DataGeneral

Software Documentation

RDOS, DOS, DG/RDOS Backup and Move Utilities

RDOS, DOS, DG/RDOS
Backup and Move Utilities

069-400022-01

For the latest enhancements, cautions, documentation changes, and other information on this product, please see the Release Notice (085-series) supplied with the software.

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Backup and Move Utilities
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Preface

This manual describes the backup and move utilities available with the RDOS, DOS, and DG/RDOS operating systems. The first chapter summarizes the programs and discusses general considerations for their use. The reader can consult Chapter 1 to find out which utility to use. Each of the subsequent chapters covers a set of utilities, grouped according to the backup medium — magnetic tape or diskette.

Chapters 2 through 6 offer detailed instructions for use, and a discussion of features, a list of error messages, and examples. The following list summarizes chapter contents.

Chapter 1, "Overview," compares the various programs in discussions about methods of data storage, estimating storage needs, and planning a backup program.

Chapter 2, "Magnetic Tape Backup with Burst Utilities," covers the stand-alone programs BURST, YBURST, and TBURST.

Chapter 3, "Diskette Backup with Burst Utilities," documents the stand-alone programs DBURST, YDBURST, and MBURST.

Chapter 4, "Owner Recovery for Burst Utilities," discusses the Owner facility, with which you can identify the name of a file that was damaged during a restore operation with one of the Burst programs.

Chapter 5, "Magnetic Tape Backup with FDUMP/FLOAD," describes the complementary system utilities FDUMP and FLOAD.

Chapter 6, "Diskette Backup with DDUMP/DLOAD," documents the system utilities DDUMP and DLOAD.

Chapter 7, "File Backup and Move with IMOVE," covers the use of IMOVE to back up files or to transport them between a DG/RDOS system and one running another Data General Corporation operating system. IMOVE works with both magnetic tapes and diskettes.

Appendix A lists the disks and diskettes available with RDOS, DOS, and DG/RDOS, including model number, capacity, device code, controller number, and unit name for each device.

Before You Use This Manual

This manual assumes that you are familiar with the following manuals:

RDOS/DOS Command Line Interpreter, DGC No. 069-400015

How to Load and Generate RDOS, DGC No. 069-400013
or
How to Generate Your DOS System, DGC No. 093-000222-02

In particular, we assume that you know how to load the operating system, understand disk structure and file organization under RDOS, DOS, or DG/RDOS, and can use the DKINIT or DOSINT program to software format disk media. We also assume that you can operate magnetic tape or diskette drives.

Related Manuals

Below we list the manuals for the RDOS, DOS, and DG/RDOS operating systems.

Introduction to RDOS (DGC No. 069-400011)
How to Load and Generate RDOS (DGC No. 069-400013)
RDOS/DOS Command Line Interpreter (DGC No. 069-400015)
RDOS System Reference (DGC No. 093-400027)
RDOS/DOS Assembly Language and Program Utilities (DGC No. 069-400019)
RDOS/DOS Superedit Text Editor (DGC No. 069-400017)
RDOS/DOS Text Editor (DGC No. 069-400016)
RDOS/DOS Debugging Utilities (DGC No. 069-400020)
RDOS/DOS Sort/Merge and Vertical Format Unit Utilities (DGC No. 069-400021)
Guide to RDOS Documentation (DGC No. 069-400012)
RDOS, DOS, DG/RDOS Backup and Move Utilities (DGC No. 069-400022)
How to Generate Your DOS System (DGC No. 093-000222-02)
Using DG/RDOS on DESKTOP GENERATION Systems (DGC No. 069-000056)

Reader, Please Note:

We use these conventions for command formats in this manual:

COMMAND required *[optional]* ...

Where	Means
COMMAND	You must enter the command (or its accepted abbreviation) as shown.
required	You must enter some argument (such as a filename). Sometimes, we use: $\{\text{required}_1 \atop \text{required}_2\}$ which means you must enter *one* of the arguments. Don't enter the braces; they only set off the choice.
[optional]	You have the option of entering this argument. Don't enter the brackets; they only set off what's optional.
...	You may repeat the preceding entry or entries. The explanation will tell you exactly what you may repeat.

Additionally, we use certain symbols in special ways:

Symbol	Means
⤶	Press the NEW LINE or carriage return (CR) key on your terminal's keyboard.
☐	Be sure to put a space here. (We use this only when we must; normally, you can see where to put spaces.)

All numbers are decimal unless we indicate otherwise; e.g., 35_8.

Finally, in examples we use

```
THIS TYPEFACE TO SHOW YOUR ENTRY⤶
THIS TYPEFACE FOR SYSTEM QUERIES AND RESPONSES.
```

) is the CLI prompt.

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- If you need additional manuals, please use the enclosed TIPS order form (USA only) or contact your Data General sales representative.

End of Preface

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Chapter 1
Overview

Table 1-1. RDOS, DOS, and DG/RDOS Backup and Move Utilities

Utility	Media	microNOVA® *DOS*	NOVA® or ECLIPSE® *DOS, RDOS*	ECLIPSE® S/20 *RDOS*	DESKTOP GENERATION™ *DG/RDOS*
BURST	Disk image ◄—► tapes Disk image ◄—► disk		√		
YBURST	Disk image ◄—► tapes Disk image ◄—► disk			√	√
TBURST	Disk image ◄—► tapes Disk image ◄—► disk	√			
DBURST	Disk image ◄—► diskettes		√		
YDBURST	Disk image ◄—► diskettes			√	
MBURST	Disk image ◄—► diskettes	√			
FDUMP/ FLOAD	Disk directories ◄—► tapes	√	√	√	√
DDUMP/ DLOAD	Disk directories ◄—► diskettes	√	√	√	√
IMOVE *	Disk files, directories ◄—► diskettes Disk files, directories ◄—► tape ** Diskette files, directories ◄—► diskette				√

*IMOVE enables file move by diskette or tape between DG/RDOS and AOS, AOS/VS, MP/OS, MP/AOS and MP/AOS-SU.

**IMOVE confines magnetic tape read and write operations to a single tape.

The Backup and Move Utilities

The RDOS, DOS, and DG/RDOS utilities for backing up or moving files offer a variety of methods that are appropriate to particular systems, hardware, and data storage needs. Table 1-1 shows the programs in relation to the range of processors, operating systems, storage methods (disk image or directories), and storage media (magnetic tape, diskette, or disk) that are available.

All of these programs are suitable for backing up your data — copying your files from disk to another storage medium in order to preserve them. You would use backup data, for example, to recover from equipment failure or accidental deletion of a file. You also might want to use a backup program to store data in archives, then recall it for periodic processing.

In addition to use for backup, DESKTOP GENERATION™ users can employ the IMOVE program to move data from one system to another. Table 1-1 shows that IMOVE can read and write both tapes and diskettes for a variety of operating systems.

This manual documents each of these programs with detailed operating instructions. We also cover the Owner facility, which helps you to track the ownership of disk blocks lost during a load transaction by one of the Burst utilities.

This chapter covers concerns that are common to all the backup programs and systems: data storage methods, estimating storage needs, and planning a backup program.

Data Storage Methods

The Burst utilities store files in the form of a *disk image,* and the Dump utilities store files in directories. These two methods make a difference in processing speed and data selectivity, and we discuss them below.

Disk Images

A disk image is an exact, block-by-block copy of a disk on the receiving medium. When you restore a disk image from a tape or diskette dump set, every block is restored on the target disk at the same address, and in the same order, as on the original disk. The Burst utilities transfer disk images between disk and diskette, magnetic tape, or another disk.

The Burst utilities run as stand-alone programs, without an operating system, and are faster than the comparable FDUMP/FLOAD or DDUMP/DLOAD programs. With the Burst utilities, you cannot choose to save or restore a particular directory or file; you back up or restore the whole disk in any operation.

In disk image copies, Burst restores blocks to the same addresses they had on the original disk. However, DLOAD and FLOAD reallocate blocks consecutively when restoring. Thus DLOAD and FLOAD can compact data that had been fragmented (files formed of noncontiguous blocks) on the original disk.

Disk Directories

Users commonly divide disks into a hierarchical organization of directories: primary and secondary partitions and subdirectories under RDOS and DG/RDOS; primary partitions and directories under DOS. The directories contain sets of files usually grouped by common functions or users, for example, a master directory containing system utilities, and an application directory containing programs and a database.

The utilities FDUMP/FLOAD, DDUMP/DLOAD, and IMOVE allow you to select directories for backup. In this way you can narrow the scope of a backup set to a few directories; for instance, those containing new or modified files.

For FDUMP/FLOAD, you choose a current directory; any subsequent activity with either program affects the current directory and *all subordinate directories*. You cannot include or exclude any subordinate directory from FDUMP or FLOAD activity. For instance, if you choose primary partition DP0 as the current directory, then the utility accesses all its subordinates. The effect in this case is similar to a disk image copy with Burst, differing insofar as FLOAD restores blocks contiguously.

DDUMP/DLOAD allow more selectivity than FDUMP/FLOAD. For DDUMP too you first choose a current directory for dumping. DDUMP then lets you choose whether to include in the dump *all or none* of the subordinate directories. DDUMP also lets you exclude permanent files, link files, and link resolution files from a backup set.

In sum, you cannot select individual files with FDUMP/FLOAD or DDUMP/DLOAD, though you can select classes of files (for example link files) with DDUMP/DLOAD.

IMOVE, on DESKTOP GENERATION systems, lets you choose directories *and individual files* for a dump or load operation. IMOVE takes filename arguments; the filenames can designate directories (.DR files) or single files. If you omit any filename argument, IMOVE acts on the current directory and all its subordinates, just as DDUMP and DLOAD do.

Estimating Storage Needs

Before starting a backup session, you may find it useful to estimate the number of magnetic tapes or diskettes you'll need. Many factors affect the capacity of media to store disk files: storage method (image or directory), number of files, or disk file type (random, sequential, contiguous). As a result, we can offer only broad guidelines.

In general, the Burst utilities can pack about 20 percent more data on a given medium than can FDUMP or DDUMP. The following tables reflect this differential. Tables 1-2 and 1-3 show approximate disk block capacities of magnetic tape when used with Burst and FDUMP, while Table 1-4 displays diskette capacities under Burst and DDUMP.

Magnetic tape units read and write data at low density, known as 800 bpi (bits per inch, also known as b/in.) and high density, 1600 bpi. The figures in Tables 1-2 and 1-3 show capacities for 800- and 1600-bpi tapes.

Table 1-2. Magnetic Tape Capacity with Burst Utilities

Tape Length (in feet)	Number of Disk Blocks *	
	(800 bpi)	(1600 bpi)
300	5,600	11,200
600	11,200	22,400
1,200	22,400	44,800
2,400	44,800	89,600

*Approximate figures.

Table 1-3. Magnetic Tape Capacity with FDUMP

Tape Length (in feet)	Number of Disk Blocks *	
	(800 bpi)	(1600 bpi)
300	4,480	8,960
600	8,960	17,920
1,200	17,920	35,840
2,400	35,840	71,680

*Approximate figures.

For IMOVE users on DESKTOP GENERATION systems, the cartridge tape offers 15.2 Mbytes of storage capacity.

Table 1-4 shows the approximate number of blocks available on each type of diskette for Burst and DDUMP. Note that the Burst programs and DDUMP consume about 32 blocks per diskette for overhead, so a model 6030 diskette with a 616 block capacity actually has about 580 blocks available for backup with Burst, and about 464 blocks available to DDUMP. IMOVE uses 16 blocks per diskette for overhead, so the model 6268 diskette with 720 blocks in capacity takes about 700 blocks in backup data.

Table 1-4. Diskette Blocks Available

Model	Type	System	Blocks Available *		
			Burst	DDUMP	IMOVE
6030	Single density, single sided	NOVA & ECLIPSE	580	464	-
6038	Single density, single sided	microNOVA	580	464	-
4514	Single density, double sided	NOVA & ECLIPSE	680	544	-
4513	Single density, double sided	S/20	680	544	-
6268	Single density, double sided	DESKTOP GENERATION	680	544	700
6096	Double density, double sided	S/20	2430	1944	-
6097	Double density, double sided	NOVA & ECLIPSE	2430	1944	-

*Approximate figures. Burst and DDUMP use about 32 blocks per diskette in overhead, and IMOVE uses 16 blocks per diskette.

Note that all these figures are estimates that favor giving you extra capacity rather than just the right amount. You're better off having extra formatted diskettes on hand so you won't run out in the middle of a dump.

Calculating Disk Usage

An important step in estimating storage needs is to determine the number of disk blocks in the prospective backup set, then to divide the number of disk blocks by blocks available on the backup medium.

If you're dumping an entire disk, as with Burst or options to FDUMP, DDUMP, or IMOVE, you can use the CLI command DISK to check disk usage. The DISK command returns the number of blocks used and remaining, in addition to the maximum number of blocks available for a contiguous file. The following example shows that a DESKTOP GENERATION model 6271 disk has 4505 used blocks:

```
R
GDIR ⤸
DE0
R
DISK ⤸
LEFT: 26599 USED: 4505 MAX. CONTIGUOUS: 26489
R
```

The 4505 used blocks on DE0 should fit on seven model 6268 diskettes. To find that figure, we divide 4505 by 680, the number of blocks available to YBURST on each diskette. See Table 1-4.

Note that the DISK command returns the usage statistics for the *current partition.* If the current directory is the primary partition, for example DP1 or DE0, then DISK reflects usage on the entire disk — likewise if the current directory is a subdirectory within the primary partition. But, if the current directory is a secondary partition, then DISK reflects usage only for that partition.

If you are using FDUMP, DDUMP, or IMOVE to save part of a disk, you can use the CLI command LIST to supplement or replace the DISK command. LIST returns file statistics, showing file size in bytes, which you can translate into blocks in order to compute the dump size. 512 bytes comprise a disk block. For example

```
R
LIST/E/A/S <CR>
LARGEFILE1  512000 D   01/06/84  13:32  01/06/84  [341143]
LARGEFILE2   51200 SD  12/13/83  14:53  12/28/83  [153444]
SMALLFILE1    3072 C   07/23/83  9:54   11/03/83  [213141]
R
```

First, add the file byte counts: 512000 + 51200 + 3072 = 566272.

Divide the byte total by 512, the number of bytes in a block: 566272 / 512 = 1106 blocks.

Finally, add 1 block for each file to be backed up: 1106 + 3 = 1109. The backup utilities use about one block per file in overhead, even for very small files.

You need 1109 blocks in storage capacity to dump these three files. For a magnetic tape dump, you could use one 300-foot tape at 800 bits per inch (bpi), as shown in Table 1-3. For a diskette dump, you could use three model 6030 diskettes or one model 6097 diskette, as shown in Table 1-4.

Planning a Backup Program

Your choice of a utility for backup depends upon your processor, operating system, and storage device — magnetic tape or diskette. In addition to those factors, other considerations can influence your choice — factors of storage capacity, storage method, or processing speed.

For example, if your system has both a diskette drive and a magnetic tape drive, you might choose a magnetic tape for backup because it holds more than a diskette. On the other hand, diskettes are small, and a dump set of diskettes might be easier to store in your workroom than a dump set of tapes.

If you have a diskette drive but not a magnetic tape drive, or vice versa, you still can choose between a Burst utility for disk image backup, and a Dump utility for directory backup.

We recommend that you plan a regular backup program of your disk media. Keep in mind that if you wait until you see signs of trouble, you're probably too late to back up. The same problem (a new bad block, for instance), that makes a file unreadable to you will make it unreadable to a backup utility. The backup programs can't save damaged files.

The best program you can plan would employ a combination of the backup utilities, taking advantage of their various features.

For example, you could use a Burst utility weekly to get a quick but complete disk image. You can supplement this with an FDUMP or DDUMP daily backup of heavily used or important directories. In the event of disk problems, you would first restore the Burst image, then selectively delete files or directories that have been modified, then use FLOAD or DLOAD to add the most recent version of those directories.

You can further refine a backup procedure by using the CLI commands DUMP and LOAD. These commands allow you to act on single files, directories, or groups of directories; to select files based on creation (or modification) date, to exclude files of a specified name, and to rename files. DUMP and LOAD work with both magnetic tape and diskette as well as other devices.

The CLI DUMP and LOAD commands have two disadvantages. First, they are slower than the backup utilities. Second, their operations are confined to the size of the dump medium: you can't extend a dump beyond one diskette or one magnetic tape.

Note that the CLI command MOVE also allows selection by creation date, and you can use it like DUMP and LOAD in a backup scheme.

To plan a backup scheme that is efficient as well as thorough, you need to weigh the various advantages of the different backup software and to judge the priority of your data.

Assume a weekly backup program that includes a Monday or Friday disk image dump with Burst, supplemented with daily incremental dumps, with the CLI DUMP command, of all files created or modified that day. If the disk is destroyed, you can restore it with the weekly Burst set, then bring it up to date with successive restores of each daily CLI DUMP.

Another procedure could include a monthly backup with Burst, a weekly backup with DDUMP or FDUMP of very important directories, and a daily backup of new files with the CLI DUMP command.

End of Chapter

Chapter 2
Magnetic Tape Backup with Burst Utilities

Table 2-1. Burst Utilities for Magnetic Tape

Utility	Media	microNOVA *DOS*	NOVA or ECLIPSE *DOS, RDOS*	ECLIPSE S/20 *RDOS*	DESKTOP GENERATION *DG/RDOS*
BURST	Disk image ◄—► tapes Disk image ◄—► disk		√		
YBURST	Disk image ◄—► tapes Disk image ◄—► disk			√	√
TBURST	Disk image ◄—► tapes Disk image ◄—► disk	√			
DBURST	Disk image ◄—► diskettes		√		
YDBURST	Disk image ◄—► diskettes			√	
MBURST	Disk image ◄—► diskettes	√			
FDUMP/ FLOAD	Disk directories ◄—► tapes	√	√	√	√
DDUMP/ DLOAD	Disk directories ◄—► diskettes	√	√	√	√
IMOVE *	Disk files, directories ◄—► diskettes Disk files, directories ◄—► tape ** Diskette files, directories ◄—► diskette				√

*IMOVE enables file move by diskette or tape between DG/RDOS and AOS, AOS/VS, MP/OS, MP/AOS and MP/AOS-SU.

**IMOVE confines magnetic tape read and write operations to a single tape.

The Magnetic Tape Burst Utilities

The utilities BURST, YBURST, and TBURST control the dump and load of disk images between disk and magnetic tape; they also handle the copying of disk images directly to another disk. As stand-alone programs that write and read disk images, BURST, YBURST, and TBURST offer quick backup and restore operations for whole disks.

The tape Burst utilities have additional features that allow you to create multiple reel backup sets, use two magnetic tape units in one session, and build self-contained backup sets for disk recovery.

