is, to display the dynamic badspot file without assigning a disk partition, run FIX_DISK –ONLINE on the respective head zero partition.

Note The –COMDEV option serves as an automatic SHUTDN and ASSIGN DISK command, which is incompatible with executing Online FIX_DISK. For online repair, the command device is treated as any other disk partition. Thus, no special option is needed to tell FIX_DISK to repair the command device.

The –PARTIAL objectname *Option*

The –PARTIAL *objectname* option was previously only an internal option for use by FS_RECOVER. At 23.4, this option is now supported for users, for both online and assigned disk repair. –PARTIAL allows repair to be restricted to a subdirectory or single file; you must specify the pathname of the file system object (with the partition name omitted) as the argument to this option.

–PARTIAL is valid for segment directories, but not for subfiles of a segment directory. If you specify a subfile, the entire segment directory will be repaired.

–PARTIAL Option Restrictions

Use of –PARTIAL precludes use of any of the following options:

- –ADD_BADSPOT (–ADBADS)
- –AUTO_TRUNCATION (–AT)
- –CONVERT_19
- –CONVERT_20
- –CONVERT_21
- –CONVERT_22.1
- –DBS (and the options it replaced: –INTELLIGENT_CONTROLLER (–IC), and –ALL_CONTROLLER (–AC))
- –MAX_EXTENT_SIZE (–MAXSIZ)
- –MIN_EXTENT_SIZE (–MINSIZ)

- –SECTOR (and the options it replaced:
  –OVERRIDE_DEFAULT_INTERLEAVE (–ODI), and
  –RESTORE_DEFAULT_INTERLEAVE (–RDI))
- –UFD_COMPRESSION (–CMPR)

Procedure for Running Online FIX_DISK

The Online FIX_DISK process does not inform users when it starts. It is advisable that you issue a system message when you initiate the process to alert users that user processes may wait for a particular file system object while it is being repaired.

The most automatic way to run Online FIX_DISK is from FS_RECOVER, initiated by the INIT_RECOVER.CPL line in PRIMOS.COMI, as part of the coldstart process. When you set up your coldstart procedure, you can configure FS_RECOVER to meet your FIX_DISK requirements. This is recommended as it requires the least intervention and can occur when an Operator is not on duty.

While Online FIX_DISK is running, the STAT DISKS command will report which partition is in repair. A user can check this to determine when the repair completes.

TO_BE_REPAIRED Attribute

File system objects now have an attribute **TO_BE_REPAIRED (TBR),** that indicates the file system object is in need of repair. The privileged user sets this attribute; FIX_DISK clears it after repairing the object. You can check the TBR attribute while Online FIX_DISK is running. The object can be used safely even though Online FIX_DISK is still running on the disk partition.

The commands and subroutines that handle the TBR attribute follow.

STBR Operator Commnand

The operator command STBR (SET_TO_BE_REPAIRED) turns on the TBR attribute for a file system object. Only User 1, the System Administrator, or a member of the .RAS$ ACL group can issue this command. The format is

STBR ***pathname*** **[–RESET] [–HELP (–H)]**

The –RESET option allows you to turn off the attribute if it was set in error on a particular file system object.

STBR Messages: The following messages are issued by this command.

"To be repaired" attribute set on *filename*.
The TBR attribute was successfully set.

"To be repaired" attribute reset on *filename*.
The STBR command line included the –RESET option; the TBR attribute was turned off.

Insufficient access rights. Can't set "to be repaired" attribute.(STBR)
pathname: *pathname*
The STBR command was issued by a nonprivileged user.

STBR Examples: The following example sets the TBR attribute on the file TRYIT.COMO.

```
OK, STBR TRYIT.COMO
[STBR Rev. 23.4 Copyright (c) 1992, Prime Computer, Inc.]

"To be repaired" attribute set on TRYIT.COMO.
OK,
```

–TBR Option to LD

The –TBR option to the LD command lists those file system objects with the TBR attribute set. For example:

```
OK, LD -TBR
<COMADG>JOAN (ALL access)
5 records in this directory, 5 total records out of quota of 0.
1 File.
name              type   rbf   tbr
------------------------------------------------------------------
TRYIT.COMO        dam          TBR
OK,
```

