OmniDrive™
Diagnostic Guide

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Diagnostic Guide

NOTICE

TABLE OF CONTENTS

GETTING STARTED

This guide explains the diagnostic program for the OmniDrive™ mass storage system. This program is used to detect and correct certain types of hardware and software problems that may develop in the drive.

Back up the drive on a regular basis to avoid loss of valuable data. Backups can be made with The Bank™ mass storage device or the Mirror® backup interface system. See the appropriate manuals for instructions. It is recommended that a backup be made prior to using the diagnostic program. For certain options, a backup is required to preserve the data on the drive.

The diagnostic program should be used only by the person responsible for maintaining the OmniDrive and the network. All other users should avoid using the network when the diagnostic program is in use.

Contact the Corvus Customer Service Department for the nearest authorized service center to call with problems beyond the scope of this guide.

HOW THIS GUIDE IS ORGANIZED

Chapter 1 describes the diagnostic tools available, including the indicator lights and a chart of possible problems and their solutions. The chapter also explains entering the diagnostic program from the diagnostic diskette or from Constellation II.

Chapter 2 explains checking and updating the firmware.

Chapter 3 describes how to exercise the heads and how to find media defects on the OmniDrive. It also explains parking the heads.

Chapter 4 explains how to change the parameters, including the interleave factor, spare tracks and the read after write option.

Chapter 5 explains how to format the drive.

Appendix A contains two forms for recording diagnostic changes and updates.

USAGE

Throughout this guide, type means to enter two or more characters or keyboard symbols on the computer keyboard. Type all words, symbols, spaces and punctuation to the right of type exactly as shown. Do not add or leave out punctuation marks at the end of the statement.

Examples:

Type COPY B:*.DOC

Type DIR C:

Don't type the spaces between type and the first character to its right.

Throughout this guide, **press** means to enter a single character or symbol on the computer keyboard. When a keytop symbol appears, press the key to which it refers. Don't type out each letter of the word in the keytop symbol.

Examples:

Press Y

Press [RETURN]

When the command **type** or **press** appears in a sentence or paragraph, enter the information indicated.

Example:

Type your user name and password and **press** [RETURN] .

The variables **x.xx** in the screen display stand for software revision numbers.

To **reset** the drive means to turn the power switch off, then on again. The drive is automatically reset each time it is switched off and on.

The **convenience connector** refers to the small plug used to connect two tap cables together. The connector was supplied with the OmniDrive.

SOFTWARE REQUIRED

The diagnostic program and the related files containing the firmware and the diagnostic data block file can be found on one of the Corvus-supplied diskettes. Usually, the programs will be found on the diagnostic utilities diskette, or on the boot diskette. The system manager guide for the computer or operating system describes the specific diskette needed.

The files may also be found in one of the system volumes on the OmniDrive.

OVERVIEW OF OMNIDRIVE DIAGNOSTICS | 1

This chapter discusses the methods of diagnosing OmniDrive problems, including the drive indicator lights and a chart of possible problems and their solutions. It also explains how to enter the diagnostic program from both floppy diskette and Constellation II.

DIAGNOSTIC TOOLS

The OmniDrive has three indicator lights on the front panel to show the drive's status. The left light is the fault indicator light, the center light is the busy light and the right light is the ready light. When the drive is ready, only the right light should be on. During normal operation, the center and right lights flicker as data is transferred to and from the drive.
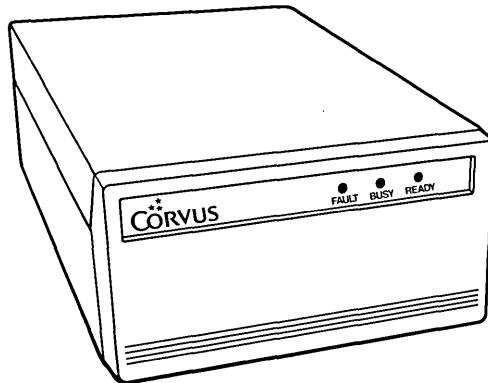
OmniDrive Indicator Lights

The OmniDrive takes approximately one minute to come ready after it is turned on. If the drive is not ready, reset the drive and wait several minutes.