Each of the three utilities is geared for a particular operating system and hardware combination, as shown in Table 2-1. BURST runs on NOVA and ECLIPSE DOS and RDOS sytems; YBURST runs on ECLIPSE S/20 RDOS and DESKTOP GENERATION DG/RDOS systems; and TBURST runs on microNOVA DOS systems. The tape Burst utilities accommodate all disk, diskette, and magnetic tape devices supported by their governing operating systems. The programs are stand-alone, require 32 Kwords of memory, and run unmapped.

BURST, YBURST, and TBURST are identical to each other in function, prompts, commands, and messages. In this chapter we cover the three programs together and refer to them as the tape Burst utilities, or simply as Burst.

This chapter covers the functions of the three utilities, invoking the utilities, their dialog, and error messages. The final section reproduces a sample dialog for each of the program commands.

Functions of BURST, YBURST, and TBURST

The tape Burst utilities primarily offer quick and efficient means to back up and restore disk images between tape and disk. The utilities each have four commands, and no switches. The commands are

- DUMP a disk image to magnetic tape(s)
- LOAD a disk image from magnetic tape(s) to disk
- VERIFY a magnetic tape dump to ensure that the dump is free of bad tape records
- DUPLICATE a disk image, copying it from one disk to another of the same type

NOTE: The TBURST utility has an additional command, OWNER. This acts identically to the OWNER utility for the other Burst programs. See Chapter 4 for documentation of the Owner facility.

The magnetic tape Burst utilities copy *disk images* to and from disk and magnetic tape. A disk image is an exact copy of the original disk, block by block. Burst's disk image carries a disk's MAP.DR, SYS.DR, and all files, as is. Consequently, you cannot selectively dump individual files or directories (partitions and subdirectories), and you cannot selectively restore directories or files from a Burst tape. Since they run stand-alone and copy images, the Burst programs run more quickly than the magnetic tape backup utilities FDUMP and FLOAD.

Because the Burst DUMP command writes disk images, the LOAD command restores the data in its original form, without compacting it. That is, any files with noncontiguous blocks on the original disk are written in the same noncontiguous pattern on the new disk.

When you invoke your Burst utility and issue a command, the program begins a dialog, asking you to name input and output devices. The program repeats the device names as a precaution, since the DUMP, LOAD and DUPLICATE operations overwrite existing data on the output device. Burst reports conditions and errors, and asks you whether or not to proceed when possible.

The next sections discuss considerations for input and output disks in Burst operations, and the functions and rules pertaining to magnetic tape use.

Using Disk

Whether you are using magnetic tape or disk as the output medium, disk is always the ultimate target of your backup set. That is, when you dump a disk image to a set of tapes, the final destination of the data on the tapes could be that disk or another disk. Certain rules govern the copying of disk images to disk, whether from tape (LOAD command) or disk (DUPLICATE command); these rules are enumerated below.

1. *The target disk must be of the same model as the original disk;* for example, two 6103 disks. When you LOAD a set of backup tapes from one disk to another, the disks must be of identical type. Similarly, the DUPLICATE function requires identical models.

   Note that on cartridge disks with fixed and removable platters (models 6045, 6070, and 6095), the fixed portion and the removable portion are identical to each other. Thus, you can DUPLICATE the fixed portion on its removable counterpart, and vice versa.

2. *The remap area size and starting location must be identical on both target and original disks* in a LOAD or DUPLICATE session. The remap area is the group of blocks set aside for block-by-block substitution of bad blocks. If you routinely take default values for remap areas when software formatting disks with DKINIT or DOSINIT, you can easily meet this requirement.

3. *Any bad blocks on an input or output disk must have been entered in its bad block table.* If the Burst program encounters a new bad block, it attempts to clear it; if it can't clear the error, the program halts. In this situation, Burst cites the address of the bad block; use the software formatting program (DKINIT for RDOS and DG/RDOS, DOSINIT for DOS) to enter the bad block address in the disk's table.

4. *The Burst utilities can read or write disks connected to a Burst Multiplexor Channel (BMC). But Burst cannot access disk by way of an Interprocessor Bus (IPB).*

Using Magnetic Tape

The functions and rules for the use of magnetic tape with the Burst utilities are detailed in the following sections.

Precautionary Steps

Most problems that occur with Burst can be traced to a dirty magnetic tape drive or to bad tapes. Before starting a tape operation, clean the read-write head of the unit. Use new or good quality tapes. When media problems occur, try different tapes.

Multiple Reels

The tape Burst programs allow you to dump to or load from a single tape reel or *multiple reels,* depending on the amount of data on the input disk. The program encodes a *sequence number* in the header of each tape; in a LOAD operation of a multiple reel series, the program reads the sequence numbers and warns you if you've mounted a tape out of sequence.

Alternating Magnetic Tape Units

If you have two magnetic tape drives on your system, you can use *alternating magnetic tape units* for multiple reel operations. With the DUMP, LOAD, or VERIFY commands, you can mount the first tape on one tape unit, the second tape on another. Upon finishing with the first tape (reaching the end-of-tape mark, EOT), the program rewinds it and prompts for the next tape on the alternate unit, and so on until the operation is complete.

Changing Tapes

In any multiple reel operation, including those with alternating units, Burst rewinds each tape when it's done, setting it back to the BOT (beginning-of-tape) mark. Burst then prompts for the next tape, asking you to enter RDY when you've mounted it. If you forget to change a tape after it is rewound, then enter RDY, Burst will overwrite or reload the tape. For this reason, you should monitor your operation carefully and change tapes as soon as Burst rewinds them.

Identifying Tapes

We recommend that you use gummed paper labels to identify any backup tape. You can mark the label with the backup date and time, input disk name, bits per inch (bpi), and, if it is part of a multiple reel set, the tape sequence number. In this way you can avoid mixing up tapes or losing valuable data.

Magnetic Tape Unit Restriction

Some magnetic tape controllers can carry up to eight units, but *Burst can access only units 0, 1, 2, and 3* of any magnetic tape controller.

Verifying Tape Readability

After finishing a DUMP operation, you should issue the VERIFY command to read each tape in the dump. If VERIFY reports bad records on a tape, you can restart the DUMP with a replacement tape.

Follow these steps to VERIFY your dump tapes:

1. Leave the original disk in its drive.
2. Issue the VERIFY command immediately after the DUMP completes.

Note that VERIFY does *not* compare the information on the tape to the information on the disk, but it ensures that the backup set is readable. We recommend that you always VERIFY tapes after a dump; the tape Burst utilities are more likely to detect bad tape records when reading than when writing. Use of VERIFY greatly improves your chances of loading a backup set without tape errors.

Disk Recovery with a Stand-Alone Backup Set

In anticipation of a disk crash or large-scale data loss (for example, destruction of master directory MAP.DR and SYS.DR), you can build a self-contained set of backup tapes, which would include the appropriate bootstrap and Burst programs in addition to the disk image.

That is, in the CLI environment you can use the CLI XFER command to write the system bootstrap, TBOOT.SV, to tape file 0 (MTn:0), and BURST.SV, YBURST.SV, or TBURST.SV to tape file 1 (MTn:1). Then use the Burst program to write the disk image, commencing with file 2 (MTn:2) of the first tape of the backup set.

When the Burst program asks you to name the magnetic tape unit, answer with the appropriate device name and file 2, for example MT0:2 or MT1:2. (Normally, you only identify tape units to Burst, not tape file numbers. For this feature, however, you do specify a tape file number, and it must be tape file 2.) When you specify file 2, the Burst program skips file 0 and 1 on the first tape. Once the disk image passes the end of the first tape reel, the Burst utility reverts to tape file 0 for dumping or loading subsequent tapes.

With a self-contained backup set, you can restore a disk by loading the tape boot program TBOOT from tape file 0, and directing TBOOT to read in the Burst program from tape file 1, then using Burst to restore the disk image from tape file 2. This is very useful if you have only one disk on your system — you won't need a working disk in order to restore a disk, and you can restore in a stand-alone environment.

Disk Recovery with a Release Tape and a Backup Set

To repair a damaged disk on a single disk system, the alternative to using a self-contained backup set is to follow some first-time load steps for your system, outlined as follows.

1. Load the starter operating system, BOOTSYS.SV, from file 2 of your release tape (MTn:2).
2. When the starter system asks FULL (F) OR PARTIAL (P OR <CR>)?, answer F to expedite a full initialization of the target disk. This is the equivalent of issuing INIT/F from the CLI, and gives the disk the DOS or RDOS file structure, as appropriate.
3. When the starter system CLI is running, boot the Burst program from file 6 of the release tape (MTn:6). When your Burst program is running, you can restore the backup tapes.

Running the Tape Burst Utilities

To run BURST, YBURST, or TBURST, you can use the CLI BOOT command to load the stand-alone program. At the CLI R prompt, issue the BOOT command with the name of the master disk and the utility; for example:

```
R
BOOT Dnn:BURST <CR>

MASTER DEVICE RELEASED

** DISK BACKUP/RESTORE - REV nn.nn **

COMMAND?
```

NOTE: On DG/RDOS systems, the CLI command line termination character is NEW LINE (↓). However, carriage return (<CR>) is the command line termination character for the DG/RDOS program YBURST, as it is for all the tape Burst programs on other systems.

As an alternative to using the CLI command BOOT to run the Burst utility, you can follow the program load procedure for your system and load Burst as you would your operating system. When the bootstrap program issues the FILENAME? query, enter the name of the appropriate tape Burst utility. For example:

```
FILENAME?   TBURST <CR>

** DISK BACKUP/RESTORE - REV nn.nn **

COMMAND?
```

When the Burst utility is running, it identifies itself and its revision number (represented here as nn.nn), and prompts you for the intended function, as follows.

```
** DISK BACKUP/RESTORE - REV nn.nn **

COMMAND?
```

Answer with the appropriate command followed by a carriage return. The commands are

- DUMP a disk image to magnetic tape(s)
- LOAD a disk image from magnetic tape(s) to disk
- VERIFY a magnetic tape dump to ensure that the dump is free of bad tape records
- DUPLICATE a disk image, copying it from one disk to another of the same type

In this discussion, we go through a DUMP command dialog to write a disk image to magnetic tape. Next we show variations in the dialog for the VERIFY, LOAD, and DUPLICATE functions.

DUMP Dialog

When you answer DUMP to the command query, the program next asks for the name of the disk you want to dump.

```
COMMAND?    DUMP <CR>

INPUT DISK UNIT?    DP0 <CR>
```

Respond with the appropriate unit name, such as DP0, DZ3, or DP2F. Refer to Appendix A for a list of disks and their unit names. The program then asks for the name of the output device, a magnetic tape unit in the case of the DUMP command.

```
MAGTAPE UNIT?    MT0 <CR>
```

Enter the name of the magnetic tape unit (for example MT0 or MT1) on which you want to dump the disk. The program then asks for the unit name of a second magnetic tape unit.

```
SECOND MAGTAPE UNIT (HIT RETURN FOR NONE)?    <CR>
```

If you intend to alternate magnetic tape units, enter the name of the second unit. If you are using a single tape unit, press <CR>. In any case, the dialog then states the devices and direction of the function, and gives you a chance to stop if you've made a mistake.

```
I AM ABOUT TO COPY DP0 TO MT0:0.
SHALL I CONTINUE? (TYPE "YES" TO PROCEED)    YES <CR>
```

If you have entered the proper unit names for both input and output devices, answer YES. If the device names are incorrect, press any other key; this forces the utility to restart at the COMMAND level, where you can reenter the function and the proper device names.

If you answer YES to the SHALL I CONTINUE question, the program prompts you to mount the first reel on the first magnetic tape unit, as follows.

```
MOUNT REEL # 1, ON MTn AND ENTER "RDY" WHEN READY.    RDY <CR>
```

After you mount your first tape and enter RDY, the program dumps to the tape. If the entire disk image fits on one tape, the program issues the message

```
*** DISK TO TAPE DUMP COMPLETE ***
```

and rewinds the tape. If, however, Burst reaches the end-of-tape mark before completing the disk image, it prompts you to mount another tape and rewinds the just-completed tape. The prompt is

```
MOUNT REEL # n ON MTn AND ENTER "RDY" WHEN READY.
```

When Burst finishes rewinding the tape, replace it with the next reel and enter RDY to continue the dump. The program continues to prompt for needed tapes until the image is copied. If you are dumping to alternate units, Burst asks you to mount the next tape on the next unit and enter RDY. Be sure to change tapes when they're rewound so that Burst won't overwrite a completed tape.

When the DUMP operation is done, the program issues the following message and halts.

```
*** DISK TO TAPE DUMP COMPLETE ***
```

VERIFY Dialog

The VERIFY dialog prompts for input magtape unit name(s) and the name of the "output" disk. Note that the VERIFY function does not produce output, nor compare the disk to the tape data. Answer with the original disk unit's name to the output disk question. VERIFY then reads each tape in the backup set to ensure that each record can be read correctly.

```
COMMAND?    VERIFY <CR>

MAGTAPE UNIT?    MT0 <CR>

SECOND MAGTAPE UNIT (TYPE RETURN FOR NONE)?    <CR>

OUTPUT DISK UNIT?    DZ0 <CR>

MOUNT DISK AND TYPE "RDY" TO CONTINUE.    RDY <CR>

*** VERIFYING DUMP ***
MOUNT REEL # 1 ON MT0 , ENTER "RDY" WHEN READY.    RDY <CR>

MOUNT REEL # 2 ON MT0 , ENTER "RDY" WHEN READY.    RDY <CR>

*** DUMP VERIFICATION COMPLETE ***
```

LOAD Dialog

The LOAD function asks the same questions as the DUMP dialog, but in a different order. Note that when loading, the program checks the tape header to make sure that you've mounted the correct reel in the series. Briefly, the questions and messages are

```
** DISK BACKUP/RESTORE - REV 7.30 **

COMMAND?    LOAD <CR>

MAGTAPE UNIT?    MT1 <CR>

SECOND MAGTAPE UNIT (TYPE RETURN FOR NONE)?    <CR>

OUTPUT DISK UNIT?    DP0 <CR>

I AM ABOUT TO COPY MT1:0 TO DP0.
SHALL I CONTINUE? (TYPE "YES" TO PROCEED)    YES <CR>

MOUNT REEL # 1 ON MT1 , ENTER "RDY" WHEN READY.    RDY <CR>

MOUNT REEL # 2 ON MT1 , ENTER "RDY" WHEN READY.    RDY <CR>

MOUNT REEL # 3 ON MT1 , ENTER "RDY" WHEN READY.    RDY <CR>

*** TAPE TO DISK RESTORE COMPLETE ***
```

DUPLICATE Dialog

The DUPLICATE command asks for the unit names of the input and output disks, presents the operation as you've directed, and asks whether or not to continue. DUPLICATE sends a message upon successful completion. For example:

```
COMMAND?    DUPLICATE <CR>

INPUT DISK UNIT?    DP1
OUTPUT DISK UNIT?    DP4

I AM ABOUT TO COPY DP1 TO DP4
SHALL I CONTINUE? (TYPE "YES" TO PROCEED)    YES <CR>

*** DISK DUPLICATION COMPLETE ***
```

Error Processing

When the Burst program encounters an error condition, it issues a message and does one of several things: stops altogether because Burst can't solve the problem (bad disk block); advises you to correct the problem (mistyped command or bad tape) and continue; or gives you the chance to halt or continue with the session.

The BURST, YBURST, and TBURST error messages are listed below in alphabetical order, with advice on corrective action.

DISK ERROR ON UNIT Dnn. BAD BLOCK = nnnnnn

When the tape Burst utility encounters a disk bad block that does not appear in the disk's bad block table, it attempts 20 times to clear the error. Failing that, the utility returns this message and halts. Note that this error can occur from an input disk (DUMP or DUPLICATE) or an output disk (LOAD or DUPLICATE).

To fix the problem, run DKINIT or DOSINIT and use the ENTER command to place this bad block address (nnnnnn) in the disk's bad block table. Until you do so, you can't use this disk with a Burst utility.

DISK FORMAT ERROR: REMAP AREA ON TARGET DISK DOES NOT MATCH REMAP AREA ON INPUT DEVICE. REMAP AREA SIZE MUST BE nnnnnn, REMAP START BLOCK MUST BE mmmmmm.

The remap area size (nnnnnn) and its starting location (mmmmmm) must be identical on both the target disk and the original disk when you use the LOAD or DUPLICATE command. To fix this problem, run the software formatting program DKINIT or DOSINIT and use the REMAP command to enter the remap area values that the Burst utility has cited. If you use DKINIT or DOSINIT default values when software formatting disk media, you aren't likely to encounter this error message.

ERROR - UNABLE TO INITIALIZE Dnn

This indicates an invalid file structure on your disk, that is, a non-DOS or non-RDOS file structure. The Burst program halts at this error. If the disk in question is your intended source, or original disk, then you cannot access it with an RDOS, DOS, or DG/RDOS Burst utility.

If this is the target disk of a DUPLICATE or LOAD operation, you can give the disk the appropriate file structure by issuing the INIT/F command from the CLI.

INVALID UNIT NAME

You have mistyped the unit name or entered an invalid device unit name. Retype the unit name.

MAGTAPE ERROR n:

This indicates a malfunctioning drive or media problem. Clean the read/write head of the magnetic tape unit, and/or use newer or better tapes.

MTn NOT READY - PLEASE MAKE IT READY!

You have left the tape unit powered off, failed to mount the tape, or left the unit off-line. Check that you have prepared the tape and unit correctly.

WARNING: Burst periodically checks if the unit is back on-line, and resumes processing when it finds the unit on-line, so be sure to keep your fingers out of the moving parts when Burst is active.

SYSTEM ERROR CODE nnnnnn

A media problem might provoke this error. Clean the tape unit read/write head, and/or use better tapes. If the problem persists, submit a Software Trouble Report (STR) to Data General Corporation, giving the code that the error displays. Try again with another revision or copy of the program, for example BURST.SV from your release tape.

THE FOLLOWING DISK BLOCKS COULD NOT BE RESTORED FROM TAPE:

BLOCK	*nnnnnn*	*BLOCK*	*nnnnnn*
BLOCK	*nnnnnn*	*BLOCK*	*nnnnnn*

.
.
.

SHALL I CONTINUE? (TYPE "YES" TO PROCEED)

The Burst LOAD or VERIFY function can't read some blocks on the tape, and Burst lists the blocks that it can't read. Note that because Burst handles data in groups of 16 blocks each, this error message lists a minimum of 16 blocks, and lists further blocks in groups of 16.

This situation results from bad tape records, which may be the fault of the tape itself or the hardware. First, clean the read-write head of the tape drive. If you are in VERIFY mode, we recommend that you restart the DUMP with fresh tapes. To abort the VERIFY action, enter characters other than YES, for example <CR>.

If you are using the LOAD function when this error occurs, enter YES to proceed. We recommend that you always continue a LOAD in spite of problems, then use Owner to identify damaged files. If you leave damaged files on disk, you could eventually cause a system panic. However, if you have a more reliable dump set from which to retrieve your data, then you could stop the LOAD function by entering, for example, <CR>.