The –DETAIL option to LD now also displays the TBR attribute, as shown in the following example.

```
OK, LD -DETAIL
<COMADG>JOAN (ALL access)
5 records in this directory, 5 total records out of quota of 0.
2 Files.
name          date/time modified  date/time backedup  date/time created
                date/time accessed     size   rwlock    dump   access  delprot
                 type  rbf   trunc  protected by                      tbr
-------------------------------------------------------------------------------
JOAN.TEST       06 Aug 92 13:53:32  ** dtb not set ** 06 Aug 92 13:50:00
                06 Aug 92 13:53:48        1       sys   nodmp      ALL
                dam                  (Default ACL)
TRYIT.COMO      05 Aug 92 11:13:08  ** dtb not set ** 05 Aug92 11:12:56
                05 Aug 92 11:21:08        1       sys   nodmp      ALL
                dam                  (Default ACL)                    TBR
OK,
```

CPL WILD and ATTRIB Functions Extensions

Both the WILD and ATTRIB functions accept the –TBR option. WILD –TBR selects any file system objects with the TBR attribute set. ATTRIB –TBR returns the character string TRUE if the TBR attribute is set, or FALSE if it is not set.

STATUS DISKS Display Extension

When Online FIX_DISK is checking or repairing a file system object, STATUS DISKS will report the partition as `In Repair`, as shown in the following example where the partition with the pdev 40460 is being repaired:

```
OK, STATUS DISKS

                                                  Mirror
                                                 Primary Secondary  State
Disk    Ldev  Pdev  System  Robust             ----------------------------------

COMADG    0   2060
SYSENS    1         ENS
INTEG     2         ENS
FOXTST    3         ENS
OSGRP4    4         ENS
NEWENS    5         ENS
OSGRP2    6         ENS
OSGRP0    7         S35
OSGRP3   10         S35
OSGRP7   11         S35
OSGRP8   12         S35
OSGRPB   13         S35
OSGRPD   14         S35
OSGRPE   15         S35
```

```
OSGRP6  16          S35
OSGRPL  17          S35
OSGRPG  20          S35
OLRINF  21  40660
ADGREG  22  40460                In Repair
CDDTST  23  40462
CDDCMD  24   2062
OLRREG  25   2260
MRG233  26  51062
PR233   27  51060
INFBAS  30  51260
OK,
```

Subroutine Extensions

The TBR attribute is accessible from a program through extensions to the following subroutines:

Subroutine	*Function*
DIRLS, DIRRD, ENT$RD	If the TBR attribute is set, the return structure for each directory entry includes a 1 in the bit reserved for the attribute.
DIR$SE	The TBR attribute can be made part of the selection criteria for this subroutine, so that a call will return only those file system objects with the attribute set, and the return structure includes a 1 in the bit reserved for TBR.

The following subroutine returns information about a partition currently under repair by Online FIX_DISK:

LDISK$	If Online FIX_DISK is running, the return structure of disk partition entries indicates those partitions currently in repair, and also returns the user number associated with the execution of Online FIX_DISK.

See Update 1 to the second edition of *Subroutines Reference II: File System* for a discussion of these changes.

Aborting Online FIX_DISK

You can abort Online FIX_DISK either by stopping the process or using the CLUPOLFD command.

Stopping the Online FIX_DISK Process

A forced logout of a process running Online FIX_DISK or pressing `Control-p` will abort and clean up for Online FIX_DISK. To determine the user number for the forced logout, issue a FIX_DISK command as follows:

```
FIX_DISK DISK pdev -ONLINE -CHECK
```

This will return the user number if Online FIX_DISK is still running on the specified disk partition. If the process has finished before it can return the message with the user number, FIX_DISK will perform the check, which is a quick procedure, but will not do any repair.

CLUPOLFD Command

The CLUPOLFD command aborts and cleans up for Online FIX_DISK. This command should be used only as a *last resort* for recovering from an unforeseen event. This command is restricted to User 1 or the System Administrator. .RAS$ ACL group members *cannot* issue this command. The command format is

CLUPOLFD *pdev*

pdev is the physical device number of the disk partition under repair.

Any process waiting on FIX_DISK locks is notified and proceeds when the cleanup is done.

Mirrored Disks and Online FIX_DISK

Using Online FIX_DISK on mirrored partitions checks and repairs both the primary and secondary disks at the same time. This provides a big advantage over assigned FIX_DISK.

Note, however, that Online FIX_DISK reads from the primary and secondary disks alternately, so that you cannot expect Online FIX_DISK to read every in-use record on the mirrored partition. Refer to Chapter 9 for more information on disk mirroring.