The following table shows some common drive problems and possible solutions:

OmniDrive Condition	Possible Cause	Remedy
Drive indicator lights are off and fan is off.	No power	Check power cord connection. Make sure drive is turned on.
Indicator lights off and fan is on.		Reset drive.
Indicator lights on, but drive does not come ready.	Faulty drive Faulty firmware	Reset drive. Update firmware.
Indicator lights on, but computer cannot communicate with drive.	Faulty Omninet connection. Incorrect Omninet address settings.	Check all Omninet connections. Check Omninet address setting. Reset drive.
Intermittent problems.	Firmware may be damaged. Media defects.	Update firmware. Check for bad tracks.
Drive ready but does not respond to computer.	Incorrect interleave factor.	Change interleave factor.
Drive lights on but drive does not come ready.		Reformat drive and update firmware.

ENTERING THE DIAGNOSTIC PROGRAM

Run the diagnostic program using a computer connected directly to the OmniDrive. No other users should be using the network because the drive will be unavailable for regular use.

The OmniDrive should be connected directly to one computer using the convenience connector to link the tap cables. The convenience connector was supplied with the OmniDrive.

Turn off all equipment. The computer cannot be more than 30 feet from the OmniDrive. Make sure that the tap cables for the two devices can be connected together.

Unplug the OmniDrive tap cable from its network tap box. The other end of the tap cable should remain connected to the OmniDrive. Insert the free end of the tap cable into one end of the convenience connector.

Unplug the tap cable for the computer that will run the diagnostic program from its network tap box. Insert the free end into the other end of the convenience connector.

For more information on using the convenience connector, refer to the *OmniDrive Setup Instructions* and the Omninet network station installation guide for the computer.

FROM DISKETTE

The procedure for entering the diagnostic program is different for each type of computer. For some computers, the program is contained on a bootable diskette. For other computers, the computer must be booted with a boot diskette before the diskette containing the diagnostic program can be used.

Refer to the system manager guide for the particular computer or operating system for the exact procedure.

After the computer boots and the OmniDrive diagnostic program option is selected, the screen displays the program's main menu:

```
OMNIDRIVE DIAGNOSTIC[x.xx]              Slot: 1
Main Menu                             Server: 2
------------------------------------------------
 V  — Version check

 M — Modify Parameters

 X  — Exercise Heads

 C  — Check for Bad Tracks
 U  — Update Firmware on Drive
 F  — Format Corvus Drive

 P  — Park Heads for Shipment

 S  — Select Drive


 E  —Exit
------------------------------------------------
 Please select an option:
```
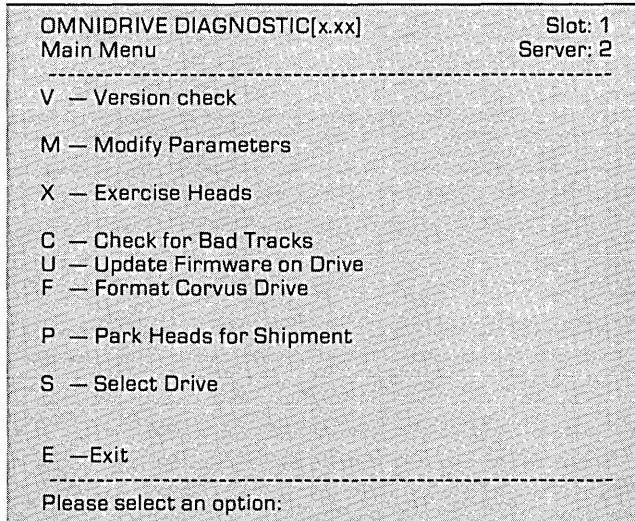
Go to the appropriate chapter to use the option that addresses the apparent problem with the OmniDrive.

FROM CONSTELLATION II

The diagnostic program can also be run from
Constellation II without using a diskette.
However, if the OmniDrive is not functioning
properly, run the program from diskette.

For some computers, the Constellation II main
menu will automatically be displayed when
the computer is turned on. Otherwise, turn on
the computer and enter the Constellation II
program.

Press M to select the maintenance utilities,
then **press** O to run the OmniDrive diagnostic
program. The screen displays the program's
main menu. Go to the chapter that addresses
the apparent problem with the OmniDrive.

FIRMWARE DIAGNOSTICS

This chapter presents the two diagnostic procedures for OmniDrive firmware. Firmware is the factory-supplied software that enables the computer to communicate with the OmniDrive. Two procedures are used to diagnose and correct firmware problems: the version check and updating the firmware.