If you enter YES to proceed with a LOAD, the program continues restoring the disk image from tape, but you will have lost some data. Later, using the OWNER or YOWNER program (the OWNER command for TBURST), you can find out to which files the lost blocks had belonged. Be sure to save the disk block numbers that the Burst utility displays for later input to Owner.

UNKNOWN COMMAND - COMMANDS ARE DUMP, DUPLICATE, LOAD, VERIFY

You have mistyped the command or entered an invalid command. Reenter your command.

WRITE ERROR OCCURRED ON MTn , REEL # x

This error indicates that the magnetic tape hardware can't write a portion of the tape.

If this error occurs in a DUMP operation on the *first* tape, Burst issues this error message and halts. The problem might be a faulty magnetic tape, so you could restart Burst and replace the suspect tape. If this fails, or if you suspect that the tape unit hardware is at fault, you can try another tape unit.

If the WRITE ERROR occurs in a DUMP operation on the second (or a later) tape, Burst invokes error recovery, asking for a new tape, as follows:

MOUNT NEW REEL # x, AND ENTER "RDY" WHEN READY.

Mount a replacement reel and enter RDY, and Burst restarts the dump where it had left off; Burst assigns to the replacement tape the same sequence number it had marked on the faulty tape. If you are using two units and the alternate unit is ready, Burst continues the dump on the alternate tape drive when you type RDY.

Once you enter RDY, Burst then shows the hardware status of the tape drive that resulted in the error as:

UNRECOVERABLE TAPE STATUS ERROR: STATUS= zzzzzz

Note that this message pertains to the original WRITE ERROR that occurred with the previous tape. See the DUMP example in the next section.

DUMP Command Example

The following example shows a multiple reel, alternating tape unit dump of a model 6160 disk. Burst experiences a WRITE ERROR on reel 2 and asks for another tape. When the new reel 2 is mounted, Burst identifies the tape status code of the original WRITE ERROR. Status code 106101 designates a parity error, which usually means the tape is faulty. The dump to the new reel 2 goes smoothly, then a WRITE ERROR occurs again on reel 3.

```
** DISK BACKUP/RESTORE - REV 7.30 **

COMMAND?   DUMP <CR>

INPUT DISK?   DZ0 <CR>

MAGTAPE UNIT?   MT0 <CR>

SECOND MAGTAPE UNIT (HIT RETURN FOR NONE)?   MT1 <CR>

I AM ABOUT TO COPY DZ0 TO MT0:0.
SHALL I CONTINUE? (TYPE "YES" TO PROCEED)   YES <CR>

MOUNT REEL # 1 ON MT0 , ENTER "RDY" WHEN READY.   RDY <CR>

MOUNT REEL # 2 ON MT1 , ENTER "RDY" WHEN READY.   RDY <CR>

WRITE ERROR OCCURRED ON MT1 , REEL # 2
MOUNT NEW REEL # 2 AND ENTER "RDY" WHEN READY.   RDY <CR>

UNRECOVERABLE TAPE STATUS ERROR: STATUS= 106101
MOUNT REEL # 3 ON MT1 , ENTER "RDY" WHEN READY.   RDY <CR>

WRITE ERROR OCCURRED ON MT1 , REEL # 3
MOUNT NEW REEL # 3 AND ENTER "RDY" WHEN READY.   RDY <CR>

UNRECOVERABLE TAPE STATUS ERROR: STATUS= 106101

*** DISK TO TAPE DUMP COMPLETE ***
```

VERIFY Command Example

This example shows an uneventful VERIFY operation using alternate tape dives. Burst finds no errors on the tapes and announces that the action is complete.

```
** DISK BACKUP/RESTORE - REV 7.30 **

COMMAND?   VERIFY <CR>

MAGTAPE UNIT?   MT0 <CR>:

SECOND MAGTAPE UNIT (TYPE RETURN FOR NONE)?   MT1 <CR>

OUTPUT DISK UNIT?   DZ0 <CR>

MOUNT DISK AND TYPE "RDY" TO CONTINUE.   RDY <CR>

*** VERIFYING DUMP ***
MOUNT REEL # 1 ON MT0 , ENTER "RDY" WHEN READY.   RDY <CR>

MOUNT REEL # 2 ON MT1 , ENTER "RDY" WHEN READY.   RDY <CR>

MOUNT REEL # 3 ON MT0 , ENTER "RDY" WHEN READY.   RDY <CR>

*** DUMP VERIFICATION COMPLETE ***
```

LOAD Command Example

The dialog below illustrates a multiple reel, alternating unit load of three Burst tapes to a model 6160 disk. On the second tape the program encounters blocks that it cannot read and restore to disk. The program reports the locations of the blocks as they were on the *original* disk. Citing these numbers, the user can run an Owner utility (see Chapter 4) to determine the files to which these blocks had belonged. Note that the user continues the LOAD operation despite the restore errors. If the user had chosen to abort the LOAD, then incomplete files could be left on the disk, causing future problems. Note also that Burst lists 16 blocks.

```
** DISK BACKUP/RESTORE - REV 7.30 **
COMMAND?    LOAD <CR>

MAGTAPE UNIT?    MT0 <CR>

SECOND MAGTAPE UNIT (TYPE RETURN FOR NONE)?    MT1 <CR>

OUTPUT DISK UNIT?    DZ0 <CR>:

I AM ABOUT TO COPY MT0:0 TO DZ0.
SHALL I CONTINUE? (TYPE "YES" TO PROCEED)    YES <CR>

MOUNT REEL # 1 ON MT0 , ENTER "RDY" WHEN READY.    RDY <CR>

MOUNT REEL # 2 ON MT1 , ENTER "RDY" WHEN READY.    RDY <CR>

THE FOLLOWING DISK BLOCKS CANNOT BE SUCCESSFULLY RECOVERED FROM TAPE:
        BLOCK 011411                BLOCK 011412
        BLOCK 011413                BLOCK 011414
        BLOCK 011415                BLOCK 011416
        BLOCK 011417                BLOCK 011420
        BLOCK 011421                BLOCK 011422
        BLOCK 011423                BLOCK 011424
        BLOCK 011425                BLOCK 011426
        BLOCK 011427                BLOCK 011430
SHALL I CONTINUE? (TYPE "YES" TO PROCEED)    YES <CR>

MOUNT REEL # 3 ON MT0 , ENTER "RDY" WHEN READY.    RDY <CR>

*** TAPE TO DISK RESTORE COMPLETE ***
```

DUPLICATE Command Example

This example shows a duplication of one disk to another of the same type. The DUPLICATE function asks whether or not to continue the operation as stated, performs the duplication, and signals that it is complete.

```
COMMAND?    DUPLICATE <CR>

INPUT DISK UNIT?    DP1
OUTPUT DISK UNIT?    DP1F

I AM ABOUT TO COPY DP1 TO DP1F
SHALL I CONTINUE? (TYPE "YES" TO PROCEED)    YES <CR>

*** DISK DUPLICATION COMPLETE ***
```

End of Chapter

Chapter 3
Diskette Backup with Burst Utilities

Table 3-1. Burst Utilities for Diskette

Utility	Media	microNOVA *DOS*	NOVA or ECLIPSE *DOS, RDOS*	ECLIPSE S/20 *RDOS*	DESKTOP GENERATION *DG/RDOS*
BURST	Disk image ◄—► tapes Disk image ◄—► disk		√		
YBURST	Disk image ◄—► tapes Disk image ◄—► disk			√	√
TBURST	Disk image ◄—► tapes Disk image ◄—► disk	√			
DBURST	Disk image ◄—► diskettes		√		
YDBURST	Disk image ◄—► diskettes			√	
MBURST	Disk image ◄—► diskettes	√			
FDUMP/ FLOAD	Disk directories ◄—► tapes	√	√	√	√
DDUMP/ DLOAD	Disk directories ◄—► diskettes	√	√	√	√
IMOVE *	Disk files, directories ◄—► diskettes Disk files, directories ◄—► tape ** Diskette files, directories ◄—► diskette				√

*IMOVE enables file move by diskette or tape between DG/RDOS and AOS, AOS/VS, MP/OS, MP/AOS and MP/AOS-SU.

**IMOVE confines magnetic tape read and write operations to a single tape.

The Diskette Burst Utilities

The utilities DBURST, YDBURST, and MBURST perform disk image to diskette backup. The DUMP and LOAD functions of the diskette Burst utilities can read and write all disk and diskette models supported by RDOS and DOS. The *verify* option ensures that diskettes are readable. The utilities write and read a *sequence number* on each diskette in a backup series to guarantee proper loading.

As shown in Table 3-1, DBURST runs on NOVA and ECLIPSE systems that use DOS or RDOS; YDBURST runs on the ECLIPSE S/20 running RDOS; and MBURST works on microNOVA DOS systems. The stand-alone programs require 32 Kwords of memory, and run unmapped.

The three utilities are equivalent in function, prompts, commands, and messages. In this chapter we cover them together and refer to them as the diskette Burst utilities, or simply as Burst.

NOTE: The MBURST program has an additional command, OWNER. This command performs identically to the OWNER utility for the other Burst programs. See Chapter 4 for documentation on the Owner operation.

This chapter discusses the function of the utilities, how to run them, their dialog, and their error messages. The final section shows sample dialogs illustrating the DUMP and LOAD commands.

Functions of DBURST, YDBURST, and MBURST

The diskette Burst utilities copy *disk images* to and from disks and diskettes. A disk image is an exact copy of the original, block by block. Burst's disk image carries MAP.DR, SYS.DR, and all files on the specified disk or diskette, as is. Consequently, you cannot selectively dump individual files or directories (partitions or subdirectories), and you cannot selectively restore directories or files from a Burst diskette. Since they run stand-alone and copy images, the Burst programs run more quickly than the diskette backup utilities DDUMP and DLOAD.

Because the Burst DUMP command writes disk images, the LOAD command restores the data in its original form, without compacting it. That is, any files with noncontiguous blocks on the original disk reappear in the same noncontiguous pattern on the new disk.

The diskettes you use for DUMP and the disks you use for LOAD must be prepared to receive the data. The considerations for using each medium are outlined below.

Using Diskettes

The diskettes you use to receive backup data must already be hardware- and software-formatted. You software format diskettes (and disks) with DOSINIT on DOS systems and DKINIT on RDOS systems. (DOSINIT is documented in *How to Generate Your DOS System;* DKINIT is documented in *How to Load and Generate RDOS.*) The final step in software formatting is full initialization with the CLI command INIT/F.

The formatting programs DOSINIT and DKINIT scan a disk or diskette for hard errors, also known as bad blocks. The formatter sets these blocks aside in a bad block table so the operating system will not use them.

NOTE: The Burst utilities do not accept any *single density* diskettes that show even a single bad block during formatting with DOSINIT or DKINIT. Thus, model 6030 diskettes on NOVA and ECLIPSE (except ECLIPSE S/20) systems, and model 6038 diskettes on microNOVA systems, must pass formatting without any bad blocks.

You complete software formatting with full initialization, using the INIT/F command under the CLI. INIT/F sets up the appropriate data structure, DOS or RDOS, on a diskette or disk. In the process, it destroys existing data on the diskette or disk; be certain you don't need the data on a diskette or disk when you initialize it fully.

For example, the command to fully initialize a diskette in drive DP0 is:

```
R
INIT/F DP0 <CR>
CONFIRM?  YES
R
```

Because the INIT/F command is so powerful, wiping out any existing data, it gives you a chance to stop the process. If you type any character but Y to the CONFIRM? query, the CLI issues a NO and cancels the INIT command. When you type Y, the CLI issues YES, performs the full initialization, and returns the R prompt.

You must perform an INIT/F on each new diskette you use for backup. We recommend you prepare more diskettes than you expect to use, giving you extra diskettes if others show errors during the backup operation.

We recommend that you mark each diskette in a backup series with the input disk name, the date, and the sequence number.

Using Disks

When you use the LOAD command to restore a diskette series to a disk, the target disk must meet the following requirements.

1. *The target disk must have an RDOS or DOS file structure,* as appropriate. Use the CLI command INIT/F to set up the correct file structure.
2. *The target disk must be the same model as the original disk,* the disk from which the diskette series was derived. For example, both must be model 6067 disks.

   Note that on cartridge disks with fixed and removable platters (models 6045, 6070, and 6095), the fixed portion and the removable portion are identical to each other. Thus, you can back up the fixed portion to its removable counterpart, and vice versa.
3. *The remap area size and starting location must be identical on both the target and the original disks.* The remap area is the group of blocks set aside by DOSINIT or DKINIT for block-by-block substitution of bad blocks. If you take default values for the remap area when formatting, you can meet this requirement easily.
4. *Any bad blocks on the target disk must be entered in the bad block table.* If the Burst program encounters an unregistered bad block during a LOAD, it prints the block's address then stops. You can use the ENTER command in DOSINIT or DKINIT to register the bad block, then restart the LOAD operation to the target disk.
5. *The diskette Burst utilities can read or write disks connected to a Burst Multiplexor Channel (BMC). But Burst cannot access a disk by way of an Interprocessor Bus (IPB).*

Running the Diskette Burst Utilities

You can invoke the Burst utility with the RDOS CLI command BOOT, naming the diskette or disk that contains BOOT.SV and the program save file: DBURST.SV, YDBURST.SV, or MBURST.SV. For example:

```
R
BOOT DP0:DBURST <CR>
MASTER DEVICE RELEASED
** DISK TO DISKETTE BACKUP/RESTORE - REV nn.nn **
COMMAND?
```

Burst, in this example DBURST, identifies itself and its revision number, shown here as nn.nn, and asks which of its commands you want to run. When you specify one of Burst's commands, DUMP or LOAD, the program initiates a dialog that lets you control the operation.

Note that neither the DUMP nor the LOAD function lists filenames as it acts upon them.

DUMP Command

With the DUMP function, you write an entire disk or diskette image to the object diskette(s). The Burst program reads the complete disk and backs up all blocks that contain data. You cannot specify particular directories or files.

```
COMMAND?   DUMP <CR>
INPUT DISK UNIT?   DP0 <CR>
DISKETTE UNIT?   DP1 <CR>
```

After you enter DUMP, Burst asks for the input unit, that is, the unit name of the disk or diskette you intend to back up. Then Burst asks for the unit name of the diskette drive to receive the data. See Appendix A for a list of disk and diskette unit names.

```
I AM ABOUT TO COPY DP0 TO DP1
SHALL I CONTINUE? (TYPE "YES" TO PROCEED).   YES <CR>
```

The Burst program restates the source and destination of the DUMP operation and gives you a chance to stop it. This is important because the DUMP destroys all existing data on the object diskettes. To continue the DUMP, type YES. To stop the DUMP, type any other character, and Burst reverts to COMMAND level, letting you start over.

If you type YES, the program prompts you to install the first diskette in the drive:

```
LOAD DISKETTE # 1. ENTER "RDY" WHEN READY.   RDY <CR>
```

When you give Burst the RDY signal, it starts the dump operation. The utility repeats this message, incrementing the diskette number, when it completes writing to a diskette. You can attach a label to each object diskette naming the date, source disk or diskette name, and the sequence number of this diskette within the dump set.

If Burst detects a data error while writing a diskette, you receive the message:

```
WRITE ERROR OCCURRED ON DISKETTE #n.
LOAD NEW DISKETTE #n. ENTER "RDY" WHEN READY.
```

The Burst program can rescue the series by rewriting the data for just this one bad diskette in the backup set. When you get this message, replace the label and insert a different diskette and type RDY. Burst then rewrites the data for this particular diskette.

We recommend that you software format any diskette that manifests a write error during Burst.

When Burst completes writing the source disk or diskette to the backup diskette series, it issues the message:

```
DO YOU WISH TO VERIFY YOUR DUMP (ENTER "YES" TO PROCEED)   YES <CR>
```

The optional verification step consists of Burst reading each of the dump diskettes to detect media errors. Although verification takes some time, we recommend this step because Burst is more likely to find media errors on reads than writes. Note that you can only verify the diskettes immediately after the DUMP completes.

If you don't choose to verify the series, enter any characters but YES and Burst issues the message:

```
*** DISK TO DISKETTE DUMP COMPLETE ***
```

If you type YES, Burst verifies the integrity of each of the backup diskettes in turn. After verifying a diskette, the program prompts you to insert the next diskette with the message:

```
LOAD DISKETTE #n. ENTER "RDY" WHEN READY.
```

After verifying the final diskette in the backup series, Burst sends the message:

```
*** DISKETTE VERIFICATION COMPLETE ***
```

If Burst detects an error while verifying (or loading) a diskette, it sends the message

```
WRITE FAILURE ON DISKETTE UNIT
BLOCK nnnnn CANNOT BE RESTORED ON HARD DISK
```

When this error occurs while you're verifying, you can take several actions. You can restart the DUMP operation, replacing this diskette with a fresh diskette. This action is reasonable if the error shows up early in the set, or if the data is particularly important. Alternatively, you can take a note of the block number (nnnnn) and identify its file owner later with the Owner facility. Then you can dump that file with another facility, for example the CLI command DUMP (for copying single files as opposed to directories or disk images). This second option is reasonable if the error occurs late in a many-diskette series — for example, on the twentieth diskette — and you don't want to restart the DUMP.

LOAD Command

The LOAD command allows you to restore data from your backup diskettes to disk or diskette.

Before Burst begins to load data, it checks the sequence number of the first and each successive diskette in the backup series to make sure that the correct diskette is in place. If you insert a diskette out of sequence, the Burst program issues an error message and asks you to insert the correct diskette.

The LOAD dialog begins

```
COMMAND?    LOAD <CR>
INPUT DISKETTE UNIT?    DP1 <CR>
OUTPUT DISK UNIT?    DP0 <CR>

I AM ABOUT TO COPY DP1 TO DP0.
SHALL I CONTINUE? (TYPE "YES" TO PROCEED)    YES <CR>
```

Burst restates the direction of the restore operation, giving you a chance to stop. Any data currently on the output unit, in this example DP0, will be destroyed during the LOAD. If you have entered the correct disk and diskette unit names, type YES; otherwise, type another character, and Burst returns to COMMAND level. If you type YES, Burst directs

```
LOAD DISKETTE # 1. ENTER "RDY" WHEN READY.    RDY <CR>
```

Insert the first diskette and type RDY to begin the restore. When the utility completes the restore of data on that diskette, it repeats this prompt, incrementing the sequence number by one. After you have inserted all the diskettes in the series and Burst has completed the restore, it issues the message:

```
*** DISKETTE TO DISK RESTORE COMPLETE ***
```

If, during the loading process, Burst doesn't restore certain blocks on the disk, compile a list of these block numbers and use the OWNER or YOWNER program (the OWNER command in MBURST) to determine which files are lost. The Owner operation is documented in Chapter 4.

