

NETWORK
DIAGNOSTICS
GUIDE
FOR THE
IBM PC

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**Network
Diagnostics Guide**

**for the
IBM PC**

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About this Guide

This guide explains the mass storage diagnostic program for OmniDrives.

The mass storage diagnostic program is used to detect and correct certain types of hardware and software problems that may develop in the OmniDrive.

CHAPTER OVERVIEW

Chapter 1 describes tools used to determine and correct problems with the OmniDrive. This chapter also explains entering the diagnostics program.

Read Chapter 1 for an overview of the diagnostics program—the chart on page 12 will help you to identify your OmniDrive’s diagnostic problem. Go to the chapter that addresses that particular diagnostic problem.

Chapter 2 explains checking and updating the firmware.

Chapter 3 outlines how to exercise the drive, find media defects on the drive, and prepare the drive for transportation.

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

Chapter 5 discusses formatting the drive.

Chapter 6 highlights the application of advanced options in the diagnostics program.

Chapter 7 discusses Omninet diagnostics and how to list active devices on the network and to send test messages.

Appendix A is a chart of drive error codes.

Appendix B is a table to be used by the network manager as a record of all diagnostic tests run on OmniDrives.

Conventions

Throughout this guide, *type* means to enter two or more characters 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:

Do not 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. Do not type out each letter of the word in the keytop symbol.

Examples:

Press Y

Press [RETURN]

When the command *type* or *press* appears in boldface 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 displays stand for software revision numbers.

The variable **NN** in the log-on displays stands for the number of the server that is providing the boot information.

The terms **boot** and **reboot** refer to loading and reloading the operating system into a computer.

The term **server** refers to the combination of a disk server and a disk drive. The term **server** also refers to an **OmniDrive**. Disk drives need an external disk server to communicate on the network while the **OmniDrive** has a built-in server.

The term **mass storage system** refers to an **OmniDrive**, a disk drive with a disk server, or a **Corvus Bank**.

The term **Omninet** refers to a **Corvus** network system. **Network** refers to one or more computers that use **Constellation II** software and are attached to one or more **OmniDrives**.

The term **default** refers to the value or option that is assigned by **Constellation II** when another has not been specified by the user.

Before You Begin

Back up the Omnidrive on a regular basis to avoid loss of valuable data. It is recommended that at least one backup be made prior to using the diagnostic program. Please refer to the *Network User's Guide for the IBM PC* in the chapter "Volume Backup and Restoration." If you have a Bank or a Mirror Server, refer to their respective guides to back up data. You can also use the IBM MS-DOS BACKUP command to back up data.

The diagnostic program should be administered only by the person responsible for maintaining the OmniDrive and the network. To prevent data loss, all other users should avoid working on the network while the diagnostic program is in operation.

To format the drive, update firmware, or to spare tracks, a backup is required to preserve the data on the drive. For these programs, you *must* run the diagnostic program from the diagnostic diskette CORMS32 instead of from Constellation II on the OmniDrive. It is recommended that you run all diagnostic programs from the CORMS32 diskette.

When possible use the diagnostic program with the drive attached to a computer by convenience connector.

Contact an authorized Corvus Service Center for problems beyond the scope of this guide's diagnostics.

Chapter 1

Overview of Drive Diagnostics

Contents

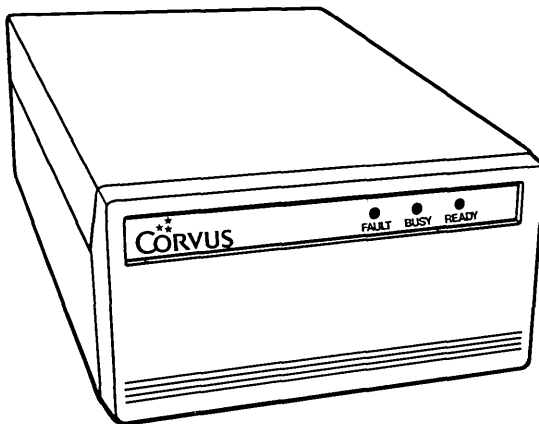
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15	Entering the Diagnostic Program
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Introduction

This chapter describes methods of diagnosing drive problems. A chart of possible problems and their solutions is presented. This chapter also explains how to enter the diagnostic program from both Constellation II and from floppy diskette. Run the program from diskette whenever the drive containing the program is inoperable.