Check the version of firmware contained on the drive to determine the version as well as information on the size, type and other attributes of the drive. Updating the firmware transfers a new version from a floppy diskette or another drive so that the OmniDrive has a current and correct version.

VERSION CHECK

The version check should be performed before other diagnostic tests. Write down the results for later reference.

Press V to check the version.

The screen displays:

```
OMNIDRIVE DIAGNOSTIC[x.xx]                    Slot: 1
Version Check                                 Server: 2
------------------------------------------------------
    Drv   P/V   Capacity   Size/Rev   SPT   TPC   CPD
    ---   ---   --------   --------   ---   ---   ---
     1     P     21600     11MB/0     18     4    306

    ROM   DB    Firmware
    ---   --    ------------------------------------
     9     4    FODR1.4 -- CONST II - 01/84

Press <space> to continue.
```

11

Drv   This is the drive number. An OmniDrive is always drive 1.

P/V   This shows if the drive number is for a physical or a virtual drive. An OmniDrive does not use virtual drives and should always have a physical drive number.

Capacity   This is the number of 512-byte sectors available for data storage.

Size/Rev   This is the nominal drive size and type of drive. The size shown is the rated size of the drive. The rev shown should always be 0, for OmniDrive.

SPT   This stands for sectors per track. The OmniDrive is divided into sections so that it can access information quickly. The drive is divided into cylinders, which are divided into tracks, which in turn are divided into sectors.

TPC   This is tracks per cylinder. See SPT above.

CPD   This stands for cylinders per drive. See SPT above.

ROM   This gives the version of the ROM chips contained in the drive. These chips contain special code and should be changed only by authorized service centers.

DB   This shows the version of the ODDIAG.DATA block.

Firmware This is the version of firmware found on the drive. The date shown is the release date for the firmware. The firmware version and release date should be written down for later use.

After making a copy of the information shown in the version check, press [SPACE] to return to the main menu.

UPDATING THE FIRMWARE

The firmware code is contained in the FODRX.X.DATA file, where X.X is the version number. This file is found on the same diskette as the diagnostic program.

From the main menu, select update firmware.

Press U

The screen displays:

```
OMNIDRIVE DIAGNOSTIC[x.xx]              Slot : 1
Update Firmware                       Server : 2
--------------------------------------------------
Change drive tables?  [N]
```
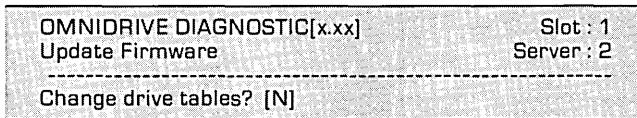
The drive tables contain the spare track table, the interleave factor and the read after write status. Changing the drive tables can destroy data on the drive. Unless all the data on the drive has been backed up or the data on it is not needed, do not change the drive tables.

13

When these tables are changed, the spare track table is cleared, the interleave factor is set to 9 and the read after write is OFF.

Press [RETURN] to keep the current tables.

The screen display is similar to:

```
Enter firmware file name: [FODR1.4]
```

The diagnostic program must be able to read the firmware data file from the floppy diskette if the diagnostic program is run from the diskette. If the diagnostic program is run from the drive itself, and a new firmware file on diskette is used, the diskette name must be specified as well as the firmware file name.

Press [RETURN] if the firmware file name is correct. Otherwise, enter the new firmware file name and press [RETURN] . If updating with new firmware received on a diskette, use those diskette and firmware file names.

Once the correct names are entered, the screen displays:

```
Reading firmware from FODR1.4.DATA
.................................
Firmware written.

Press <space> to continue.
```

Press [SPACE] to return to the main menu. The firmware is now updated.

HARDWARE DIAGNOSTICS | 3

The diagnostic program has two options for checking the drive hardware: exercising the read-write heads and checking the media surfaces for defects or blemishes. A third option allows parking the heads before shipment.

EXERCISING THE HEADS

Exercising the heads checks the movement of the read-write heads across the platters in the disk drive mechanism. The primary purpose of this test is to make sure the heads move freely. This test also performs a simple check for hard and soft data errors. A hard error in this test indicates that the read-write heads could not find the track on the platter surface. A soft error is a read-write error that is detected and corrected by the drive controller.

If hard errors are found, check for bad tracks. If few or no soft errors appear, the drive should be in good operating condition. A large number of soft errors may indicate that there is a problem with the firmware or the interleave factor.