Error Processing

When the Burst utility encounters an error condition, it issues a message and does one of several things: stops altogether because Burst can't solve the problem (bad disk block); advises you to correct the problem and continue (mistyped command or diskette out of sequence); or gives you the chance to halt or continue with the session.

Burst error messages are listed below in alphabetical order, with advice to remedy the problems.

DISK ERROR ON UNIT DXN.
BLOCK nnnnn CANNOT BE RESTORED ON HARD DISK

The Burst program can't read one of the blocks on the diskette and can't restore it to disk. Keep note of the block number (nnnnn) in order to find its filename with the Owner operation.

DISK ERROR ON UNIT DXN. BAD BLOCK = nnnnn

The target disk has a bad block (a hard error). Use the ENTER command in the disk formatting program DOSINIT or DKINIT to enter the block's address (nnnnn) into the bad block table. Then you can dump or load the disk with Burst.

DISK FORMAT ERROR: REMAP AREA ON TARGET DISK DOES NOT MATCH
REMAP AREA ON INPUT DEVICE. REMAP AREA SIZE MUST BE nnnnnn.
REMAP START BLOCK MUST BE mmmmmm.

The remap area size (nnnnnn) and its starting location mmmmmm) must be identical on both the target disk and the original disk when you use the LOAD function. To fix this problem, run the software formatting program DKINIT or DOSINIT and use the REMAP command to enter the remap area values that the Burst program has given. If you use DKINIT's default values when software formatting, you are not likely to have this problem.

DISKETTE HAS WRONG SEQUENCE NUMBER # y
LOAD DISKETTE # x, ENTER "RDY" WHEN READY.

You have inserted a diskette out of sequence. The Burst program identifies the number of the inserted diskette and the number of the one it expects. Insert the correct diskette and enter RDY.

DISKETTE WRITE PROTECTED. ATTACH WRITE TAB AND
ENTER "RDY" WHEN READY.

The program cannot write (DUMP) to the diskette while it is write-protected. Enable the diskette for writing and enter RDY.

NOTE: On model 6030, 6038, 6096, and 6097 diskettes, having the tab *off* establishes the write-protected condition.

On model 4513, 4514, and 6268 diskettes, having the tab *on* establishes the write-protected condition.

ERROR - UNABLE TO INITIALIZE DPn

This indicates an invalid file structure on the disk, one that is not a DOS or RDOS file structure. If you intend to DUMP this disk, you cannot do so with a Burst utility. If the disk is the target disk of a LOAD operation, you can give it the proper file structure by issuing the INIT/F command from the CLI.

INVALID UNIT NAME

You have entered the name of a disk unit that is not supported by RDOS or DOS. Retype the proper unit name.

SYSTEM ERROR CODE xxxxxx

The Burst program is faulty. Submit a Software Trouble Report (STR) to Data General Corporation. Try another version or copy of the program.

UNKNOWN COMMAND - COMMANDS ARE DUMP AND LOAD

You have mistyped or entered an invalid command. Retype the command.

WRITE ERROR OCCURRED ON DISKETTE # x

The Burst utility cannot write to this diskette. Replace the diskette in the drive with a new one and enter RDY; the DUMP rewrites the sequence number and continues on the new diskette. To repair the diskette that has shown the error, use DKINIT or DOSINIT FULL command for software formatting. (The diskette Burst utility cannot use any single density diskette that manifests a bad block in DKINIT or DOSINIT.)

NOTE: If this write error occurs on the *first diskette* in a sequence, restart the Burst program from the beginning rather than continuing as specified above.

WRITE FAILURE ON DISKETTE UNIT
BLOCK nnnnn CANNOT BE RESTORED ON HARD DISK

Burst returns this error in a VERIFY or LOAD operation when it can't read a block on the diskette. If you are using the LOAD operation, we suggest that you continue the load, then use the Owner facility to identify the name of the file that lost block nnnnn.

Be sure to keep a list of block numbers that Burst can't restore; you enter these block numbers later to the Owner facility. Once you identify the name of the damaged file, you can delete it or restore it from another dump set. If you leave damaged files on disk, you could eventually cause a system panic.

When this error occurs while you're verifying, you can choose one of two actions. You can restart the DUMP operation, replacing this diskette with a fresh diskette. This action is reasonable if the error shows up early in the set, or if the data is particularly important. Alternatively, you can take a note of the block number (nnnnn) and identify its file owner later with the Owner facility. Then you can dump that file with another facility, for example the CLI command DUMP (for copying single files as opposed to directories or disk images). This second option is reasonable if the error occurs late in a many-diskette series — for example, on the twentieth diskette — and you don't want to restart the DUMP.

DUMP Dialog Example

The following example shows a four-diskette dump of a model 6045 disk (DP0) to a model 6030 diskette drive (DP1). Burst encounters a write error on diskette 2 and asks for a replacement diskette. The user inserts a new diskette and the DUMP rewrites diskette 2 and continues. The user chooses to verify the four diskettes after the DUMP is complete.

***DISK TO DISKETTE BACKUP/RESTORE - REV. 7.30 ***

COMMAND? DUMP <CR>

INPUT DISK UNIT? DP0 <CR>

DISKETTE UNIT? DP1 <CR>

I AM ABOUT TO COPY DP0 TO DP1.
SHALL I CONTINUE? (TYPE "YES TO PROCEED) YES <CR>

LOAD DISKETTE # 1, ENTER "RDY" WHEN READY. RDY <CR>

LOAD DISKETTE # 2, ENTER "RDY" WHEN READY. RDY <CR>

WRITE ERROR OCCURRED ON DISKETTE # 2.
LOAD NEW DISKETTE # 2, ENTER "RDY" WHEN READY. RDY <CR>

LOAD DISKETTE # 3, ENTER "RDY" WHEN READY. RDY <CR>

```
LOAD DISKETTE # 4, ENTER "RDY" WHEN READY.    RDY <CR>
DO YOU WISH TO VERIFY YOUR DUMP? (TYPE "YES" TO PROCEED)    YES <CR>
LOAD DISKETTE # 1, ENTER "RDY" WHEN READY.    RDY <CR>
LOAD DISKETTE # 2, ENTER "RDY" WHEN READY.    RDY <CR>
LOAD DISKETTE # 3, ENTER "RDY" WHEN READY.    RDY <CR>
LOAD DISKETTE # 4, ENTER "RDY" WHEN READY.    RDY <CR>
*** DISK TO DISKETTE DUMP COMPLETE ***
```

LOAD Dialog Example

The following example reverses the process of the DUMP example, showing the uneventful restore of four model 6030 diskettes (DP1) to the model 6045 disk (DP0). Note that LOAD has no trouble reading either diskette 2 or any of the diskettes, a likely result of the verify step.

```
** DISK TO DISKETTE DISK BACKUP/RESTORE - REV. 7.30 **
COMMAND?    LOAD <CR>
DISKETTE UNIT?    DP1 <CR>
OUTPUT DISK UNIT?    DP0 <CR>
I AM TO COPY DP1 TO DP0.
SHALL I CONTINUE? (TYPE "YES" TO PROCEED)    YES <CR>
LOAD DISKETTE # 1, ENTER "RDY" WHEN READY.    RDY <CR>
LOAD DISKETTE # 2, ENTER "RDY" WHEN READY.    RDY <CR>
LOAD DISKETTE # 3, ENTER "RDY" WHEN READY.    RDY <CR>
LOAD DISKETTE # 4, ENTER "RDY" WHEN READY.    RDY <CR>
*** DISKETTE TO DISK RESTORE COMPLETE ***
```

End of Chapter

Chapter 4
Owner Recovery for Burst Utilities

Table 4-1. Owner Utilities

Utility	Media	microNOVA *DOS*	NOVA or ECLIPSE *DOS, RDOS*	ECLIPSE S/20 *RDOS*	DESKTOP GENERATION *DG/RDOS*
OWNER	Disk	*	√		
YOWNER	Disk			√	√

*On microNOVA DOS systems, the Owner function is handled by the OWNER command in TBURST and MBURST.

The Owner Facility

The stand-alone programs OWNER and YOWNER help you to identify files that lost some blocks during a restore operation with the Burst utilities. Whether you use a magnetic tape Burst utility (BURST or YBURST) or a diskette Burst utility (DBURST or YDBURST), you can use Owner to trace the ownership of lost blocks.

The OWNER program runs on NOVA and ECLIPSE DOS and RDOS systems, while the YOWNER program runs on the ECLIPSE S/20 and DESKTOP GENERATION systems, as shown in Table 4-1. The OWNER and YOWNER programs are identical and are covered together in this chapter.

For microNOVA DOS users, the Owner facility's function is handled by the OWNER command in either TBURST or MBURST. The OWNER command is identical to the OWNER (and YOWNER) program. We refer to the OWNER and YOWNER programs and the OWNER command together as the Owner facility. Follow the directions in this chapter to use the Owner facility from TBURST or MBURST.

This chapter discusses Owner's functions, dialog, and error messages, and concludes with a sample dialog.

Functions of Owner

The Owner facility does not actually recover lost blocks, it simply identifies the path and filename of the file to which the lost blocks had belonged.

For instance, when the LOAD function of a Burst utility cannot restore a block because of, say, a magnetic tape error, it reports the block number, in octal format. The block number alone is not helpful to you in assessing which newly restored file is imperfect. If you keep a record of the number reported by LOAD, you can later feed it to Owner, which identifies the name of the file to which the lost block had belonged. You can then try to rebuild the file or restore it from another backup set.

Running the Owner Facility

To run OWNER or YOWNER, load the program as you would any stand-alone program, either with the CLI BOOT command or through the program load procedure for your system. To run it when you boot your system, answer OWNER or YOWNER to the program load FILENAME? query. When you invoke the OWNER program from the CLI, for example, the dialog looks this way:

```
R
BOOT Dnn:OWNER <CR>
MASTER DEVICE RELEASED
** DISK BLOCK OWNER - REV nn.nn **

COMMAND?   OWNER <CR>
```

The corresponding BOOT command on the ECLIPSE S/20 and DESKTOP GENERATION systems is BOOT Dnn:YOWNER.

NOTE: On DG/RDOS systems, the CLI command termination character is NEW LINE (↓). However, carriage return (<CR>) is the command line termination character for the DG/RDOS program YOWNER, as it is for the Burst and Owner utilities on other systems.

To use the OWNER command in TBURST or MBURST, enter OWNER to the COMMAND query. The resulting dialog is identical to that of the OWNER and YOWNER programs.

Owner Dialog

When you run the OWNER or YOWNER program, it identifies itself and its revision number, shown here as nn.nn, and asks for your command. Both OWNER and YOWNER have one command, OWNER, just as the TBURST or MBURST command for the same function is OWNER.

```
** DISK BLOCK OWNER - REV nn.nn **

COMMAND?   OWNER <CR>
INPUT DISK UNIT?
```

After you enter the OWNER command, the program asks for the unit name of the disk to which the lost blocks had belonged. Note that you can enter the name of the original disk, from which the backup came, or the target disk, the one from which blocks were lost during the restore. In either case, the disk in question must be on-line when you access the Owner facility.

First, enter the unit name of the disk; Appendix A lists unit names. Then Owner asks for the block numbers of the blocks you're tracking. Enter the octal block number that was reported by Burst. You can omit the leading zeros in a number; for example, 000334 becomes 334.

```
INPUT DISK UNIT?   DP1 <CR>

BLOCK NUMBER (TYPE RETURN TO STOP)?   334 <CR>

BLOCK NUMBER (TYPE RETURN TO STOP)?   657 <CR>

BLOCK NUMBER (TYPE RETURN TO STOP)?   662 <CR>

BLOCK NUMBER (TYPE RETURN TO STOP)?   <CR>
```

After you enter the disk unit name, Owner asks you to enter the octal block numbers. Owner repeats this question 16 times or until you enter a <CR> without a preceding number. The Burst utilities report lost blocks in groups of 16, and Owner accepts up to 16 in one session.

In this example, we enter three block numbers. Owner then searches the disk and returns the pathnames of the files with missing blocks.

```
BLOCK NUMBER 00000000334 IS CLAIMED BY FILE DP0:1PART.DR:WORDS.LB
BLOCK NUMBER 00000000657 IS CLAIMED BY FILE DP0:ASUB.DR:NAMES.SV
BLOCK NUMBER 00000000662 IS CLAIMED BY FILE DE0:ASUB.DR:NAMES.SV

*** ALL MATCHES REPORTED ***
```

Error Processing

Owner issues a message when it comes upon an error condition, and either stops if it can't solve the problem, or lets you correct the problem. Below we list the error messages alphabetically, with advice on how to deal with the problems.

BLOCK LIST IS FULL

You have entered more than 16 block numbers. The program ignores the seventeenth entry and processes the 16 entries in its block list.

DIRECTORY DEPTH EXCEEDED

The directory structure on the specified disk does not conform to the standard DOS or RDOS (DG/RDOS) directory structure. You cannot use Owner to search this disk.

**** ERROR - INVALID UNIT NAME ****

You have mistyped the unit name or entered one that is not supported by your operating system. Reenter the correct disk unit name.

ILLEGAL DISK BLOCK NUMBER

You have entered a block address that is past the capacity of the disk, or you have included an illegal digit (one greater than 7) in the block number. Enter the correct block number.

SYSTEM ERROR CODE xxxxxx

There is something wrong with the Owner facility. Submit a Software Trouble Report (STR) to Data General Corporation, including the error code named (xxxxx). Try a different revision or copy of OWNER.SV or YOWNER.SV (or TBURST.SV. or MBURST.SV, as appropriate).

UNKNOWN COMMAND - COMMAND IS OWNER

You have mistyped or entered an invalid command; the only command for Owner is OWNER. Retype the command.

Owner Example

The following dialog shows a search of input disk DZ0 for three lost blocks. Note that Owner finds two of the blocks in the same file.

```
** DISK BLOCK OWNER - REV 7.30 **

COMMAND?    OWNER <CR>

INPUT DISK UNIT?    DZ0 <CR>

BLOCK NUMBER (TYPE RETURN TO STOP)?    111437 <CR>

BLOCK NUMBER (TYPE RETURN TO STOP)?    111440 <CR>

BLOCK NUMBER (TYPE RETURN TO STOP)?    111441 <CR>

BLOCK NUMBER (TYPE RETURN TO STOP)?    <CR>

BLOCK NUMBER 00000111437 IS CLAIMED BY FILE DZ0:CUSTPAR.DR:ACCTS.LB
BLOCK NUMBER 00000111440 IS CLAIMED BY FILE DZ0:CUSTPAR.DR:ACCTS.LB
BLOCK NUMBER 00000111441 IS CLAIMED BY FILE DZ0:TEMP.DR:T.DR:USYS.LB

*** ALL MATCHES REPORTED ***
```

End of Chapter

Chapter 5
Magnetic Tape Backup with FDUMP/FLOAD

Table 5-1. FDUMP/FLOAD for Magnetic Tape Backup

Utility	Media	microNOVA *DOS*	NOVA or ECLIPSE *DOS, RDOS*	ECLIPSE S/20 *RDOS*	DESKTOP GENERATION *DG/RDOS*
BURST	Disk image ◄—► tapes Disk image ◄—► disk		√		
YBURST	Disk image ◄—► tapes Disk image ◄—► disk			√	√
TBURST	Disk image ◄—► tapes Disk image ◄—► disk	√			
DBURST	Disk image ◄—► diskettes		√		
YDBURST	Disk image ◄—► diskettes			√	
MBURST	Disk image ◄—► diskettes	√			
FDUMP/ FLOAD	**Disk directories ◄—► tapes**	√	√	√	√
DDUMP/ DLOAD	Disk directories ◄—► diskettes	√	√	√	√
IMOVE *	Disk files, directories ◄—► diskettes Disk files, directories ◄—► tape ** Diskette files, directories ◄—► diskette				√

*IMOVE enables file move by diskette or tape between DG/RDOS and AOS, AOS/VS, MP/OS, MP/AOS and MP/AOS-SU.

**IMOVE confines magnetic tape read and write operations to a single tape.

Functions of FDUMP/FLOAD

FDUMP and FLOAD are complementary utilities that control the copying of disk directories to and from magnetic tape. FDUMP writes the current directory and all its subdirectories to a specified magnetic tape file, while FLOAD restores the directories. The two utilities can handle multiple reel backup sets, and can access alternating magnetic tape units on systems with two units.

The FDUMP/FLOAD programs run on all processors supported by RDOS, DOS, and DG/RDOS, as shown in Table 5-1, and can access all disks and magnetic tape units of the three operating systems. Note that the program versions included with your system are built for your particular hardware configuration, for example a mapped NOVA processor, and are incompatible with other processors. For instance, you can't run a mapped NOVA FDUMP on an unmapped NOVA processor or a mapped ECLIPSE processor.

FDUMP and FLOAD are utilities of the operating system that you invoke with the CLI commands FDUMP and FLOAD. The two utilities are often called fast-dump and fast-load because they work faster than the CLI commands DUMP and LOAD. FDUMP/FLOAD are incompatible with DUMP and LOAD, and you cannot mix FDUMP and DUMP files on a tape, nor can you load DUMP tapes with FLOAD.

This chapter covers protocol for dealing with disk directories and magnetic tape, FDUMP and FLOAD commands and examples, and error processing for the two utilities.

Preparing to Use FDUMP/FLOAD

Before using FDUMP or FLOAD, you need to choose which directories to back up with FDUMP, and to position yourself correctly in a directory structure for a restore operation with FLOAD. You also need to designate magnetic tape file numbers. The following sections cover rules and methods for accessing disk and magnetic tape in FDUMP/FLOAD.

Disk Protocol

Whereas the Burst utilities operate on entire disks, in the form of disk images, FDUMP and FLOAD let you copy particular disk directories: the current directory and its subordinates, if any.

You can restore FDUMP tapes from one type of disk model to another disk model.

FDUMP saves all permanent (those with the P attribute) and nonpermanent files in the current directory. However, FDUMP does *not* save read-protected files (those with the R attribute).

FLOAD does not restore any file from tape that has the same name as an existing file in the current directory — the one to which you're restoring. Though the two files may be different, or the file on tape may be from a different directory, FLOAD won't restore the file, and tells you so with a message. If you want to restore the tape file, delete or rename the disk file first.

You cannot select individual files from directories with FDUMP or FLOAD.

To select the current directory, use the CLI command DIR and specify the directory you want to dump. Keep in mind that all directories under the current directory are part of the current directory and are therefore included in any FDUMP/FLOAD operation. You needn't initialize directories under the current directory for FDUMP/FLOAD. For example, to select the secondary partition CUBIT.DR and its subdirectories, move to CUBIT this way:

```
R
DIR CUBIT <CR>
R
```

Similarly, if you name as current directory the primary partition (also called master directory) of a disk, then the FDUMP/FLOAD operation copies the entire disk. For instance, if you

name DP1 as the current directory, then its secondary partitions and subdirectories are included in the dump or load.