Crash Dump Disk and Online FIX_DISK

Online FIX_DISK can check and repair the file system portion of a crash dump disk while the crash dump disk is active. An active crash dump disk cannot be assigned. To use assigned FIX_DISK and have an active crash dump disk, you would need to activate an alternate crash dump disk.

Robust Partitions and Online FIX_DISK

After a system crash, a robust partition could be marked as not properly shut down. A robust partition that is not properly shut down cannot be mounted normally. The –FORCE option to the ADDISK command is specific to adding a robust partition. If the robust partition is marked as properly shut down, the robust partition is mounted normally.

If the robust partition was not properly shut down (that is, it is not clean), the –FORCE option adds the partition in read-only mode. You can then run Online FIX_DISK without the –FIX option to diagnose the problems on the robust partition,

You can use Online FIX_DISK to add a badspot to a robust partition.

When You Need Assigned FIX_DISK

Under certain circumstances, the only way you can repair a partition is by shutting it down and doing an assigned FIX_DISK. Some of these situations are

- Robust partitions that have not been properly shut down. When a robust partition is marked as not properly shut down, it cannot be added with the ADDISK command until it is repaired. FS_RECOVER or Online FIX_DISK will identify the need for assigned disk repair. See the previous section on Robust Partitions and Online FIX_DISK.
- Directory Used count or Tree Used count inconsistency. Quota information, specifically the Directory Used count and Tree Used count, are not updated by Online FIX_DISK. These numbers can actually change while the file system object is being checked or repaired by Online FIX_DISK because of user access to the file system object. Online FIX_DISK will report the inconsistency.

  For example, if the partition contains journal or log files, such as DSM logs, which are always open, the Directory Used count determined by Online FIX_DISK will be different than the value stored in the directory.

If the accuracy of the quota information is important to your site, that is, if strict quotas are enforced, and if running Online FIX_DISK caused files to be truncated or deleted, you will need to run an assigned FIX_DISK to correct the Directory Used and Tree Used counts.

- Compressing directories. If you would like FIX_DISK to eliminate all directory entries that have been flagged as deleted, you must use assigned FIX_DISK with the –UFD_COMPRESSION (–CMPR) option. (This option is not available with the –ONLINE option.)
- Automatic Truncation or deletion of directories. If your partition is nested too deeply and you want to use the –AUTO_TRUNCATION option of FIX_DISK to truncate or remove directories below a specified level, you must do this with assigned FIX_DISK. (This option is not available with the –ONLINE option.)

FIX_DISK Messages

At Rev. 23.4, FIX_DISK messages change in four categories:

- New messages specific to Online FIX_DISK
- New messages for either Online or assigned FIX_DISK
- Replacement messages that clarify the reporting of disk status or condition
- Enhanced messages that expand on older messages about the state of the DSKRAT

New Messages Specific to Online FIX_DISK

The following new messages are specific to Online FIX_DISK.

```
Record number is in use but is NOT marked as in use in the DSKRAT!
Rerun Fix_Disk with -Fix to update the DSKRAT!
  Record(s) CURRENTLY belong to:
pathname
  Record(s) can be allocated to another file system ojbect!
```

This message can occur when you run Online FIX_DISK without the –FIX option and a record is encountered that has pointers to it as an in-use record, yet the RAT shows it as an available (free) record. This message informs you of the possibility of the record becoming doubly allocated.

```
Record number is in use but is NOT marked as in use in the DSKRAT!
DSKRAT UPDATED!
  Records belong to:
pathname
```

When Online FIX_DISK is run to repair the disk partition, the DSKRAT is immediately updated to mark the in-use records as allocated. This message indicates the update to the DSKRAT.

```
Directory Used count is inconsistent. It could be YY instead of XX.
Online FIX_DISK will NOT modify the Directory Used count.
```

When Online FIX_DISK executes, it calculates the Directory Used count. However, since the file system objects are available to users, it cannot guarantee that this number will remain the same at the time the process is completed. The number it provides is an estimate only. Online FIX_DISK will *not* update the Directory Used count, as assigned FIX_DISK will.

```
Tree Used count is inconsistent. It could be YY instead of XX.
Online FIX_DISK will NOT modify the Tree Used count.
```

When Online FIX_DISK executes, it calculates the Tree Used count. However, since the file system objects are available to users, it cannot guarantee that this number will remain the same at the time the process is completed. The number it provides is an estimate only. Online FIX_DISK will *not* update the Tree Used count, as assigned FIX_DISK will.