To exercise the heads,

Press X

The screen displays:

```
OMNIDRIVE DIAGNOSTIC[x.xx]                    Slot : 1
Exercise Heads                             Server : 2
-----------------------------------------------------
How many passes do you wish to run? [80]
```

15

Press RETURN

After a few moments the screen displays
the results:

```
..................................................
.............................................
.

Error Summary:

Number of passes      : 80
Number of soft errors :  0
Number of hard errors:  0

Press <space> to continue.
```
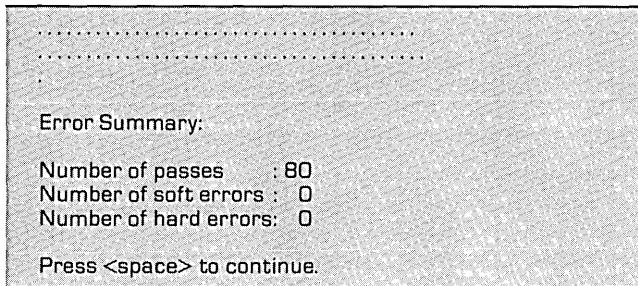
Press SPACE   to return to the main menu.

CHECKING FOR BAD TRACKS

Checking for bad tracks checks the magnetic
media on the drive platter surfaces for possible
defects. Media defects that cause bad tracks
result in hard errors that cannot be corrected
by the drive controller. Follow these steps if
hard errors appear in one of the other tests or
if the drive has been subjected to a sudden impact.

Check for bad tracks at least three consecutive
times if any bad tracks are discovered in the
first test. If a track is noted as bad, it is probably
defective and should be corrected. Go to the
section "Adding Spare Tracks" in Chapter 4,
"Changing OmniDrive Parameters," to correct
bad tracks.

To check for bad tracks,

Press C

The screen displays:

```
OMNIDRIVE DIAGNOSTIC[x.xx]                    Slot : 1
Check For Bad Tracks                          Server : 2
--------------------------------------------------------
Check for bad tracks (Y/N)?
```

Press Y

The screen displays:

```
This test takes from 1 to 6 minutes.

Test in progress.
```

The test is performed automatically. If the test discovers no bad tracks, the screen displays:

```
No blocks with CRC errors found.

Press <space> to continue.
```

If the test does find bad tracks, the screen display is similar to:

```
3 block[s] with CRC errors

Head      Cylinder      Sector      Track
----      --------      ------      -----
  0         229           6          916
  0         170          13          600
  0         280           7         1120

Press <space> to continue.
```

Press SPACE to return to the main menu. Run the CRC check again as necessary, then add spare tracks using Chapter 4.

PARKING THE HEADS

Parking the heads positions the heads over an area on the disk that contains no data. A sudden impact will not cause the heads to bounce against the media surface containing data. The heads should be parked before the drive is shipped or transported for extended distances.

When the heads are parked, the drive heads are deactivated and the indicator lights all go out. The drive must be reset before it can be used again. The heads are automatically activated when the drive is reset.

To park the heads,

Press P

The screen displays:

```
OMNIDRIVE DIAGNOSTIC[x.xx]                    Slot : 1
Park Heads                                  Server : 2
-------------------------------------------------------
Park heads (Y/N)?
```
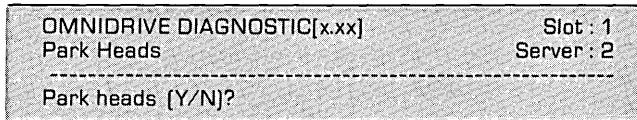
Press Y

The indicator lights go out and the screen displays:

```
Heads parked.

Press <space> to continue.
```
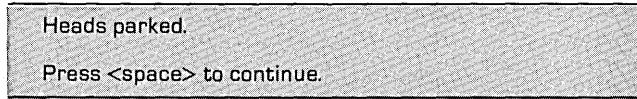
Press ⌈SPACE⌉ to return to the main menu. Exit the diagnostic program and prepare the drive for shipping or transportation.

CHANGING OMNIDRIVE PARAMETERS 4

Three OmniDrive parameters can be changed: the interleave factor, the spare track table and the read after write option. The interleave factor determines how many sectors on a track the head will skip before reading the next sector. The spare track table identifies any tracks that have been replaced because of media defects. The read after write option tells the drive whether to read each sector after it is written.