Diagnostic Tools

The drive has three lights on the front panel to indicate its status. The left light is the fault indicator light, the center is the busy light, and the right light is the ready light. The patterns displayed by these lights can help identify some problems.



Indicator Lights

When the drive is ready, only the ready light should be on. During normal operation, the busy and ready lights flicker as data is transferred to and from the drive.

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

Indicator lights may also display unusual patterns because of hardware problems. For example, if only the busy light is on, there may be a problem with the firmware.

If hardware problems are suspected and the indicator lights are displaying unusual patterns, review the chart on the following page. This chart lists some common drive problems and possible solutions. Note however, that many problems can be caused by improper equipment connection. Be certain to plug in all equipment properly.

Refer to the chart below when you need to check drive diagnostic problems.

Problem/Condition	Possible Cause	Possible Remedy
Drive indicator lights are off and fan is off.	No power.	Check power cord connection. Make sure drive is turned on.
Indicator lights are off and fan is on.	Controller or power supply	Reset drive.
Indicator lights are on but the drive does not become ready.	Faulty drive.	Reset drive.
Indicator lights are on but computer cannot communicate with the drive.	Faulty Omninet connection or incorrect Omninet address settings.	Check all Omninet connections. Check Omninet address settings. Reset drive.
Disk read or write errors occur.	Media defects.	Check for bad tracks.
Drive ready but does not respond to computer.	Bad connections or switch 7 set incorrectly.	Check connections and switch 7, then reset drive.
Fault light is on.	No firmware or firmware is faulty.	Update firmware.

Read all of this chapter. When you refer to the chart above, find a diagnostic solution and go to the appropriate chapter and section that will solve the diagnostic problem.

Mass Storage Diagnostic Program

The mass storage diagnostic program checks the drives for causes of operating failure and is primarily a troubleshooting program. The diagnostic program contains options that detail features of the drive and also rectify certain problems such as drive firmware and media defects.

The diagnostic program should be operated by the network manager. Because some options can cause permanent data loss, be certain to read about each option carefully. To learn how to enter and run the diagnostic program, continue on to the next section.

Entering the Diagnostic Program

Although not recommended, the diagnostic program can be run with the computer and drive connected to the network. However, Corvus engineers suggest using the diagnostic program with the drive attached locally to the computer. Isolating a drive ensures the correct drive is subjected to diagnostic operations and helps prevent accidental data loss.

Connect the OmniDrive directly to a computer using the convenience connector, supplied with the OmniDrive, to link the tap cables. To do this, turn off all equipment and unplug the OmniDrive tap cable from its network tap box. The other end remains connected to the OmniDrive. Plug the free end of the tap cable into the convenience connector.

Next, unplug the tap cable of the computer from its network tap box. Insert that free end into the convenience connector.

The drive should be connected to the IBM PC and turned on before you enter the diagnostic program.

Again, to format the OmniDrive, update firmware or to spare tracks, the CORMS32 diskette must be used. It is always recommended that you use the CORMS32 diskette to run all diagnostics tests.

To enter the diagnostic program from floppy diskette, go to page 20.

To enter the diagnostic program from Constellation II, follow the instructions on the following page.

FROM CONSTELLATION II

1. **Turn on all Corvus equipment.**
2. **Turn on the IBM PC.**
3. **Log on as the system manager.**

Log on as IBMGR with the password HAI. After you log on, the Corvus management utility main menu appears.

4. Enter the maintenance utilities.

Press M

The screen displays the maintenance utilities main menu:

```
CORVUS UTILITY [x.xx]      Server:
Maintenance Utilities Drive  Drive:
```

```
D - Mass Storage Diagnostic
O - Ominet Test
```

```
P - Pipes Management
F - Semaphore Management
M - Multiplexer Management
```

```
U - Update Utilities
```

```
S - Select Drive
L - List Drives
E - Exit
```

```
-----
Please select an option: _
```

5. Select the mass storage diagnostic program

Press D

The screen displays a map of all active stations and servers on the network, then displays:

Select server number [0..63]: 0

6. Select the server number.

The server number is the Omninet address of the OmniDrive.