Restore operations with FLOAD must take place on the same or a higher level of the directory structure from which the FDUMP originated. That is, if the FDUMP current directory was a secondary partition, then the FLOAD current directory must be a secondary or primary partition. Dumps of a subdirectory can be loaded on any directory level. Dumps of a primary partiton can only be loaded to a primary partition.

For instance, if an FDUMP set comprises a primary partition and lower directories, then the restore with FLOAD must take place with a primary partition as current directory; otherwise, FLOAD aborts the operation with the error message

DIRECTORY DEPTH EXCEEDED

Before starting FDUMP or FLOAD, you can orient yourself with the GDIR command, which returns the name of the current directory, thus:

```
R
GDIR <CR>
CUBIT
R
```

To use the utilities, be sure that the FDUMP and FLOAD program files reside in the current directory, or that links in the current directory point to the files. The files are FDUMP.SV and FLOAD.SV.

Magnetic Tape Protocol

The magnetic tape utilities consolidate disk files into a single file on tape. You designate tape files with the convention MTn:x, where n is the number of the magnetic tape unit and x is the tape file number.

Tape file access is easier with FLOAD if you dump only to file 0 (MTn:0) with FDUMP. However, you can stack backup sets on a single tape by dumping to every third tape file. FDUMP writes four tape files per dump operation, as follows:

MTn:0	20 word header
MTn:1	FDUMP data in records of 2048 words
MTn:2	20 word trailer
MTn:3	20 word trailer

When you stack a second dump on a tape, FDUMP overwrites the second trailer in tape file 3 with the header for the second dump. Thus you can write multiple dumps on a tape by specifying tape file 0, 3, 6, 9, and so on. When retrieving the backup sets with FLOAD, use the same tape file designations.

Note that when you use the local switch /A to name an alternating magnetic tape unit, you must specify tape file 0.

You need not initialize the magnetic tape unit (or units) before issuing an FDUMP or FLOAD command. Both utilities automatically initialize and release (INIT and RELEASE) the tape unit you name in the command. However, if you've already initialized the unit before invoking FDUMP or FLOAD, then the program does *not* release it at the end.

FDUMP writes a reel number at the beginning of each tape in a backup set, which FLOAD subsequently reads. If you mount a reel out of sequence, FLOAD advises you to mount the correct reel.

We recommend that you use gummed paper labels to identify any backup tape. You can mark the label with the backup date and time, input disk name, bits per inch (bpi), and, if it is part of a multiple reel set, the tape sequence number. In this way you can avoid mixing up tapes or losing valuable data.

Precautionary Steps

Problems that occur with FDUMP and FLOAD can often be traced to a dirty magnetic tape drive or to bad tapes. Before starting a tape operation, clean the read/write head of the unit. When dumping, use new or good quality tapes. When media problems occur, try different tapes.

Using FDUMP

The FDUMP utility writes the current directory and its subordinate directories to magnetic tape. The program prompts for successive reels of magnetic tape until it completes the dumping of the current directory. Optionally, the program can write to two alternating magnetic tape units, also prompting for new reels as needed.

The FDUMP Command

Switches to the FDUMP command let you specify an alternate magnetic tape drive, and select an output device to receive a list of the dumped filenames. Table 5-2 defines FDUMP switches. The format of the command is as follows:

FDUMP *[/global switch]* MTn:x *[argument/local switch]*

The magnetic tape argument (MTn:x) is required; n designates the magnetic tape unit number, and x the tape file number. Global and local switches are optional.

Table 5-2. FDUMP Switches

Global Switch	Operation
/L	List dumped filenames on line printer (overrides /V).
/V	List dumped filenames on terminal display.
Local Switch	
MTn:0/A	Continue dump on tape file 0 on alternate drive n when tape on first drive is filled.
filename/L	List names of dumped files in filename (overrides global /L and /V).

We recommend that you use one of the switches to get a listing of dumped filenames. Combined with paper labels you put on the tape reels, the listing makes a useful record of your backup.

Whenever FDUMP finishes writing to a reel, and the dump is not complete, the program rewinds the reel to the BOT (beginning-of-tape) mark, and prompts for the next reel, whether for that unit or an alternating unit. When you signal that the next tape is mounted, FDUMP continues. If you've left the original tape on the unit at BOT and on-line, FDUMP will overwrite it. For this reason, be sure to dismount tapes as soon as they're rewound, especially when you're using alternate units.

The prompt message is

MOUNT NEXT REEL, STRIKE KEY WHEN READY

FDUMP accepts any keystroke (including <CR> or NEW LINE) as a signal that the next reel is mounted. This makes it especially important that you change tapes as soon as they're rewound, since you could mistakenly type ahead.

NOTE: DG/RDOS users, the NEW LINE key is the command termination character under the CLI. On other systems, the command termination character is usually carriage return (<CR>), but can be NEW LINE with some terminals.

FDUMP Example

The following command sequence shows the dump of partition EXPERT and its subdirectories onto two alternating magnetic tape drives. The /V switch returns the filenames to the terminal display as the program dumps them. Note that FDUMP identifies the directory (EXPERT) then lists the filenames; FDUMP also highlights the link file GROVER.SV with the symbol *L. FDUMP uses two tapes and returns to the CLI when complete.

```
R
GDIR <CR>
DZO
R
DIR EXPERT <CR>
R
FDUMP/V MTO:0 MT1:0/A EXPERTS.FS/L <CR>
DISK TO TAPE DUMP
        EXPERT
  /       ANGIE       JONATHAN        SARAHNELL   *L  GROVER.SV
  /       BECCA       SHANA           JOANNE          STEVEN
MOUNT NEXT REEL, STRIKE KEY WHEN READY
.
.
.
R
```

We cover error messages at the end of this chapter in the "FDUMP/FLOAD Error Processing" section.

Using FLOAD

The FLOAD utility restores FDUMP data from magnetic tape to the current directory. FLOAD retains the disk file structure (primary and secondary partitions, and subdirectories) as it was dumped to tape, loading the current directory and its subordinates. FLOAD does not overwrite any existing files on disk; in fact, the program will not restore a file from tape if it has the same name as a disk file in the same directory.

The FLOAD Command

The format of the FLOAD command is

FLOAD *[/global switch]* MTn:x *[argument/local switch]*

The magnetic tape argument (MTn:x) is required; n designates the magnetic tape unit number, and x the tape file number. You must specify the tape file number, for example 0, 3, or 6, of the FDUMP backup set you wish to restore. See the preceding section, "Magnetic Tape Protocol," for more information.

FLOAD's global and local switches are optional. The switches, listed in Table 5-3, allow you to list names of files as they're loaded, and to list the filenames on FDUMP tapes *without* loading them. This latter feature is especially useful if you have no record of files on FDUMP tapes and need to identify them.

Table 5-3. FLOAD Switches

Global Switch	Operation
/L	List loaded filenames on line printer (overrides /V).
/V	List loaded filenames on terminal display.
/N	List filenames but *do not load* any files. Used alone, lists files on terminal display. Used with global /L, lists files on line printer.
Local Switch	
MTn:0/A	Continue load from tape file 0 on alternate drive n when tape on first drive is loaded.
filename/L	List names of loaded files in filename (overrides global /L).

When FLOAD reaches the end of a tape, it rewinds it and prompts you to load another with the message

```
MOUNT NEXT REEL. STRIKE KEY WHEN READY
```

You cannot FLOAD an FDUMP set that contains a primary partition into a lower current directory. That is, if you have dumped an entire disk, your current directory for the FLOAD operation must be a primary partition, for instance DP1.

FLOAD Examples

The following example shows the command sequence to check the filenames on an FDUMP set without loading them.

```
R
FLOAD/N MT0:0 <CR>
TAPE TO DISK RESTORE
        MIDEAST
/         REDSEA     NILE          CASPIAN       GULF
/         TIGRIS     EUPHRATES     JORDAN
R
```

The next example shows a two-reel restore, with filename output going to the line printer. Note that we use the DIR command to designate a current directory to receive the load.

```
R
DIR FORTY <CR>
R
FLOAD/L MT1:0 <CR>
TAPE TO DISK RESTORE

MOUNT NEXT REEL. STRIKE KEY WHEN READY    <CR>

R
```

FDUMP/FLOAD Error Processing

FDUMP and FLOAD return error messages when they come across conditions that require your intervention, and conditions from which they can't recover — for example, a new bad block on a disk.

The error conditions include system error returns, usually denoted as SYS ERR RETN in the message. These conditions cause the program to output the message, then abort. Control returns to the CLI, which displays an additional message describing the error.

Below we list the error messages in alphabetical order, offering advice on what caused the problem and what you should do.

xxxxx CAN'T OPEN- ERR CODE nnnnn

FDUMP can't open the file xxxxx. FDUMP doesn't dump this file, but continues the dump at the next file.

ERR CODE nnnnn RETURNED FROM MTDIO CALL.

The trouble probably lies in the magnetic tape unit or tape. Clean the unit's read/write head, and/or use new or better tapes.

xxxxxx FILE ALREADY EXISTS- NOT LOADED.

FLOAD reports that a file with the same name (xxxxxx) already exists on disk on the same directory level. If you want to restore the tape file, first delete the disk file.

INVALID COMMAND STRING

The CLI command string you entered contains an error, for example a nonexistent command. Enter the correct command string.

xxxxxx IS READ-LOCKED-- NOT DUMPED.

The file xxxxxx has the R attribute, meaning that you can't read or copy it. This is not an error, but merely an informational message.

MTn NOT READY- MAKE IT READY!

You have left the tape unit power off, failed to mount the tape, or left the unit off-line. Prepare the tape and unit correctly, and the program continues when it finds the unit on-line.

RECORD COUNT DOES NOT AGREE WITH TAPE TRAILER!

At the end of each tape, FDUMP writes a trailer label that contains the number of tape blocks written. FLOAD keeps a parallel count and compares its own and the original when it finishes reading a tape. This error message shows that the counts do not agree. The most likely cause is a dirty or malfunctioning magnetic tape unit. Clean the unit or try another drive.

STATUS nnnnn RETURNED FROM MTDIO CALL.

Something is wrong with the magnetic tape unit or the tape. Clean the unit's read/write head, and/or use new or better tapes.

SYS ERR RETN: OFFSET: nnnnn IN FD

FDUMP can't access or release a directory. There is something wrong with the input disk; for example, an unregistered bad block or a hardware problem. You probably can't back up this disk.

SYS ERR RETN- OFFSET: nnnnn IN FR

FLOAD can't create a disk directory or file on the target disk. The target disk might have an unentered bad block or some other problem. Reformat the target disk with DKINIT or DOSINIT, or use another disk.

SYS ERR RETN- OFFSET: nnnnn IN GPSUB

The program has a problem communicating with the console or producing a list file. Submit a Software Trouble Report (STR) to Data General Corporation.

SYS ERR RETN- OFFSET: nnnnn IN MTIO

The program has encounterd a problem in controlling tape input/output (I/O). Clean the tape unit's read/write head, and/or use new or better tapes. If these steps fail, submit a Software Trouble Report (STR) to Data General Corporation.

TAPE HAS WRONG REEL NO.

FLOAD finds that you've mounted a tape out of sequence. Mount the correct reel and the program continues.

TAPE WRITE PROTECTED. INSERT RING AND STRIKE ANY KEY.

You have not inserted a write-enable ring in the reel when using FDUMP. Insert a ring, press a key, and FDUMP continues.

UNRECOVERABLE TAPE ERROR WHILE RESTORING FILE-
xxxxxx. POSITIONING TO NEXT READABLE FILE.

FLOAD has encountered an unrecoverable tape error while reading a block of a data file. FLOAD closes the file xxxxxx on disk as it is restored so far, though the file might be incomplete. FLOAD then positions the tape forward to the next file that it can read (if any). When FLOAD recommences the restore at the readable file, it sends the message

yyyyyy IS WHERE CONTINUING

yyyyyy identifies the first readable file where the load continues.

To determine which files you have lost, you can refer to an original listing from FDUMP, or use FLOAD/N to generate a new list.

UNRECOVERABLE TAPE ERROR AFTER LAST NAME DISPLAYED.

FLOAD cannot read a file header, and so cannot restore the file. FLOAD moves forward to the next readable file. To identify the lost file, refer to the FDUMP listing or use FLOAD/N to generate a new list.

UNRECOV. TAPE ERR. RDING DUMP HDR__ REPOS. TO NEXT RDABLE FILE.

FLOAD can't read the header at the beginning of the dump. Since FLOAD uses the header only for display, the restore can proceed successfully if the rest of the tape is readable.

End of Chapter

Chapter 6
Diskette Backup with DDUMP/DLOAD

Table 6-1. DDUMP/DLOAD for Diskette Backup

Utility	Media	microNOVA *DOS*	NOVA or ECLIPSE *DOS, RDOS*	ECLIPSE S/20 *RDOS*	DESKTOP GENERATION *DG/RDOS*
BURST	Disk image ◄—► tapes Disk image ◄—► disk		√		
YBURST	Disk image ◄—► tapes Disk image ◄—► disk			√	√
TBURST	Disk image ◄—► tapes Disk image ◄—► disk	√			
DBURST	Disk image ◄—► diskettes		√		
YDBURST	Disk image ◄—► diskettes			√	
MBURST	Disk image ◄—► diskettes	√			
FDUMP/ FLOAD	Disk directories ◄—► tapes	√	√	√	√
DDUMP/ DLOAD	**Disk directories ◄—► diskettes**	√	√	√	√
IMOVE *	Disk files, directories ◄—► diskettes Disk files, directories ◄—► tape ** Diskette files, directories ◄—► diskette				√

*IMOVE enables file move by diskette or tape between DG/RDOS and AOS, AOS/VS, MP/OS, MP/AOS and MP/AOS-SU.

**MOVE confines magnetic tape read and write operations to a single tape.

DDUMP/DLOAD Diskette Backup

The DDUMP and DLOAD utilities allow you to back up and restore disk directories by way of diskettes. DDUMP writes directories onto one or a series of diskettes, while DLOAD handles the corresponding restore of data from the diskettes to disk. The two programs keep track of the number of diskettes used by assigning and reading a sequence number at the beginning of each diskette.

DDUMP and DLOAD run on all processors supported by DOS, RDOS, and DG/RDOS, as shown in Table 6-1, and can access all disk and diskette units of the three operating systems. The programs are system utilities that you call with the CLI commands DDUMP and DLOAD.

This chapter covers DDUMP/DLOAD functions, use, dialog, messages, examples, and error processing.

Functions of DDUMP/DLOAD

With DDUMP you can dump individually any primary or secondary partition, or any subdirectory. DDUMP allows you to select or exclude permanent files (those with the P attribute), directories subordinate to that which you're dumping, or link and link resolution files.

The utility does not dump read-protected files (files with the R attribute), or files currently in use (those with a use count greater than 0).

DLOAD reads all of the diskettes in a DDUMP backup series and lists its contents or writes the data to the current directory. DLOAD compacts the data it loads; the program it restores all data into a contiguous area on the destination disk. The compacting of data fixes any fragmentation problems of heavily used disk media.

Before it begins a restore, DLOAD reads the sequence number written by DDUMP on each diskette. DDUMP also writes a date and time on each diskette in a backup series, thus giving DLOAD another criterion to check. If you insert a series diskette out of sequence or insert one with the wrong date and time (different from the others in the series), DLOAD issues a message and prompts for the correct diskette.

We recommend that you mark each DDUMP diskette with the backup date and time, the input directory, and the diskette sequence number. In this way you can avoid mixing up diskettes or mistakenly overwriting them.

DLOAD optionally allows you to list names of dumped files only, without loading them. This choice is useful if you don't have a DDUMP listing of the files on the diskettes.

Another option of DLOAD lets you exclude link files from the restore. Otherwise, DLOAD restores exactly what's on the diskettes, with the exception of disk files with the same names as those on diskette. You cannot overwrite a disk file with an identically named diskette file; you must delete the unwanted disk file before starting the restore. You cannot restore individual files from the dump, nor can you rename files as you restore.

You select the directory to copy to diskette by making it the current directory with the CLI command DIR. For example, you can make subdirectory SUBDIRABC current and dump its files alone. Or you can make a primary partition (for example DE0) current, and dump the entire disk or diskette by using a switch or selecting an option in the DDUMP dialog.

To use the utilities, be sure that the DDUMP and DLOAD program files reside in the current directory, or that links in the current directory point to the files. The files are

DDUMP.SV

DDUMP.OL

DDUMP.ER

DLOAD.SV

DLOAD.OL

Note that DDUMP.ER serves as the error message file for both DDUMP and DLOAD.

Diskettes you write to with DDUMP must be hardware and software formatted.

If you use a diskette that already contains data, DDUMP does not overwrite the data. DDUMP appropriates the largest area of contiguous, unused blocks on a diskette, groups them in a file it calls DDUMPFILE, and writes the dump to that file. Thus you can mix regular files and a DDUMPFILE on one diskette. For a backup that extends over one diskette, however, we recommend that you devote entire diskettes to the dump.

DDUMP has a special feature that performs the INIT/F function on each diskette in a series. INIT/F, or full initialization, is the last step in software formatting a disk or diskette; the command sets up an appropriate file structure (DOS, RDOS, or DG/RDOS) on the disk medium. INIT/F obliterates existing data on the disk or diskette, so be sure you're ready to overwrite the data when issuing INIT/F. If you perform INIT/F on a diskette containing data, then you'll regain all blocks for the dump.

Because you're likely to need many diskettes for a DDUMP operation, DDUMP's INIT/F feature is very convenient in initializing a batch of diskettes. Note that no harm is done if you exercise INIT/F more than once in succession on a disk or diskette. For instance, if you have a fully initialized diskette mixed in with a batch of uninitialized diskettes, you can still use DDUMP's general INIT/F function.

When you run DDUMP or DLOAD, the program asks a series of questions that define the operation. Alternatively, you can use switches to DDUMP or DLOAD that correspond to dialog questions. Note that if you pre-define the operation by using some switches, the program doesn't ask any questions.

DDUMP and DLOAD accept only uppercase input.

Neither program requires you to terminate your dialog answers with <CR> (or NEW LINE in the case of DESKTOP GENERATION users). Upon receiving a Y or N, the program echoes YES or NO and proceeds to the next item. However, when DDUMP or DLOAD asks you to LOAD DISKETTE n AND ENTER "RDY" WHEN READY, you must enter RDY and press <CR> (or NEW LINE).

Using DDUMP

The format of the DDUMP command is this:

DDUMP*[/switches]* Dnn

The Dnn argument identifies the diskette unit name of the diskette to receive the dump. See Appendix A for a list of disk and diskette unit names. The switches are optional; if you don't use any switches, DDUMP asks all the dialog questions; if you use one or more switches, DDUMP skips all the questions.