New Messages for Either Online or Assigned FIX_DISK

The following messages are new at 23.4:

```
Disk Partition: pdev is Online.
You can use -ONLINE to check/repair this disk partition.
FIX_DISK aborted.
```

You specified the FIX_DISK command line without the –ONLINE option, and the partition is online. Either shut down and assign the disk, or specify the command line with the –ONLINE option.

```
Device pdev is not assigned.
FIX_DISK paused to allow device assignment. Type START to continue.
```

The disk partition has been shut down but not assigned. FIX_DISK waits until you assign the disk and type START. If you intended to run Online FIX_DISK, abort the current command, issue the ADDISK command, and issue the FIX_DISK command with the –ONLINE option.

Replacement Messages

The following messages replace and/or clarify older messages:

Replacement Message

```
The file system may be incorrect.
Disk not properly shutdown.
```

Original Message

```
Disk not properly shutdown. Full fix disk will be run.
The quota system may be incorrect.
```

Discussion

This message changes the emphasis to the file system being incorrect, with the shutdown information as the reason. This may be combined with the message: `The disk was previously not shutdown properly.` if both conditions exist.

Replacement Message

```
The file system may be incorrect.
The disk was previously not shutdown properly.
```

Original Message

```
The quota system may be incorrect.
```

Discussion

This message occurs when an improperly shutdown partition is mounted without being repaired. The emphasis in this message was changed to reflect the greater importance of the file system being incorrect over the quota system being incorrect. This message may be combined with the message: `Disk not properly shutdown.` if both conditions exist.

Enhanced Messages

The following messages expand on the original DSKRAT messages:

```
DSKRAT MISMATCH!

DSKRAT UPDATED!
```

These indicate an inconsistent RAT. These messages can be issued either for assigned FIX_DISK or Online FIX_DISK. Note that you should examine all messages that are issued for full information on problems.

```
There are free (orphaned) records in the DSKRAT.
DSKRAT MISMATCH!
```

You will see this message if –FIX was not used on the FIX_DISK command line. It indicates that the only reason for the inconsistent RAT is the existence

of orphaned records. Run FIX_DISK with –FIX only when you are concerned about the disk partition becoming full, if there are no other messages indicating additional problems with the checked partition.

```
There were free (orphaned) records in the DSKRAT and/or
there were files truncated or deleted by FIX_DISK.
DSKRAT UPDATED!
```

FIX_DISK was run with –FIX. The partition is now clean.

```
In-use records were missing from the DSKRAT!
DSKRAT MISMATCH!
```

If FIX_DISK was run without the –FIX option, this message displays. It detected that in-use records were not marked in the RAT. This is a *serious* problem with potential for doubly allocated records; repair is necessary. Run FIX_DISK with the –FIX option.

```
In-use records were missing from the DSKRAT!
DSKRAT UPDATED!
```

If FIX_DISK was run with the –FIX option, this message displays. RAT inconsistencies were detected and repaired.

Online FIX_DISK Examples

The following examples illustrate the new messages that clarify the problems FIX_DISK finds. An example of fixing the COMDEV online is also included.

Example of FIX_DISK With –ONLINE, No –FIX

This example illustrates a partition that was not shut down properly. The problems identified are a potential doubly-allocated record, an incorrect index of the DAM file, another DAM file with a bad index length, and an inconsistent Directory Used count.

```
OK, FIX_DISK -DISK 40460 -ONLINE
[*FIX_DISK Rev. 23.4 Copyright (c) 1992, Prime Computer, Inc.]
Date: 08/06/92. Time: 12:24.
Disk Partition: 40460 is Online.
Partition name is ADGREG
This is a revision 22 partition.
Disk uses forward sectoring with -DBS OFF.
The file system may be incorrect.                    /*new message
The disk was previously not shutdown properly.
BEGIN MFD
  BEGIN CMDNC0
  END   CMDNC0  1
```

```
   BEGIN DOS
   END   DOS  1
   BEGIN TEST
The forward pointer (37) is bad, it points to a record
that belongs to another file.                          /*mismatch message
The index level of this DAM file is incorrect.
It should be 0 instead of 1!
MFD>TEST>RING0.LOAD.COMO
The DAM index is too long to represent the DAM file!
MFD>TEST>RING0.LOAD.COMO
The Directory Used count is inconsistent. It could be 18 instead of 76.
Online Fix_Disk will NOT modify the Directory Used count.      /*new message
MFD>TEST
  END   TEST  18
END   MFD
2514814 records in partition
   25 records used
    0 records lost
14789 records left
    0 records compressed
There are free (orphaned) records in the DSKRAT.               /*new message
DSKRAT MISMATCH!
FIX_DISK finished
OK,
```