These three parameters are stored in the drive tables in the firmware. The default settings are:

    Interleave factor   — 9
    Spare Track Table — No spared tracks
    Read After Write   — OFF

The save changes option on the diagnostic program main menu must be used after changing any parameters to write the new values in the drive tables.

WARNING—All data on the drive should be backed up before the interleave factor or the spare track table is modified or changed.

To modify the parameters, from the main menu,

Press M

The screen displays:

```
OMNIDRIVE DIAGNOSTIC[x.xx]                    Slot : 1
Modify Parameters                             Server : 2
------------------------------------------------------------

   L  — List Parameters

   I  — Interleave Factor

   T  — Spare Track Table

   R  — Read After Write

   S  — Save Changes

   E  — Exit
------------------------------------------------------------
Please select an option:
```
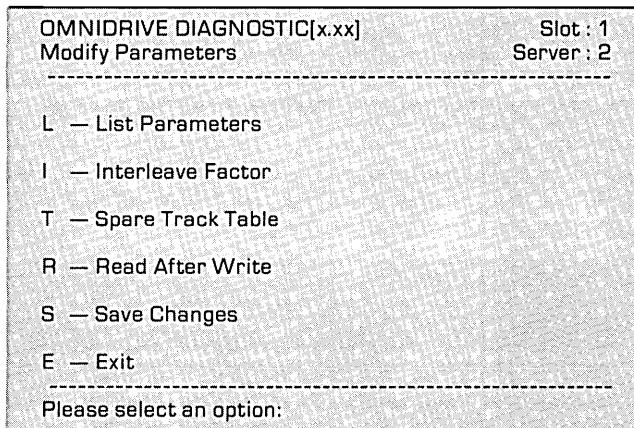
LISTING THE PARAMETERS

First list the parameters to determine the current settings.

Press L

The screen displays:

```
Modify Parameters                             Slot : 1
List Parameters                               Server : 2
------------------------------------------------------------
Spared Tracks : 123 456 789

3 tracks are currently spared.
20 total tracks may be spared.

Interleave Factor: 9

Read After Write: OFF

Press <space> to continue.
```

20
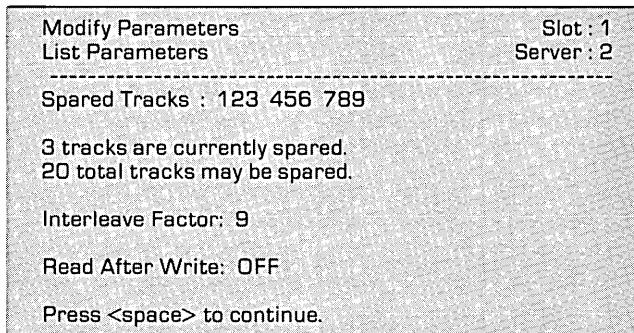
Note the current settings, then **press** [SPACE] to return to the modify parameters menu.

CHANGING THE INTERLEAVE FACTOR

The interleave factor determines the frequency at which the drive controller attempts to read data from or write data to sectors on the drive platters. For example, an interleave factor of 9 means that every ninth sector is written, while an interleave factor of 6 means every sixth sector is written. The default interleave setting of 9 is designed to allow the drive to handle any type of computer. For some computers, an interleave factor of 7 or 6 may yield better performance. The entire drive must be backed up before the interleave factor is changed. The data should be restored to the drive after the new interleave factor is set.

To change the interleave factor,

Press I

A bell may sound and the screen displays:

```
Modify Parameters                        Slot : 1
Interleave Factor                      Server : 2
-----------------------------------------------------
The option you have selected may
destroy data on the drive. Please
make sure that you are talking to
the proper drive.

Continue [Y/N]?
```
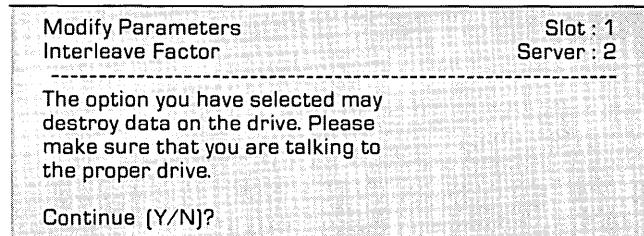
Press Y to change the interleave factor. To exit, **press** N and SPACE to return to the modify parameters main menu.