Before calling DDUMP, use the CLI DIR command to select the directory you want to back up. For example, to dump the directory VIRGIL:

```
R
DIR VIRGIL <CR>
R
DDUMP DP1 <CR>
** DISK TO DISKETTE BACKUP - REV. nn.nn **
```

DP1 is the unit name of the diskette drive to receive the data from VIRGIL. When invoked, DDUMP displays a banner that includes its revision (REV.) number, represented by nn.nn in this example.

NOTE: For DESKTOP GENERATION users, the command line termination character is NEW LINE; the termination character on other systems is usually carriage return (<CR>), depending on what terminal you have.

DDUMP asks a series of questions that lets you expand the scope of the dump. Each of the questions corresponds to one of the DDUMP switches. Refer to Table 6-2 for DDUMP switches. If you invoke DDUMP with any switches, then it doesn't ask any dialog questions.

Table 6-2. DDUMP Switches

Switch	Meaning
/A	Include permanent files in dump.
/C	Check (verify) dumped files.
/D	Include directories subordinate to the current directory.
/F	Include link resolution files in dump (use with /K).
/I	Perform INIT/F on each diskette.
/K	Include link files in dump.
/L	List on line printer the names of files dumped (overrides /V).
/V	List on display screen the names of files dumped.

We discuss the DDUMP questions in turn below.

DO YOU WANT THE DEFAULT FOR ALL QUESTIONS (["Y"] OR "N") ? NO

Y for YES, shown in brackets (*[]*) in this question, is the default for this question and selects the default values for each of the remaining parameters. If you answer yes, DDUMP asks no further questions. In the questions, DDUMP always shows the default answer in brackets, and you select it by typing the default answer or <CR> (NEW LINE under DG/RDOS).

DO YOU WANT TO DUMP PERMANENT FILES (["Y"] OR "N") ? YES

This question allows you to include or exclude permanent files for your dump of this directory (and its subordinate directories, if you choose to dump them too).

Permanent files are those with the P attribute, which you set with the CLI command CHATR. You can inspect the attributes of a file with the CLI command LIST/E.

DO YOU WANT TO DUMP DIRECTORIES/PARTITIONS (["Y"] OR "N") ? YES

With this question you can choose to dump all or none of the directories (secondary partitions and subdirectories) that are subordinate to the current directory — the one you are backing up.

If you choose N, only the files in the current directory are written to the diskettes.

DO YOU WANT TO DUMP LINK FILES (["Y"] OR "N") ? NO

Type Y to include link files in your dump, and N to omit them. In the restore cycle with DLOAD, you can choose not to restore the link files that were dumped.

You would want to exclude link files from your dump if you are preparing to transfer the directory to another system, where the directory layout is likely to be different. In addition, if you're storing data for archives, link files would be unnecessary. In any case, link files take up diskette space that might better be devoted to data.

If you answer Y to the question on link files, DDUMP asks this question:

DO YOU WANT TO DUMP LINK RESOLUTION FILES "Y" or ["N"] NO

If you answer N to this question, only the link is dumped, not its resolution file. A resolution file is the target file of a link. If you want to dump link resolution files, note the following two conditions:

1. Link resolution files cannot be directory (.DR) files.
2. The directories in which the link resolution files exist must be initialized with the CLI INIT command before you start DDUMP.

```
SELECT LISTING OPTION: ("0"=NONE, ["1"=CONSOLE], "2"=LPT)    1
```

With this question you can choose to obtain a list of all the files dumped as DDUMP writes them, either returned on your screen or printed on the line printer; or you can choose not to have a list. In this example we choose 1 to see the list on the screen. Note that if you answer 2 though you don't have a printer, you could cause an error.

If you do not have a printer, and you want to keep a record of files in the dump, you can list to a disk file. Before running DDUMP, create a link with the CLI command, for example:

```
R
LINK $LPT DISKFILE <CR>
R
```

Then, if you select the LPT option by answering 2, DDUMP writes the list to a file in the current directory called DISKFILE. You can then rename the file to identify the dump specifically; for example, 13OCT.DU.

```
DO YOU WANT TO 'INIT/F' THE DISKETTES (["Y"] OR "N") ?    YES
```

If you answer Y to this question, DDUMP saves you some steps by performing the INIT/F function on each diskette in the series. As explained earlier in the "Functions of DDUMP/DLOAD" section, INIT/F is a CLI command that completes the disk or diskette software formatting process by preparing the medium with the appropriate data structure.

INIT/F also erases any existing data on the diskette, so this option gives a quick way to empty a diskette for DDUMP. DDUMP itself does not overwrite existing data.

```
DO YOU WANT TO VERIFY YOUR DUMP (["Y"] OR "N") ?    YES
```

This question controls DDUMP's verify phase, which reads each diskette in search of media problems (for example, bad blocks on the diskette) or hardware problems (for example, faulty head alignment on the drive). DDUMP does not detect such problems while it is writing. We recommend that you take advantage of DDUMP's verification ability.

If you answer Y to this question, DDUMP verifies each diskette immediately after it completes writing to that diskette. Answer N if you do not want the backup verified.

When errors manifest themselves during a verification, DDUMP informs you of the quantity of blocks lost. DDUMP also gives you the option of either continuing with the dump operation on the next diskette or restarting the write operation for this particular diskette sequence on a fresh diskette.

The verification query is the last of the questions that DDUMP asks in order to set the parameters of the operation. The program then displays

```
LOAD DISKETTE # 1 AND ENTER "RDY" WHEN READY.    RDY <CR>
```

DDUMP signals you to insert the first backup diskette and start the dump. The utility repeats this message, incrementing the diskette number for each subsequent diskette it needs.

As the dump proceeds to multiple diskettes, you can label each diskette externally with the date, source directory, and sequence number.

DDUMP Messages

When running, DDUMP can encounter circumstances that need your intervention. When this happens, DDUMP issues a message describing the situation; we list these messages below in alphabetical order, offering advice on what you should do.

The "DDUMP/DLOAD Error Processing" section at the end of the chapter lists error messages for both programs.

A TOTAL OF nn BLOCKS COULD NOT BE READ FROM THIS DISKETTE
DO YOU WANT TO REPEAT THIS DISKETTE (["Y"] OR "N") ?

During its verify phase, DDUMP finds an error (or several) and gives you the chance to continue or to rewrite the diskette. If you answer N to this question, DDUMP signals you to load the next diskette. If you answer Y, DDUMP invokes the WRITE ERROR message, explained below.

DISKETTE IS WRITE-PROTECTED
REMOVE WRITE TAB AND ENTER "RDY" WHEN READY.

DDUMP tells you that a write-protect tab is in place on this diskette. The dump will not proceed until you remove the tab and enter RDY.

THE LINK FILE xxxxx.xx HAS NO RESOLUTION FILE

DDUMP cannot find the resolution file for the link named. You can make a note to check this later.

WRITE ERROR OCCURRED ON DISKETTE # nn
LOAD NEW DISKETTE # nn AND ENTER "RDY" WHEN READY.

DDUMP experienced a media or hardware error while writing and informs you that this diskette is not reliable. When you insert another diskette and enter RDY, DDUMP restarts the dump at the point it had reached at the start of the bad diskette. Thus, you will not lose an entire dump if one diskette is defective. We recommend that you reformat (software format, or hardware and software format) any diskettes that fail DDUMP.

DDUMP Example

The following example shows a dump of primary partition DP1 that includes permanent files, a directory, and a link file. The user directs that each diskette be processed with INIT/F in order to create room for the dump data. The user also chooses to verify the dump.

DDUMP lists each file as it dumps it. The program denotes the link file DBASE.01 with the symbol *L. DDUMP also identifies the directory LIBRARY.DR with an arrow (<------ DIRECTORY), and indents the list of files in that directory.

Note that when DDUMP experiences write errors, it asks for a replacement diskette. When DDUMP's verify phase can't read blocks, it gives the user the chance to repeat writing the diskette, or to continue.

On diskette 3, DDUMP does not list any filenames because it is still dumping URDOSC.LB. On the replacement diskette 4, DDUMP repeats the filenames it had listed for the rejected diskette 4.

When complete, DDUMP returns to the CLI.

```
R
DDUMP DP1 <CR>

DISK TO DISKETTE DUMP - REV 7.30 **

DO YOU WANT THE DEFAULTS FOR ALL QUESTIONS (["Y"] OR "N") ?    NO

DO YOU WANT TO DUMP PERMANENT FILES (["Y"] OR "N")?    YES

DO YOU WANT TO DUMP DIRECTORIES/PARTITIONS (["Y"] OR "N")?    YES
```

```
DO YOU WANT TO DUMP LINK FILES (["Y"] OR "N")?    YES
DO YOU WANT TO DUMP LINK RESOLUTION FILES "Y" OR ["N"]    NO
SELECT LISTING OPTION: ("0"=NONE, ["1"=CONSOLE], "2"=LPT)    1
DO YOU WANT TO 'INIT/F' THE DISKETTES (["Y"] OR "N")?    YES
DO YOU WANT TO VERIFY THE DUMP (["Y"] OR "N")?    YES
LOAD DISKETTE # 1 AND ENTER "RDY" WHEN READY.    RDY <CR>

  DDUMP.SV
  DLOAD.SV
  DDUMP.ER
  DBASE.01                          *L
  IDEB.RB
  BURST.SV
  LIBRARY.DR                        <------ DIRECTORY
      URDOSA.LB
      URDOSB.LB
      URDOSC.LB

*** VERIFYING DISKETTE ***

*** DISKETTE VERIFICATION COMPLETE ***

LOAD DISKETTE # 2 AND ENTER "RDY" WHEN READY.    RDY <CR>

WRITE ERROR OCCURRED ON DISKETTE # 2
LOAD NEW DISKETTE # 2, AND ENTER "RDY" WHEN READY.    RDY <CR>

*** VERIFYING DISKETTE ***

*** DISKETTE VERIFICATION COMPLETE ***

LOAD DISKETTE # 3 AND ENTER "RDY" WHEN READY.    RDY <CR>

*** VERIFYING DISKETTE ***

A TOTAL OF 3 BLOCKS COULD NOT BE READ ON THIS DISKETTE.
DO YOU WANT TO REPEAT THIS DISKETTE (["Y"] OR "N")?    YES

*** VERIFYING DISKETTE ***

*** DISKETTE VERIFICATION COMPLETE ***

LOAD DISKETTE # 4 AND ENTER "RDY" WHEN READY.    RDY <CR>

        URDOS.LS
        URDOSI.LB
WRITE ERROR OCCURRED ON DISKETTE # 4
LOAD NEW DISKETTE # 4, AND ENTER "RDY" WHEN READY.    RDY <CR>

      URDOS.LS
      URDOSI.LB
*** VERIFYING DISKETTE ***

*** DISKETTE VERIFICATION COMPLETE ***
```

```
LOAD DISKETTE # 5 AND ENTER "RDY" WHEN READY.          RDY <CR>
      DOSC.LB
      DOSO.LB
      DOSI.LB
      DPARS.SR
      DBURST.SV
      MBURST.SV
      SYS.LB
      SYS.SV
*** VERIFYING DISKETTE ***

*** DISKETTE VERIFICATION COMPLETE ***

LOAD DISKETTE # 6 AND ENTER "RDY" WHEN READY.    RDY <CR>
  SYS.OL
  SEDIT.SV
  DSKED.SV
  *** VERIFYING DISKETTE ***

A TOTAL OF 2 BLOCKS COULD NOT BE READ ON THIS DISKETTE.
DO YOU WANT TO REPEAT THIS DISKETTE (["Y"] OR "N")?   YES
  SYS.OL
  SEDIT.SV
  DSKED.SV
*** VERIFYING DISKETTE ***

*** DISKETTE VERIFICATION COMPLETE ***

** DISK TO DISKETTE DUMP COMPLETE **

R
```

Using DLOAD

The DLOAD command format is as follows:

DLOAD*[/switches]* Dnn

Dnn signifies the diskette unit from which you wish DLOAD to restore data. See Appendix A for a list of disk and diskette unit names. You can use switches, listed in Table 6-3, to define the operation when you invoke the utility; the switches replace questions and answers in DLOAD dialog.

Table 6-3. DLOAD Switches

Switch	Meaning
/F	List files that are on this diskette only.
/K	Load link files.
/L	List on line printer the names of files loaded (overrides /V).
/N	Do not load files (use with /L or /V).
/V	List on display screen the names of files loaded.

As with DDUMP, DLOAD allows you to list but not copy files (/F or /L), and to include or exclude link files from the copy (/K). But DLOAD doesn't allow you to include or exclude permanent files or subdirectories; DLOAD restores all files on the diskettes, excepting files that have the same name as files in the target disk current directory.

Before calling DLOAD, use the CLI command DIR to select the current directory, the directory to which you want to restore. For example, to restore a backup series to primary partition DP0, use these commands:

```
R
DIR DP0 <CR>
R
DLOAD DP1 <CR>
** DISKETTE TO DISK RESTORE - REV. nn.nn **
```

With this sequence, the DIR command makes DP0 the current directory, and the DLOAD DP1 command invokes the utility and directs it to read the diskette inserted in drive DP1. DLOAD responds with a banner and its revision (REV.) number, represented here by nn.nn. DLOAD then asks its questions in order to define the restore operation. Below we discuss the questions in turn.

```
DO YOU WANT THE DEFAULTS FOR ALL QUESTIONS (["Y"] OR "N") ?    NO
```

Y for YES, shown in brackets ([]), is the default for this question and selects the default values for each of the DLOAD parameters. DLOAD brackets the default in each of its questions, and you select the default by typing it explicitly, or entering just <CR> (or NEW LINE under DG/RDOS). If you answer Y, or enter <CR>, DLOAD asks no further questions.

```
DO YOU WANT TO LOAD THE FILES (["Y"] OR "N") ?    YES
```

This question lets you control whether to write the files to the target directory, or simply to list the files contained on the diskettes. If you answer Y for restore, DLOAD asks you to insert the first diskette.

If you answer N, DLOAD assumes a list operation only, and asks the question:

```
LIST THE FILES FOR THE ENTIRE SEQUENCE (["Y"] OR "N") ?
```

YES to this question allows you to list the files contained on each diskette in the backup series; NO produces a list of files contained on this diskette only (DLOAD does not check the sequence number of this diskette).

```
DO YOU WANT TO LOAD LINK FILES (["Y"] OR "N") ?    NO
```

Type Y to restore link files that are on the diskettes, or type N to exclude link files.

```
SELECT LISTING OPTION "0"=NONE, ["1"=CONSOLE], "2"=LPT    1
```

Answer 0 if you do not want a listing of the dumped files; 1 to list the files on your display screen; and 2 to direct the file listing to the line printer.

After asking these questions to set up its parameters, DLOAD prompts you to insert the first diskette and start the operation.

```
LOAD DISKETTE # 1 AND ENTER "RDY" WHEN READY.    RDY <CR>
```

DLOAD repeats this message for each subsequent diskette it needs, incrementing the diskette number appropriately.

DLOAD Messages

When running, DLOAD can encounter circumstances that need your intervention. When this happens, DLOAD issues a message describing the situation; we list these messages below in alphabetical order, offering advice on what to do.

The "DDUMP/DLOAD Error Processing" section at the end of the chapter lists error messages for both programs.

BLOCK # xxxxx OF FILE yyyyy.yy COULD NOT BE RESTORED PROPERLY
THE ENTIRE BLOCK HAS BEEN CONVERTED TO ZEROS

DLOAD identifies a block that it can not restore. DLOAD fills the corresponding block in the restored disk file with zeros. You can delete the damaged file and restore it from another backup set.

THE DUMP DATE FOR DISKETTE # nn DOES NOT MATCH THE
DUMP DATE OF THE PREVIOUS DISKETTE
LOAD CORRECT DISKETTE # nn AND ENTER "RDY" WHEN READY

DLOAD informs you with this message if you insert a maverick diskette. DLOAD reads a diskette date and time as well as sequence number. In this way, diskettes in a series are identifiable by creation date. Insert the correct diskette and enter RDY.

THE FILE xxxxx.xx ALREADY EXISTS - NOT LOADED

DLOAD has found a file on disk named identically to one on diskette. DLOAD does not restore the diskette file. If you want to restore this file from diskette, first delete the disk file.

THIS DISKETTE HAS WRONG SEQUENCE NUMBER # nn
LOAD CORRECT DISKETTE # nn AND ENTER "RDY" WHEN READY

DLOAD finds that you have inserted diskettes in the wrong order and tells you which diskette to insert.

THIS DISKETTE IS NOT A DUMP DISKETTE
LOAD CORRECT DISKETTE # nn AND ENTER "RDY" WHEN READY.

DLOAD returns this message if you mistakenly insert a diskette that is not written in DDUMP/DLOAD format. DLOAD actually searches for a file called DDUMPFILE on a diskette.

DLOAD Example

The following example of DLOAD shows the restore of the diskette set created in the DDUMP example. The user mixes up some diskettes, first inserting one that is not in DDUMP format, then inserting diskette 5 before diskette 4, then inserting a diskette 4 from the wrong set.

DLOAD reports an unreadable block on diskette 1, and identifies the file that is consequently incomplete. With this information, the user can restore the damaged file from another backup set.

DLOAD lists each file after it restores it, identifying a link file (*L) and a directory (<------ DIRECTORY). DLOAD indents the directory's file list.

```
DLOAD DP1 <CR>

** DISKETTE TO DISK RESTORE - REV 7.30 **

DO YOU WANT THE DEFAULTS FOR ALL QUESTIONS (["Y"] OR "N") ?    NO

DO YOU WANT TO LOAD THE FILES (["Y"] OR "N") ?    YES

DO YOU WANT TO LOAD LINK FILES (["Y"] OR "NO") ?    YES

SELECT LISTING OPTION: ("0"=NONE, ["1"=CONSOLE], "2"=LPT)    1

LOAD DISKETTE # 1 AND ENTER "RDY" WHEN READY.    RDY <CR>

  DDUMP.SV
  DLOAD.SV
BLOCK # 2 OF FILE DDUMP.ER COULD NOT BE RESTORED PROPERLY
THE ENTIRE BLOCK HAS BEEN CONVERTED TO ZEROS
```

```
  DDUMP.ER
  DBASE.01                          *L
  IDEB.RB
  BURST.SV
  LIBRARY.DR                        <------ DIRECTORY
      URDOSA.LB
      URDOSB.LB
      URDOSC.LB
LOAD DISKETTE # 2 AND ENTER "RDY" WHEN READY. RDY <CR>

THIS DISKETTE IS NOT A DUMP DISKETTE
LOAD CORRECT DISKETTE # 2 AND ENTER "RDY" WHEN READY.    RDY <CR>

LOAD DISKETTE # 3 AND ENTER "RDY" WHEN READY.    RDY <CR>

LOAD DISKETTE # 4 AND ENTER "RDY" WHEN READY.    RDY <CR>

THIS DISKETTE HAS THE WRONG SEQUENCE NUMBER # 5
LOAD CORRECT DISKETTE # 4 AND ENTER "RDY" WHEN READY.    RDY <CR>

THE DUMP DATE FOR DISKETTE # 4 DOES NOT MATCH THE
DUMP DATE FOR THE PREVIOUS DISKETTE.
LOAD CORRECT DISKETTE # 4 AND ENTER "RDY" WHEN READY.    RDY <CR>

      URDOS.LS
      URDOSI.LB

LOAD DISKETTE # 5 AND ENTER "RDY" WHEN READY.    RDY <CR>

      DOSC.LB
      DOSO.LB
      DOSI.LB
      DPARS.SR
      DBURST.SV
      MBURST.SV
  SYS.LB
  SYS.SV
LOAD DISKETTE # 6 AND ENTER "RDY" WHEN READY.    RDY <CR>

  SYS.OL
  SEDIT.SV

** DISKETTE TO DISK RESTORE COMPLETE **

R
```

DDUMP/DLOAD Error Processing

During operation, DDUMP and DLOAD can send error messages concerning unusual conditions. Some of the errors cause the program to abort and return to the CLI. Other errors cause the program simply to report the error and continue processing, or to report the error and proceed with appropriate recovery action. The error messages include a system error code, a number associated with the error.