Example of FIX_DISK With –ONLINE, –FIX

This example runs FIX_DISK with –FIX to repair the problems identified above. The actions that FIX_DISK takes are: truncation and deletion to correct the DAM index file problems and the orphaned records. Note that the Directory Used count message is still present, since Online FIX_DISK does not correct this quota information.

```
OK, FIX_DISK -DISK 40460 -ONLINE -FIX
[*FIX_DISK Rev. 23.4 Copyright (c) 1992, Prime Computer, Inc.]
Date: 08/06/92. Time: 12:25.
Disk Partition: 40460 is Online.
Partition name is ADGREGThis is a revision 22 partition.
Disk uses forward sectoring with -DBS OFF.
The file system may be incorrect.
The disk was previously not shutdown properly.
BEGIN MFD
  BEGIN CMDNC0
  END   CMDNC0  1
  BEGIN DOS
  END   DOS  1
  BEGIN TEST
The forward pointer (37) is bad, it points to a record
```

```
that belongs to another file.
The index level of this DAM file is incorrect.
It should be 0 instead of 1!
MFD>TEST>RING0.LOAD.COMO
The DAM index is too long to represent the DAM file!
File truncated.                                    /*corrective action
MFD>TEST>RING0.LOAD.COMO
The index level of the top index record of a DAM file is incorrect.
 It is 0, it should be > 0 & < 4.
File deleted.                                      /*corrective action
MFD>TEST>RING3.LOAD.COMO
The Directory Used count is inconsistent. It could be 9 instead of 76.
Online Fix_Disk will NOT modify the Directory Used count.  /*quota message
MFD>TEST
  END   TEST  9
END   MFD
1614814 records in partition
   16 records used
    0 records lost
14798 records left
    0 records compressed
There were free (orphaned) records in the DSKRAT and/or
  there were files truncated or deleted by Fix_Disk.     /*corrective action
DSKRAT UPDATED!
FIX_DISK finished
OK,
```

Example of Message Displayed Twice

The following example shows a situation where FIX_DISK found a problem while checking the first records of each subfile or subdirectory when a major lock was applied, then finds the same problem again when checking the entire subfile or subdirectory.

```
OK, FIX_DISK -DISK 40460 -ONLINE
[*FIX_DISK Rev. 23.4 Copyright (c) 1992, Prime Computer, Inc.]
Date: 08/07/92. Time: 15:38.
Disk Partition: 40460 is Online.
Partition name is ADGREG
This is a revision 22 partition.
Disk uses forward sectoring with -DBS OFF.
BEGIN MFD
  BEGIN CMDNC0
  END   CMDNC0  1
  BEGIN DOS
  END   DOS  1
  BEGIN TEST
File type mismatch!
```

```
   It should be 0 instead of 1                    /*first instance of message
  Bad record address = 12  BRA = 12    Father = 7    Type = 0
MFD>TEST>SIMPLE.DAT
File type mismatch!
   It should be 0 instead of 1                   /*second instance of message
  Bad record address = 12  BRA = 12    Father = 7    Type = 0
MFD>TEST>SIMPLE.DAT
The Directory Used count is inconsistent. It could be 2 instead of 71.
Online Fix_Disk will NOT modify the Directory Used count.
MFD>TEST
  END   TEST  2
END   MFD  914814 records in partition
    9 records used
    0 records lost
14805 records left
    0 records compressed
DSKRAT OK
FIX_DISK finished
OK,
```