After **pressing** Y, the screen display is similar to:

```
Enter interleaving: [9]
```

To change the interleave factor, **type** the new number and **press** RETURN .

The screen display is similar to:

```
Enter interleaving: [7]

The interleave factor is [7]

Press <space> to continue.
```

Press SPACE to return to the modify parameters main menu. Go to the section "Saving Changes."

ADDING SPARE TRACKS

The spare track table lists bad tracks that have been removed from use. Tracks containing media defects can be replaced with spare tracks. Each drive has a limited number of tracks that can be replaced. A written record of the spare track table should be kept for future use in case the table is cleared accidentally or the drive is reformatted. Always back up all information before adding spare tracks and restore it afterwards.

To select the spare track table option,

Press T

The screen displays:

```
Modify Parameters                                    Slot : 1
Spare Track Table                                    Server : 2
-----------------------------------------------------------------
A — Add A Track

R — Remove A Track

C — Clear Spare Track Table

L — List Spare Track Table

E — Exit
-----------------------------------------------------------------
Please select option:
```
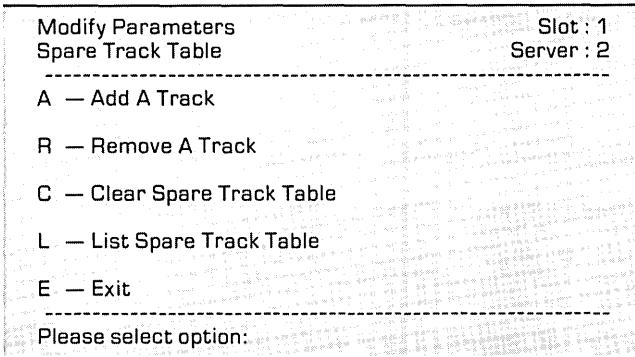
LISTING THE TABLE

First list the spare track table and make a list of any tracks that have been spared. Keep this information for later use.

Press L

The screen display is similar to:

```
Spared Tracks : 123 456 789

3 tracks are currently spared.
20 total tracks may be spared.

Press <space> to continue.
```
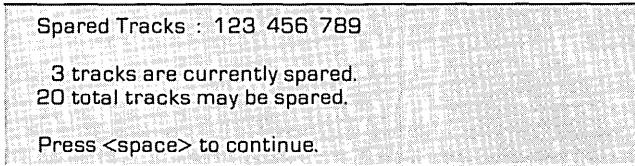
Write down the information, then **press** SPACE to return to the spare track main menu.

23

ADDING TRACKS

Adding tracks to the spare track table replaces a bad track with a good one. Tracks should be added only if they are known to be bad. Use the CRC check to verify the condition of tracks.

One method of fully reconditioning a drive is to to back up all the data, format the drive and run the CRC check. After the CRC check is finished, spare any bad tracks and restore the drive data.

To add a spare track,

Press A

The screen displays:

```
Spare Track Table                              Slot : 1
Add A Track                                    Server : 2
------------------------------------------------------------
Enter track number to be added:
```
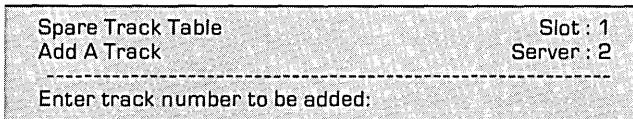
Enter the track to be added to the spare track table. For example, if the CRC check found track 321 defective,

Type 321

Press [RETURN]

The screen display is similar to:

```
Spared Tracks : 123 321 456 789

    4 tracks are currently spared.
    20 total tracks may be spared.

    Press A to add another track or
    Press <space> to continue.
```

24
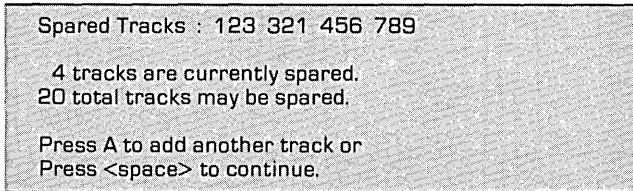
Add all tracks to be spared to the table, then press [SPACE] to return to the spare track table main menu and press E to return to the modify parameters main menu. Go to the section "Saving Changes."

REMOVING TRACKS

Generally, tracks shouldn't be removed from the spare track table. Do not remove tracks unless instructed to do so by an authorized service center.