For example, an error that causes DDUMP to abort looks this way:

```
UNABLE TO .RDB SYS.DR FOR THIS DIRECTORY
SYSTEM ERROR CODE = 19
THE CURRENT DIRECTORY/FILE SPECIFIER IS: DP0:ACCOUNTS.DR
ABORTING OPERATIONS DUE TO FATAL ERRORS
FILE DATA ERROR: DP0
R
```

Next is an example of an error that invokes a recovery procedure:

```
UNABLE TO .INIT(IALIZE) THE DISKETTE DRIVE
SYSTEM ERROR CODE = 54
LOAD NEW DISKETTE # 4 AND ENTER "RDY" WHEN READY.
```

In general, DDUMP aborts on errors encountered while reading from the source disk, or when it can't close the dump file on diskette (DDUMPFILE), or can't release the diskette. DDUMP also aborts when processing system calls (directives to the operating system) that do not involve disk I/O. DDUMP usually recovers on errors encountered while writing to diskette.

DLOAD aborts on errors it encounters while trying to write to the target disk, or when processing system calls that don't require disk I/O. DLOAD recovers on most errors it encounters while reading from diskette.

In order to receive DDUMP/DLOAD error messages, be sure that the file DDUMP.ER, or a link to it, resides in the directory from which you invoke the program. (DDUMP.ER contains error messages for both DDUMP and DLOAD). However, if you don't have DDUMP.ER or a link to it in the current directory, DDUMP or DLOAD will still return the error code (for example, 15 or 52) without the associated message. Thus you can find the message by looking up its error code in the following listing.

DDUMP/DLOAD Error Codes and Messages

Below we list the DDUMP/DLOAD error messages in numerical order, according to their code. We include explanations and advice on dealing with the errors.

Code **Message**

0 *ERROR ON .XMT/.GCHAR/.TASK CALLS*

The program is at fault. Send a Software Trouble Report (STR) to Data General Corporation.

1 *ERROR ON READING (.RDS/.RDB) DISK*

Something is wrong with the input disk: it is off-line; the disk has a new bad block, not yet entered in the bad block table; or the head-alignment on the disk drive is faulty.

2 *UNABLE TO .OPEN FILE FOR DUMPING*

The input disk does not have an RDOS file structure, or something is wrong with it. For example, it is off-line; the disk has a new bad block, not yet entered in the bad block table; or the head-alignment on the disk drive is faulty.

3 *UNABLE TO .CLOSE FILE AFTER DUMPING IT*

DDUMP can't close a file on the input disk after it dumped the file to diskette. Something is wrong with the input disk: it is off-line; the disk has a new bad block, not yet entered in the bad block table; or the head-alignment on the disk drive is faulty.

4 *UNABLE TO PRINT TO THE LINE-PRINTER*

The printer might be off-line. The program sends the listing to the console instead of the line printer when it finds the printer off-line.

5 *UNABLE TO GET CURRENT DIRECTORY NAME (.GDIR)*

The program is at fault. Send a Software Trouble Report (STR) to Data General Corporation.

6 *UNABLE TO GET STATUS OF CURRENT DIRECTORY*

This can be caused by a problem with the input disk or with the software. Possible disk problems are an off-line disk, an unentered bad block, or faulty head alignment. If you rule out these problems, submit a Software Trouble Report (STR) to Data General Corporation.

7 *UNABLE TO .OPEN SYS.DR FOR CURRENT DIRECTORY*

Something is wrong with the input disk: it is off-line; the disk has a new bad block, not yet entered in the bad block table; or the head-alignment on the disk drive is faulty.

8 *UNABLE TO GET ATTRIBUTES OF CURRENT DIRECTORY'S SYS.DR*

Something is wrong with the input disk: it is off-line; the disk has a new bad block, not yet entered in the bad block table; or the head-alignment on the disk drive is faulty.

9 *UNABLE TO .CLOSE CURRENT DIRECTORY'S SYS.DR*

The program is at fault. Send a Software Trouble Report (STR) to Data General Corporation.

10 *ERROR IN COMMAND LINE INTERPRETATION*

You have entered an invalid command. Check the format, the arguments, and the switches of your command, and reenter it.

11 UNABLE TO .INIT (INITIALIZE) DIRECTORY

Something is wrong with the input disk: it is off-line; the disk has a new bad block, not yet entered in the bad block table; or the head-alignment on the disk drive is faulty.

12 UNABLE TO .RLSE (RELEASE) THIS DIRECTORY

Either there is an open file in the input directory in question, or there is a problem with the input disk (off-line, new bad block, bad head alignment). When you experience this error, use the CLI command CLEAR to set the file's use count to zero, then restart DDUMP or DLOAD. If the program fails this way again, check for disk problems.

13 ILLEGAL DISKETTE UNIT SPECIFIER

You have mistyped or typed an illegal diskette unit name. Consult Appendix A for disk and diskette unit names, and reenter the name.

14 UNABLE TO .RSTAT LINK RESOLUTION FILE

DDUMP can't find the resolution file of a link file on the input disk. Check that the resolution file exists, or that the directory in which it resides is initialized.

15 UNABLE TO .OVOPN DUMP PROGRAM OVERLAY FILE

The most likely cause of this error is that the files DDUMP.OL and DLOAD.OL (or links thereto) don't exist in the current directory. Move the files or link to them, and restart the program.

Other causes could be defective copies of the files, a bad copy of the operating system file, or a defective input disk (off-line, unentered bad block, faulty head alignment).

16 UNABLE TO .CLOSE DUMP PROGRAM OVERLAY FILE

DDUMP or DLOAD can't close its overlay file. You can safely ignore this error because it can occur only when the dump or load operation is complete.

17 UNABLE TO .OPEN THE LINE PRINTER

You have directed the file listing to the line printer but the printer is off-line or doesn't exist. The program lists files on the console after issuing this message.

18 UNABLE TO .OPEN THE CONSOLE FOR INPUT

The program is at fault. Submit a Software Trouble Report (STR) to Data General Corporation.

19 UNABLE TO .RDB SYS.DR FOR THIS DIRECTORY

This indicates a serious problem with the integrity of the input disk. Check the disk's structure for completeness, and run DKINIT or DOSINIT with the TEST command to check for bad blocks. Other causes could be in the disk drive, perhaps in bad head alignment.

20 UNABLE TO .OPEN THE CONSOLE FOR OUTPUT

The program is at fault. Submit a Software Trouble Report (STR) to Data General Corporation.

21 UNABLE TO LOAD LOAD/DUMP PROGRAM OVERLAY

See the discussion of error code 15.

22 DIRECTORY DEPTH EXCEEDED

The disk does not conform to the RDOS, DOS, or DG/RDOS standard directory structure. Check and correct the directory structure.

23 STACK OVERFLOW

The program is at fault. Submit a Software Trouble Report (STR) to Data General Corporation.

24 END OF FILE ON SYS.DR

The directory structure on the input or output disk is faulty. The program is at fault. Submit a Software Trouble Report (STR) to Data General Corporation.

25 UNABLE TO CREATE FILE ON OUTPUT DISK

Something is wrong with the output disk: it is off-line; the disk has a new bad block, not yet entered in the bad block table; or the head-alignment on the disk drive is faulty.

26 UNABLE TO CREATE A DIRECTORY/PARTITION ON OUTPUT DISK

Something is wrong with the output disk: it is off-line; the disk has a new bad block, not yet entered in the bad block table; or the head-alignment on the disk drive is faulty.

27 UNABLE TO .INIT DIRECTORY/PARTITION ON OUTPUT DISK

Something is wrong with the output disk: it is off-line; the disk has a new bad block, not yet entered in the bad block table; or the head-alignment on the disk drive is faulty.

28 UNABLE TO .OPEN THE FILE TO LOAD IT

Something is wrong with the output disk: it is off-line; the disk has a new bad block, not yet entered in the bad block table; or the head-alignment on the disk drive is faulty.

29 UNABLE TO .CLOSE THE FILE AFTER LOADING IT

Something is wrong with the output disk: it is off-line; the disk has a new bad block, not yet entered in the bad block table; or the head-alignment on the disk drive is faulty.

30 UNABLE TO CREATE LINK FILE ON OUTPUT DISK

Something is wrong with the input disk: it is off-line; the disk has a new bad block, not yet entered in the bad block table; or the head-alignment on the disk drive is faulty.

32 UNABLE TO .WRS/.WRB FILE TO OUTPUT DISK

Something is wrong with the output disk: it is off-line; the disk has a new bad block, not yet entered in the bad block table; or the head-alignment on the disk drive is faulty.

50 ATTEMPT TO OPEN A FILE ALREADY OPEN

The program is at fault. Submit a Software Trouble Report (STR) to Data General Corporation.

51 ATTEMPT TO WRITE TO A FILE OPEN FOR READING

The program is at fault. Submit a Software Trouble Report (STR) to Data General Corporation.

52 ATTEMPT TO READ FROM A FILE OPEN FOR WRITING

The program is at fault. Submit a Software Trouble Report (STR) to Data General Corporation.

53 ATTEMPT TO CLOSE A FILE THAT IS NOT OPEN

The program is at fault. Submit a Software Trouble Report (STR) to Data General Corporation.

54 UNABLE TO .INIT (IALIZE) THE DISKETTE DRIVE

You might have entered the wrong unit name for the diskette drive, or the diskette or drive might be defective. Reenter the correct name, or try a new diskette or a different drive.

55 UNABLE TO MAKE THE DISKETTE THE CURRENT DIRECTORY

Something is wrong with the diskette drive: it is off-line; the diskette has a new bad block, not yet entered in the bad block table; or the diskette drive is malfunctioning.

56 UNABLE TO .ROPEN MAP.DR ON THE DISKETTE

The most likely cause is that the diskette is not fully initialized (with INIT/F). Beyond that, the diskette could be faulty or the drive could be malfunctioning.

57 UNABLE TO READ (.RDS) MAP.DR ON THE DISKETTE

The diskette might be defective, or the diskette drive could be out of order.

58 UNABLE TO .CLOSE MAP.DR ON THE DISKETTE

The program is at fault. Submit a Software Trouble Report (STR) to Data General Corporation.

59 UNABLE TO CREATE DDUMPFILE ON THE DISKETTE

The diskette might be defective, or the diskette drive could be malfunctioning.

60 UNABLE TO .OPEN DDUMPFILE ON THE DISKETTE

The diskette might be defective, or the diskette drive might be out of order.

61 UNABLE TO GET STATUS OF DDUMPFILE ON DISKETTE

The diskette might be defective, or the diskette drive could be malfunctioning.

62 UNABLE TO .CLOSE DISKETTE FILE

The diskette drive could be out of order.

63 UNABLE TO .RLSE (RELEASE) DISKETTE

The diskette might be defective, or the diskette drive could be out of order.

64 UNABLE TO GET FILE POSITION (.GPOS)

The program can't access the diskette file DDUMPFILE. Submit a Software Trouble Report (STR) to Data General Corporation.

65 UNABLE TO WRITE UFD INDEX BLOCK (.WRB)

The diskette might be defective, or the diskette drive could be malfunctioning.

66 UNABLE TO SET FILE POSITION (.SPOS)

The program can't set the diskette file DDUMPFILE. Submit a Software Trouble Report (STR) to Data General Corporation.

67 UNABLE TO READ A UFD INDEX BLOCK FROM DISKETTE

This is a critical error indicating that DLOAD can't read one of the eight UFD (user file descriptor) index blocks that point to UFDs on the diskette. Something is wrong with the diskette, possibly a new bad block, and you probably can't load the diskette. Try reading it again with DLOAD, or try restoring from another backup set.

68 UNABLE TO READ A UFD DATA BLOCK FROM DISKETTE

DLOAD can't read a UFD (user file descriptor) block on the diskette. If you are loading files, all information needed to load a particular file is lost and DLOAD invokes error recovery: DLOAD skips to the next diskette file and continues the restore.

If you are listing but not loading files (/N), DLOAD notifies you that it can't list the file, and it continues the listing at the next file.

69 UNKNOWN FILE HAS BEEN LOST - POSITIONING TO NEXT FILE

DLOAD can't read a UFD (user file descriptor) from diskette, so DLOAD can't load or list the affected file. The diskette drive might be malfunctioning or the diskette could be defective.

70 MAXIMUM FILE COUNT (1792) EXCEEDED

DDUMP can write no more than 1792 files on any one diskette. This error is likely to occur only if you have an extraordinary number of link files in a directory.

71 ERROR IN .RDB/.WRB OF DDUMPFILE (DISKETTE)

DDUMP/DLOAD can't read or write the diskette. Try a different diskette drive.

End of Chapter

Chapter 7
File Backup and Move with IMOVE

Table 7-1. IMOVE for Backup and File Move

Utility	Media	microNOVA *DOS*	NOVA or ECLIPSE *DOS, RDOS*	ECLIPSE S/20 *RDOS*	DESKTOP GENERATION *DG/RDOS*
BURST	Disk image ◄—► tapes Disk image ◄—► disk		√		
YBURST	Disk image ◄—► tapes Disk image ◄—► disk			√	√
TBURST	Disk image ◄—► tapes Disk image ◄—► disk	√			
DBURST	Disk image ◄—► diskettes		√		
YDBURST	Disk image ◄—► diskettes			√	
MBURST	Disk image ◄—► diskettes	√			
FDUMP/ FLOAD	Disk directories ◄—► tapes	√	√	√	√
DDUMP/ DLOAD	Disk directories ◄—► diskettes	√	√	√	√
IMOVE *	**Disk files, directories ◄—► diskettes** **Disk files, directories ◄—► tape **** **Diskette files, directories ◄—► diskette**				√

*IMOVE enables file move by diskette or tape between DG/RDOS and AOS, AOS/VS, MP/OS, MP/AOS and MP/AOS-SU.

**IMOVE confines magnetic tape read and write operations to a single tape.

Functions of IMOVE

The IMOVE utility on DESKTOP GENERATION systems dumps and loads files and directories between magnetic tape and disk or between diskette and disk. Furthermore, IMOVE can load files from magnetic tape or diskette that were created under other Data General Corporation operating systems: AOS, AOS/VS, MP/OS, MP/AOS, and MP/AOS-SU. IMOVE, then, can serve as a backup tool on a DG/RDOS system, and also as a conduit for programs and data to and from other systems. Table 7-1 shows IMOVE's range.

IMOVE runs on all DESKTOP GENERATION models under DG/RDOS, and supports the disk, diskette, and magnetic tape units on DESKTOP GENERATION systems. The 5.25-inch diskettes to be read or written with IMOVE must be double-sided, 48 tracks per inch (tpi), and 9 sectors per track.

IMOVE requires a minimum of 42 Kbytes of memory to run, an amount that is available on the smallest DESKTOP GENERATION systems. When extra memory is available, IMOVE appropriates more in order to increase its processing speed.

This chapter discusses IMOVE's system compatibility, its command line and switches, and use with magnetic tape and diskette. Examples show how to dump or load with IMOVE on either medium, and how to build and use indirect files in IMOVE arguments. The final section, on error processing, includes advice on remedial action.

System Compatibility

IMOVE can handle files from a multiplicity of systems because its protocols for magnetic tape and diskette correspond to particular programs on the other operating systems. Table 7-2 shows the relationship of programs and media that IMOVE can accommodate.

Table 7-2. IMOVE Compatibility

Media	AOS	AOS/VS	MP/OS MP/AOS MP/AOS-SU
Magnetic Tape	DUMP/LOAD	DUMP/LOAD	MOVE *
Diskettes	MMOVE *	-	MOVE *

*Used with the /DUMP switch.

IMOVE can read tapes written by DUMP under AOS or AOS/VS, and tapes written by MOVE with the /DUMP switch under MP/OS, MP/AOS, or MP/AOS-SU. Tapes written by IMOVE can be read by the appropriate programs on the other systems.

Similarly, IMOVE can read diskettes written by MMOVE with the /DUMP switch under AOS, and diskettes written by MOVE under MP/OS, MP/AOS, and MP/AOS-SU. IMOVE diskettes can be read by the corresponding programs on these systems.

NOTE: IMOVE writes and reads single magnetic tape dumps only. It will not continue a write on another tape if it fills the first, nor will it read subsequent volumes after the first in a multiple reel dump set.

Using IMOVE

You invoke IMOVE from the CLI with the command IMOVE, using switches and arguments to define your operation. The following discussions cover the command line and switches, then cover details and examples of using IMOVE with magnetic tape and diskette.

IMOVE Command Line

The format of the IMOVE command line is

IMOVE/switches devname *[filename ...]*

The devname argument specifies the name of the magnetic tape or diskette device to or from which files are to be moved, for example DE0 or MT0. In the case of magnetic tape, you must include a tape file specifier, for example MT0:1.

The optional filename argument specifies the file to be moved to or from the device; you can name multiple files.

You can specify a file outside the current directory by using a directory specifier: for example, THATDIR:LOU.SV is a valid argument.

You cannot use DG/RDOS filename templates to specify groups of files; however, you can easily use an *indirect file* that specifies file groups with templates. To invoke an indirect file as the IMOVE filename argument, use the form IMOVE/switches devname @indfile@. See the section ahead entitled "Building and Using Indirect Macro Files" for details.

If you do not specify filename(s) in a backup operation, then IMOVE dumps all files in the current directory to the magnetic tape or diskette. If you don't specify filename(s) in a restore operation, then IMOVE loads all files on the magnetic tape or diskette into the current directory (dependent upon switch selection, as shown in Table 7-3).

IMOVE dumps and loads directory files (.DR) that are in the current directory; that is, IMOVE copies the current directory and its subordinate directories (secondary partitions and/or subdirectories).

IMOVE Switches

You must specify at least one switch (either /D or /H); Table 7-3 defines IMOVE switches.