Online Repair of the COMDEV

The following example shows a normal execution of Online FIX_DISK on the COMDEV partition.

```
OK, FIX_DISK -DISK 2060 -ONLINE -FIX
[*FIX_DISK Rev. 23.4 Copyright (c) 1992, Prime Computer, Inc.]
Date: 08/06/92. Time: 15:34.
Disk Partition: 2060 is Online.
Partition name is COMADG
This is a revision 22 partition.
Disk uses reverse sectoring with -DBS OFF.
The BADSPT file has 3 entries.
BEGIN MFD
  BEGIN CMDNC0
  END   CMDNC0  17131
  BEGIN DOS
  END   DOS  22
  BEGIN TALK*
  END   TALK*  57
  BEGIN CS_REP
  END   CS_REP  3
  BEGIN LIB
  END   LIB  2059
  BEGIN INTCOM*
  END   INTCOM*  980
  BEGIN DOWN_LINE_LOAD*
  END   DOWN_LINE_LOAD*  958
```

```
  BEGIN SEARCH_RULES*
  END   SEARCH_RULES*  8
  BEGIN SEGRUN*
  END   SEGRUN*  1130
  BEGIN NETWORK_MGT*
  END   NETWORK_MGT*  649
  BEGIN SYSTEM
  END   SYSTEM  2183
  BEGIN SEG
  END   SEG  22
  BEGIN SYSOVL
  END   SYSOVL  2168
  BEGIN SERVERS*
  END   SERVERS*  110
  BEGIN SPOOL*
  END   SPOOL*  347
  .
  .
  .
  BEGIN CONFIG_USERS*
  END   CONFIG_USERS*  242
  BEGIN JOAN                    /*UFD JOAN
  END   JOAN  13
  BEGIN BOOTRUN
  END   BOOTRUN  5
  BEGIN MIDASPLUS*
  END   MIDASPLUS*  5
  BEGIN BATCHQ
  END   BATCHQ  223
  BEGIN INSTALL_TEST*
  END   INSTALL_TEST*  68
  BEGIN RJSPLQ*
  END   RJSPLQ*  723
  BEGIN DISCOVER*
  END   DISCOVER*  472
 END   MFD  58935
59256 records in partition
58935 records used
    3 records lost
  318 records left
    0 records compressed
DSKRAT OK
FIX_DISK finished
OK,
```

Checking Status of Repair

While FIX_DISK is repairing the COMDEV COMADG, a user can use the STATUS DISKS command to find out when FIX_DISK completes its processing. The first example shows the display while FIX_DISK is running; the second shows the display after the repair is completed.

```
OK, STATUS DISKS                                      Mirror
                                                  Primary Secondary  State
Disk    Ldev  Pdev  System  Robust               ----------------------------------
COMADG    0    2060                          In Repair        /*repair message
SYSENS    1           ENS
INTEG     2           ENS
FOXTST    3           ENS
OSGRP4    4           ENS
NEWENS    5           ENS
OSGRP2    6           ENS
OSGRP0    7           S35
OSGRP3   10           S35
OSGRP7   11           S35
OSGRP8   12           S35
OSGRPB   13           S35
OSGRPD   14           S35
OSGRPE   15           S35
OSGRP6   16           S35
OSGRPL   17           S35
OSGRPG   20           S35
OLRINF   21   40660
CDDTST   23   40462
CDDCMD   24    2062
OLRREG   25    2260
MRG233   26   51062
PR233    27   51060
INFBAS   30   51260
OK,
```

```
OK, STATUS DISKS                                      Mirror
                                                  Primary Secondary  State
Disk    Ldev  Pdev  System  Robust               ----------------------------------
COMADG    0    2060                              /*repair message no longer present, indicates
SYSENS    1           ENS                        /*completion of FIX_DISK
INTEG     2           ENS
FOXTST    3           ENS
OSGRP4    4           ENS
NEWENS    5           ENS
OSGRP2    6           ENS
OSGRP0    7           S35
OSGRP3   10           S35
```

```
OSGRP7  11          S35
OSGRP8  12          S35
OSGRPB  13          S35
OSGRPD  14          S35
OSGRPE  15          S35
OSGRP6  16          S35
OSGRPL  17          S35
OSGRPG  20          S35
OLRINF  21  40660
CDDTST  23  40462
CDDCMD  24   2062
OLRREG  25   2260
MRG233  26  51062
PR233   27  51060
INFBAS  30  51260
OK,
```

Displaying the TBR Attribute

If the privileged user set the TBR attribute on a particular file system object, a user can check with the LD command to determine when FIX_DISK has turned off the attribute. The following examples illustrate the LD display while FIX_DISK is running, before the particular file system object is checked or repaired, and the LD display after the file system object (the directory JOAN) has been checked and repaired.

```
OK, LD -TBR
<COMADG>JOAN (ALL access)
13 records in this directory, 13 total records out of quota of 0.
1 File.
name              type  rbf  tbr
-------------------------------------------------------------------------------
TRYIT.COMO        dam        TBR


OK, LD -TBR
<COMADG>JOAN (ALL access)
13 records in this directory, 13 total records out of quota of 0.
No entries selected.
OK,
```

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