To remove a track,

Press R

The screen displays:

```
Spare Track Table                                    Slot : 1
Remove A Track                                     Server : 2
-------------------------------------------------------------
Enter track number to be removed:
```
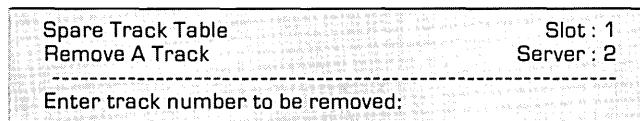
Enter the number of the track to be removed from the spare track table. For example, to remove track 456,

Type 456

Press [RETURN]

The screen display is similar to:
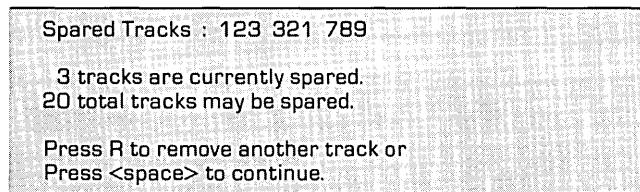
```
Spared Tracks : 123 321 789

 3 tracks are currently spared.
20 total tracks may be spared.

Press R to remove another track or
Press <space> to continue.
```

Press SPACE to return to the spare track table main menu and press E to return to the modify parameters main menu. Go to the section "Saving Changes."

CLEARING THE TABLE

Clearing the table removes all spare tracks from the table. All spare tracks should be recorded before the spare track table is cleared. Do not clear the table unless instructed to do so by an authorized service center.

To clear the table,

Press C

The screen display is similar to:

```
Spare Track Table                              Slot : 1
Clear Spare Track Table                        Server: 2
----------------------------------------------------------
Spared Tracks : 123 321 789

  3 tracks are currently spared.
 20 total tracks may be spared.

This option will clear all tracks
from the table.

Continue? (Y/N)?
```
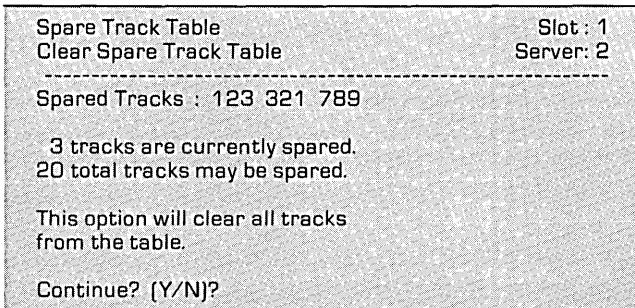
Press Y to clear the spare track table. The screen display is similar to:
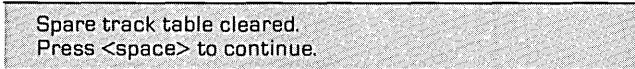
```
Spare track table cleared.
Press <space> to continue.
```

Press SPACE to return to the spare track table main menu and press E to return to the modify parameters main menu. Go to the section "Saving Changes."

26

SETTING READ AFTER WRITE

Read after write means that the OmniDrive reads each sector after writing to it to verify that the data was written correctly. This adds to data reliability but slows down the operating speed. The drive normally has the read after write option OFF.

To change the setting, from the modify parameters main menu,

Press R

The screen displays:

```
Modify Parameters                          Slot : 1
Read After Write                        Server : 2
----------------------------------------------------
  Read after Write(Y/N)?
```

Select the desired setting. For example, to turn read after write ON,

Press Y

The screen displays:

```
Read After Write is ON.

Press <space> to continue.
```

Press [SPACE] to return to the modify parameters main menu. Go to the next section, "Saving Changes."

SAVING CHANGES

Changes made to the interleave factor, spare track table or read after write must be saved to become permanent. If the diagnostic program is exited without saving the changes, the changes will not be made in the drive tables.

To save the changes, from the modify parameters main menu,

Press S

The screen displays:

```
Modify Parameters                              Slot : 1
Save Changes                                 Server : 2
--------------------------------------------------------
You are about to destroy data
on the drive. Continue [Y/N]?
```
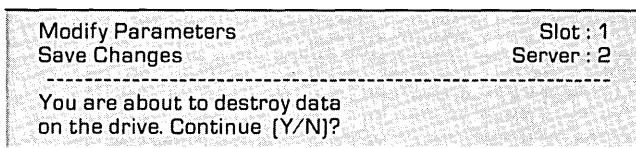
Press Y to save the changes. To retain the original values, **press** N. If Y is pressed, the screen displays:

```
Parameters Updated.

Press <space> to continue.
```
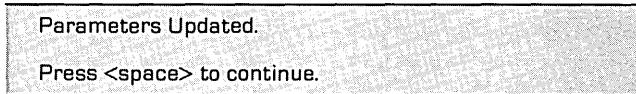
If no changes have been made, the screen displays the modify parameters main menu.