Table 7-3. IMOVE Switches

Switch	Description	Comment
/C	*Convert* line termination characters in data files; for transferring text (not binary) files between DG/RDOS and other operating systems.	Use when dumping (/D/C) to convert *<CR> to NEW LINE*. Use when loading (/D/F/C) to convert *NEW LINE to <CR>* .
/D	Write to or read from magnetic tape or diskette in *dump* format.	*Required* with any function, except /H.
/F	Load files *from* magnetic tape or diskette to current directory.	Loads tapes and diskettes created by IMOVE and by programs on other operating systems.
/H	Display *help* text about command line and switches.	No files will transfer, regardless of other switches.
/L	*List* on line printer ($LPT) names of files moved.	Creates line printer listing.
/N	*Nullify* file movement, but display filenames on screen.	Use to see dump filenames, or to test effect of command line.
/O	*Overwrite* any file in destination directory with identically named file from diskette or magnetic tape.	Without /O, preserves same-name disk files.
/R	Choose most *recent* version of a file in a restore operation.	If a same-name file in destination directory has most recent creation date, preserves it. If tape or diskette file is most recent, restores it.
/T	Move files to or from magnetic *tape*.	Required for magnetic tape operation. Without /T, IMOVE assumes a diskette.
/V	*Verify* that each file is moved by displaying its name on screen.	

The following few rules govern switches for the most common functions.

- The /D switch, specifying dump format, is required to use any IMOVE function, except the /H help function. Use /D whether you're moving files from or to the device (devname). Used alone, /D indicates dumping from disk *to* magnetic tape or diskette.
- Use /F with /D to reverse the flow of files: to move files *from* tape or diskette to disk.
- Use /T for any magnetic tape function, whether read or write.
- You can include /D or any other switch with /H, but /H always returns a screen of information and does not perform a data transfer.
- Do not use /C when moving binary data files; for example, .SV files.
- Do not use /O and /R together.
- When you use /O or /R without /F, IMOVE ignores the /O or /R.

Using IMOVE with Magnetic Tape

To dump files to magnetic tape with IMOVE, follow this sequence.

First, initialize the magnetic tape drive on your system with the INIT command. When you mount (or dismount) the tape, we suggest you mark it with a gummed paper label that identifies the date and files of the move operation.

Include the /T switch in the command line with /D, and specify the tape file number when you name the magnetic tape unit.

We suggest you dump first to file 0 (MTn:0). To stack later dumps on the tape, specify tape file 1, 2, 3, and so on. Keep a record of stacked dumps because you need to identify the tape file number when you load with IMOVE. When you overwrite an early dump, for example, tape file 0, you also destroy later tape files.

Remember, IMOVE writes single volume tape dumps only; it does not continue a dump on another tape if it runs out of room on one tape. See Chapter 1 for advice on estimating space on dump media for disk files.

To restore files from tape with IMOVE, initialize the magnetic tape device, then specify /F as well as /D and /T.

Magnetic Tape Examples

The following command sequence selects a current directory, then initializes the magnetic tape unit. The IMOVE command directs that the four files named be moved to the first tape file on MT0 in dump format. As each file is written, IMOVE verifies the move by displaying its name on the screen.

```
R
DIR FENTS ↵
R
INIT MT0 ↵
R
IMOVE/D/T/V MT0:0 EUSA.DB FIZZICS.SV CHEMISTERY.SV PUTERS.OL ↵
05-JAN-84 17:15:00
   EUSA.DB
   FIZZICS.SV
   CHEMISTERY.SV
   PUTERS.OL
R
```

IMOVE cites the date and time, verifies that it has dumped each file by displaying the filename, then returns to the CLI upon completion.

The next example shows the restore of a magnetic tape to the current directory. The command line contains no filename argument, so IMOVE writes all files on the tape into partition RIDDLEY, the current directory. IMOVE verifies all files moved, and indents the names of files in a subdirectory (RUSSEL.DR). The /O switch ensures that files from tape are restored over disk files with the same name.

```
R
DIR RIDDLEY ↵
R
INIT MT0 ↵
R
IMOVE/F/D/T/O/V MT0 ↵
05-JAN-84 13:22:04
   HOBAN.SV
   RUSSEL.DR
     CONNEXION
     PRY
     MINCER
      .
      .
      .
   EUSTIS.ST
   DOG.ET
    .
    .
    .
R
```

Using IMOVE with Diskette

IMOVE reads to and writes from diskette in dump format, which differs from the RDOS, DOS, and DG/RDOS format. Therefore, you don't need to use software formatted diskettes (those processed with DKINIT and INIT/F) with IMOVE. The diskettes, however, must be hardware formatted.

CAUTION: If you should insert software formatted diskettes in a dump operation, IMOVE writes to the diskette in dump format, and in the process erases any RDOS structure and data.

When dumping to or loading from a diskette, be sure that it is *not* initialized on the system (no INIT command). When you invoke IMOVE, it asks you to insert the diskette. You can use the CLI RELEASE command to remove a diskette from initialization before you invoke IMOVE.

In the IMOVE command line, specify /D for dump format, and name the diskette device (for example, DJ1).

For a multiple diskette dump, be sure to have sufficient diskettes on hand. See Chapter 1 for advice on estimating the number of diskettes needed for a dump set. We recommend that you mark each diskette with the date, time, and input files of the IMOVE dump operation.

When you invoke IMOVE for a dump or load operation, it asks you to insert the first diskette and enter a NEW LINE before it proceeds. IMOVE's message is as follows:

```
Please insert disk 1, then press NEW LINE to continue.
```

When IMOVE runs, it identifies the date and time, and, if you have specified /V, it displays each filename as the file is moved. In a dump operation, IMOVE writes the date and diskette sequence number at the beginning of each diskette, criteria it uses later to ensure that diskettes load properly.

When IMOVE fills a diskette, it prompts you to insert another diskette with the message

```
This disk has been filled: DJn

Please insert disk m, then press NEW LINE to continue
```

IMOVE increments the sequence number on each diskette. On a load operation, when IMOVE has restored all the data on the diskette, it prompts for the next in the series with this message:

```
This disk has been exhausted: DJn

Please insert disk m, then press NEW LINE to continue
```

IMOVE proceeds to ask for new diskettes until it completes the operation.

Diskette Examples

The following example shows the dump of four files to diskette.

```
R
DIR FENTS )
R
IMOVE/D/V DJ1 EUSA.DB FIZZICS.SV CHEMISTERY.SV PUTERS.OL )
Please insert disk 1, then press NEW LINE to continue. )
05-JAN-84 17:15:00
  EUSA.DB
  FIZZICS.SV
  CHEMISTERY.SV
  PUTERS.OL
R
```

IMOVE asks for the first diskette. When we insert the diskette and press NEW LINE, IMOVE cites the date and time, verifies each dump by displaying the filename, then returns to the CLI upon completion.

The next example shows the restore of a multiple diskette series to the current directory. The command line contains no filename argument, so IMOVE writes all files on the diskettes into directory SOANDSO. IMOVE verifies all files moved. The /R switch ensures that IMOVE chooses the most recently created version of two files that have the same name.

```
R
DIR SOANDSO )
R
IMOVE/F/D/R/V DJ1 )
05-JAN-84 13:22:04
  VIAL.SV
  VILE.OL
  WEILL.DR
  .
  .
This disk has been exhausted: DJ1

Please insert disk 2, then press NEW LINE to continue )

  .
  VIYELL.A
R
```

Building and Using Indirect Macro Files

Typing filename arguments to an IMOVE command can be tedious, particularly when you're dealing with many files. However, IMOVE accepts an *indirect macro file* as an argument; an indirect macro file is a text file, the contents of which are interpreted by the CLI for the calling program. So you can create an indirect file containing the names of files you want to act upon, then feed the indirect file name to IMOVE as an argument.

Indirect files are also useful in establishing a regular backup or file move procedure. Assume, for example, that you want to back up all .SV files in a certain directory every week. You can include the pathname and filename parameters in an indirect file, then use it each week without change.

You can streamline the process further by using the CLI BUILD command to create the indirect file.

The BUILD command uses your arguments and switches to create a text file consisting of filenames. BUILD allows you to use templates to select groups of files, and to choose files based on creation date. BUILD also allows you to exclude permanent files, link entries, or files with a specific name. The *RDOS/DOS Command Line Interpreter* manual documents the BUILD command and indirect macro usage.

For example, to make a BUILD file that designates all .SV and .SR files created since January 1, 1984, excluding files named FOO, use this command:

```
R
BUILD DUMPWORK 01-01-84/A -.SR, -.SV, FOO.-/N ↵
R
```

This creates indirect file DUMPWORK, containing the filenames you specified. To call DUMPWORK with IMOVE, enclose the name DUMPWORK in @ (commercial at signs). For example

```
R
IMOVE/D/T/V MTO:0 @DUMPWORK@ ↵
07-JAN-84 11:29:05
  PMAG.SR
  PMAG.SV
  KLIEG.SV
  NOGGS.SV
   .
   .
   .
R
```

Error Processing

IMOVE returns an error message when it encounters a condition that requires your intervention. Below we list the error messages in alphabetical order, discussing their causes and solutions.

A mapped ECLIPSE running RDOS is required.

You have invoked IMOVE on a system that does not include an ECLIPSE processor, or that is not running DG/RDOS. You can't run IMOVE on this system.

Devices and disk files must be dump formatted.

You have tried to move files to or from a device without specifying dump format. This usually means that you have omitted /D from the IMOVE command line.

Illegal contiguous file size.

While moving files from a dump-formatted magnetic tape or diskette, IMOVE encounters an AOS or AOS/VS data file that has zero maximum index levels and an element size larger than what DG/RDOS can support as a contiguous file. The maximum file size that DG/RDOS supports is 65,536 blocks. You must reduce the file's size before moving it to a DG/RDOS system.

Illegal partition size.

While moving files from a dump-formatted magnetic tape or diskette, IMOVE finds an AOS or AOS/VS Control Point Directory (CPD) file larger than what DG/RDOS can support as a partition. The maximum partition size that DG/RDOS supports is 65,536 blocks. When this error occurs, you must reduce the size of the directory under AOS or AOS/VS in order to transport it to DG/RDOS.

Improper switch selection. type IMOVE/H for help.

You have invoked IMOVE without a switch, or with one or more unknown switches. Reenter your command line, or type IMOVE/H to get help with the command line.

Incompatible dump revision.

While moving files from a dump-formatted device, IMOVE encounters a set or ordering of dump elements that it does not support. This can happen when the dump structure used by the IMOVE.SV you're running differs from the dump structure used by the program that produced the material; for example, AOS DUMP or MP/AOS-SU MOVE. Try to recreate the dump with another revision of the program.

Insufficient extended memory is available.

You have invoked IMOVE without sufficient memory available. IMOVE needs a minimum of 42 Kbytes of user memory, which is available on the smallest DESKTOP GENERATION system running DG/RDOS. This error (or the error listed next) would occur if you were running programs in the foreground and background of your system and had not allocated enough memory to the IMOVE ground. To correct this situation, terminate the foreground program and use the CLI command SMEM from the background to reallocate memory.

Insufficient logical memory is available.

You have invoked IMOVE without sufficient memory available. IMOVE needs a minimum of 42 Kbytes of user memory, which is available on the smallest DESKTOP GENERATION system running DG/RDOS. This error (or the error listed immediately above) would occur if you were running programs in the foreground and background of your system and had not allocated enough memory to the IMOVE ground. To correct this situation, terminate the foreground program and use the CLI command SMEM from the background to reallocate memory.

Invalid dump block format.

While moving files from a dump-formatted device, IMOVE finds an improper ordering of dump elements. The most likely source of this error is the program that produced the dump-formatted medium, for example AOS/VS DUMP or MP/AOS MOVE. Try to recreate the dump medium with another version of the program.

Invalid dump block type.

While moving files from a dump-formatted device, IMOVE comes across an unrecognizable dump element. This error could be caused by faulty medium — a bad magnetic tape or diskette. Try to read the tape or diskette on another device that could be more tolerant of faults, or recreate the dump on a different tape or diskette. Another cause of this error could be a fault in the program (for example, IMOVE or MMOVE) that wrote the dump; if you suspect this, recreate the dump with another copy or version of the program.

The Character Instruction Set is required.

You have invoked IMOVE on a system lacking the Character Instruction Set (CHIS). You can't run IMOVE on this system. All DESKTOP GENERATION models are equipped with CHIS.

This disk contains more than 15 bad sectors.

While dumping files to diskette, IMOVE encounters more bad sectors than it can handle with bad-block remapping. IMOVE aborts on this error; you must restart the dump operation, being sure to substitute a fresh diskette for the bad one.

This disk is not in sequence.

While you are restoring files from a diskette dump series, you have inserted a diskette out of sequence. Insert the correct diskette and IMOVE continues.

This disk is not part of the dump being processed.

While you are restoring files from a diskette dump series, you have inserted a diskette that does not match the rest of the series. A header block on each volume of a diskette series identifies the date the dump occurred; IMOVE reads the header and balks if it finds a mismatch. Insert the correct diskette and IMOVE continues.

Unexpected end of file.

While moving files from a dump-formatted magnetic tape, IMOVE finds an end-of-file (EOF) mark on the tape before it finds an end of dump identifier. This error would occur if you try to read a multiple tape dump set with IMOVE. You can't load the particular file that is split between two reels, but the files loaded so far are complete.

Unsupported file type.

While moving files from a dump-formatted device, IMOVE sees a file type that it does not support.

End of Chapter

Appendix A
Disk Identifiers

Tables A-1 and A-2 list disk and diskette identifiers for NOVA and ECLIPSE systems and for Microproducts devices.

Table A-1. Device Identifiers, NOVA and ECLIPSE Disk and Diskette Drives

Model	Description	Capacity (Mbytes)	Device Code	Controller	Unit Name
6030	Single-density diskette drive	0.3	33 73	1 2	DP0/1/2/3 DP4/5/6/7
6097[2]	Double-density diskette drive	1.2	33 73	1 2	DP0/1/2/3 DP4/5/6/7
6099[1]	Fixed-disk drive	12.5	33 73	1 2	DP0/1/2/3 DP4/5/6/7
6103[1]	Fixed-disk drive	25	33 73	1 2	DP0/1/2/3 DP4/5/6/7
6234[1]	Fixed-disk drive	50	33 73	1 2	DP0/1/2/3 DP4/5/6/7
6225[2]	Fixed-disk drive	5	33 73	1 2	DP0/1 DP4/5
6227[2]	Fixed-disk drive	15	33 73	1 2	DP0/1 DP4/5
6063	Fixed-disk drive	1	26 66	1 2	DS0/1/2/3 DS4/5/6/7
6064	Fixed-disk drive	2	26 66	1 2	DS0/1/2/3 DS4/5/6/7
6160	Fixed-disk drive	73	27 67	1 2	DZ0/1 DZ4/5
6161	Fixed-disk drive	147	27 67	1 2	DZ0/1 DZ4/5
6070	Cartridge disk drive for one fixed and one removable platter	20 (total)	33 73	1 2	DP0/1/2/3 and DP0F/1F/2F/3F[3] DP4/5/6/7 and DP4F/5F/6F/7F[3]
6045	Cartridge disk drive for one fixed and one removable platter	10 (total)	33 73	1 2	DP0/1/2/3 and DP0F/1F/2F/3F[3] DP4/5/6/7 and DP4F/5F/6F/7F[3]

(continues)

Table A-1. Device Identifiers, NOVA and ECLIPSE Disk and Diskette Drives

Model	Description	Capacity (Mbytes)	Device Code	Controller	Unit Name
4234	Cartridge disk drive for one fixed and one removable platter	10 (total)	33	1	DP0/1/2/3 and DP0F/1F/2F/3F[3]
			73	2	DP4/5/6/7 and DP4F/5F/6F/7F[3]
4047	Cartridge disk drive	2.5	33 73	1 2	DP0/1/2/3 DP4/5/6/7
6122	Moving-head disk drive with 20-surface pack	277	27 67	1 2	DZ0/1/2/3 DZ4/5/6/7
6060	Moving-head disk drive with 20-surface pack	96	27 67	1 2	DZ0/1/2/3 DZ4/5/6/7
6061	Moving-head disk drive with 20-surface pack	190	27 67	1 2	DZ0/1/2/3 DZ4/5/6/7
6067	Moving-head disk drive with 6-surface pack	50	27 67	1 2	DZ0/1/2/3 DZ4/5/6/7
6236	Fixed-disk drive	354	24 64	1 2	DA0/1/2/3 DA4/5/6/7
4514	5.25-in. diskette drive	0.36	20 60	1 2	DJ0/1/2/3 DJ4/5/6/7

(concluded)

[1] Only one fixed-disk drive per controller allowed. A cartridge disk drive cannot share the same controller.

[2] Only one model 6097 and one model 6225 or 6227 drive allowed on the same controller.

[3] Unit names ending in F indicate the fixed portion of a cartridge disk.

Table A-2. Device Identifiers, Microbus Disk and Diskette Drives (microNOVA, DESKTOP GENERATION, ECLIPSE S/20 Systems)

Model	Description	Capacity (Mbytes)	Device Code	Controller	Unit Name
6102[1]	Fixed-disk drive	12.5	26 66	1 2	DE0/1/2/3 DE4/5/6/7
6105[2]	Fixed-disk drive	25	26 66	1 2	DE0/1/2/3 DE4/5/6/7
6096[3]	Double-density diskette drive	1.2	26 66	1 2	DE0/1/2/3 DE4/5/6/7
6220[1]	Fixed-disk drive	5	26 66	1 2	DE0/1 DE2/3
6222[1]	Fixed-disk drive	15	26 66	1 2	DE0/1 DE2/3
6095	Cartridge disk drive for one fixed and one removable platter	10 (total)	27 67	1 2	DH0, DH0F[4] DH1, DH1F
4513	5.25-in. diskette drive	0.36	20 60	1 2	DJ0/1/2/3 DJ4/5/6/7
6268[5]	5.25-in diskette drive	0.36	20	1	DJ0/1
6270[5]	Fixed-disk drive	5	26 66	1 2	DE0/1/2/3 DE4/5/6/7
6271[5]	Fixed-disk drive	15	26 66	1 2	DE0/1/2/3 DE4/5/6/7
6280[6]	Fixed-disk drive	50	25 65	1 2	DM0 DM1
6224[6]	Fixed-disk drive	15	25 65	1 2	DM0 DM1

[1] Only one fixed-disk drive per controller allowed.

[2] Can be unit 0 or 1, depending on IPL switch on drive.

[3] Only one model 6096 and one model 6220 or 6222 allowed on the same controller.

[4] Fixed portion of cartridge disk designated with unit name ending in F.

[5] For use with DESKTOP GENERATION systems only.

[6] ECLIPSE S/20 systems only. Requires BMC (Burst Multiplexor Channel). One unit per controller allowed.

End of Appendix

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