Press [SPACE] to return to the modify parameters menu, then **press** E to return to the diagnostic program main menu.

28

FORMATTING THE OMNIDRIVE | 5

Formatting the drive clears all data from the drive, including the volume and file structure. Formatting the drive should be done only after other troubleshooting attempts have not solved the problem.

After the drive has been formatted, the firmware must be updated. It is recommended that a CRC check for bad tracks be run at this point, and the spare track table updated, if necessary. The data should be restored after all the diagnostic procedures are completed and the system is reinitialized using the system generation program.

WARNING: Formatting will completely destroy all data on the drive. Back up the drive before starting the format procedure and restore the data after the procedure is completed. There is no way to recover data destroyed during formatting.

If the drive is not ready but the fault and busy lights are on, the drive may need to be formatted. If only the busy light is lit, or if the lights flicker on and off, the drive is probably in sound mechanical condition but may need reformatting. After formatting, update the firmware, check for bad tracks, then modify the parameters as needed. When the drive is reset, it should come ready. If it does not, call an authorized service center.

Run the diagnostic program from diskette to format the OmniDrive.

To format the drive, from the diagnostic program main menu,

Press F

A bell may sound and the screen displays:

```
OMNIDRIVE DIAGNOSTIC[x.xx]                          Slot: 1
Format Drive                                        Server: 2
------------------------------------------------------------
The option you have selected may
destroy data on the drive. Please
make sure that you are talking to
the proper drive.

FORMAT and UPDATE options require the
diag block and firmware files to be on
a controller other than the target
drive.

Continue [Y/N]?
```
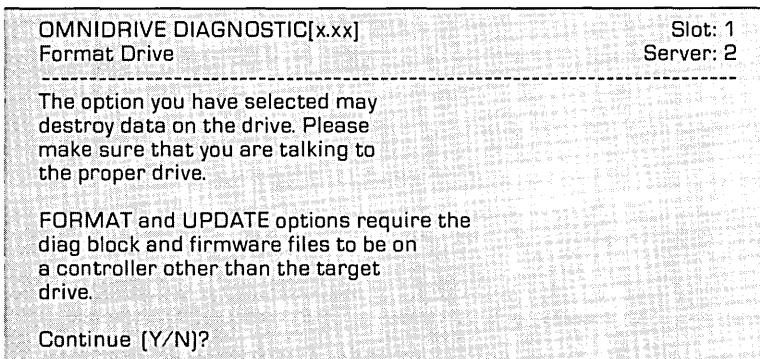
The DIAG.DATA and the FODRX.X.DATA files should be on the floppy diskette containing the diagnostic program.

Press Y

The fault and ready indicator lights on the drive should both be on. The screen displays:

```
Enter the format password:
```

The password is ODFORMAT.

Type ODFORMAT

Press [RETURN]

The format procedure begins immediately.
The screen displays:

```
Format in progress. Format takes
from 1 to 6 minutes.
```

The busy light remains on during formatting.
When the drive is formatted, the screen display
is similar to:

```
Format complete.
Enter firmware file name: [FODRx.x]
```

Press [RETURN] if the firmware file name
shown is correct; otherwise, type the correct
name and press [RETURN] .

The screen displays:

```
Reading firmware from FODRx.x.DATA
. . . . . . . . . . . . . . . . . . . . . . . . . . . .
Firmware written.
Press <space> to continue.
```

The formatting and firmware update are
complete. Press [SPACE] to return to the
diagnostic program main menu.

After the drive has been formatted, it must be
initialized using the system generation program
before data can be restored to it. It is
recommended that a check for bad tracks be
made and the spare track table updated before
the data is restored to the drive.

DIAGNOSTIC
RECORDS

SYSTEM MANAGER'S DIAGNOSTIC RECORD

	Date	Diagnostic Performed
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		

SPARE TRACK TABLE

Track	Date Spared	Track	Date Spared
1		11	
2		12	
3		13	
4		14	
5		15	
6		16	
7		17	
8		18	
9		19	
10		20	