Type the address for the OmniDrive, then

Press [RETURN]

After you enter the server and drive information, the screen displays the diagnostic main menu:

MDIAG [x.xx]: Corvus Mass Storage Diagnostic
(c) Copyright 1985 Corvus Systems Inc. Slr:1 Srv: 0

- D - Select Drive
- V - Version Check
- P - Park Heads for Shipment
- X - Exercise Drive
- C - Check for Bad Tracks
- S - Show Results

- F - Format Drive
- U - Update Firmware
- M - Modify Parameters

- N - Set Diag Data File Name
- A - Advanced Options

- E - Exit

Select diagnostic option:

Select a diagnostics option from the menu and refer to the chapter that discusses that particular diagnostic problem.

FROM FLOPPY DISKETTE

Follow the steps below to enter the program from floppy.

1. Insert the diagnostic diskette in the computer.

Insert the diskette labeled *CORMS32* in drive A of an IBM PC, PC XT, or PC AT.

2. Turn on the IBM PC.

After a moment, the screen displays:

D - Mass Storage Diagnostics

T - Transfer Manager

O - Omninet Test

L - List Drives

.....

Please select an option

Press D

The screen displays a map of all active stations and servers on the network, and displays:

```
MDIAG [x.xx]: Corvus Mass Storage Diagnostics
```

```
Select Drive                               Slr:1  Srv:0  
-----
```

```
-----  
Active network node: (*x* indicates this node)  
0* . . . . .  
. . . . .  
. . . . .  
. . . . .
```

```
Select server number [0..63]: 0
```

3. Select the server number.

The server number is the Omninet address of the OmniDrive.

Type the address for the OmniDrive.

Press [RETURN]

For Corvus drives, you must also specify the physical drive number.

After you enter the server and drive information, the screen displays the diagnostic main menu.

Select a diagnostics option from the menu and refer to the chapter that discusses that particular diagnostic problem.

Chapter 2

Firmware Diagnostics

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- 29 Updating the Firmware**

Introduction

This chapter presents two diagnostic procedures for drive firmware. The two procedures used to diagnose and correct firmware problems are *version check and firmware update*.

Firmware is the factory-supplied software that enables the computer to communicate with the drive. If there is no firmware on the drive or faulty firmware exists, then the computer cannot work with the drive.

The version check option is used to determine the current firmware version and other drive information, such as the drive size and type. The firmware update option transfers a firmware file from a floppy diskette or another drive to the OmniDrive. Update the firmware after a format, if there is no firmware on the drive, or if suggested by an authorized Corvus service representative.

Checking the Version

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

To check the version,

Press V

For OmniDrive systems, the screen display is similar to:

Drv	P/V	Capacity	Size/Rev	SPT	TPC	CPD
1	P	32472	16 mb/0	18	6	306
ROM	DB	Firmware				
21	7	ODRV.1.7 -- CONST II - 09/84				

.....

SPT = Sectors (512 bytes) per track
TPC = Tracks per cylinder
CPD = Cylinders per drive
ROM = Drive ROM version number
DB = Diag block version number

.....

Press <space> to continue, or press F to list to a file.

The firmware version is a number, **ODRV.1.7** for OmniDrives. The version number should be 1.7 or higher for OmniDrives. The firmware is the drive's operating system software and is replaced when firmware is updated. Keep a copy of the firmware version for future reference.

Another firmware version number is listed under **ROM** (Read-Only Memory). This firmware is a permanent part of the drive's hardware and cannot be changed except by authorized service centers.

Other information displayed in the version check are attributes of the drive. For example, the drive number is listed under **Drv**. An OmniDrive is always drive 1. Type of drive, physical or virtual, is listed under **P/V**. An OmniDrive does not have a virtual drive option and should always display the letter **P**.

Capacity is measured in 512-byte blocks and indicates the drive's storage capability. This number will vary depending on drive size. For OmniDrive systems, the nominal drive size and type of drive is listed under **Size/Rev**. The size shown is the rated size of the drive. The rev shown should always be **O**, for OmniDrive.

Also displayed are the number of sectors per track (SPT). The mass storage system is divided into sections so that it can access information quickly. The drive is divided into cylinders (CPD: cylinders per drive), which are divided into tracks (TPC: tracks per cylinder), which are in turn divided into sectors.

The version of the data block file is found under **DB**.

After reviewing the version check, write down the version information before returning to the diagnostic main menu.

To return to the main menu,

Press [SPACE]

Updating the Firmware

To update firmware, use the CORMS32 diagnostic diskette.

The firmware code is contained in the file ODRV.FIRMWARE or DSRV.FIRMWARE for Corvus drives. The version numbers should be 1.7 or greater for OmniDrives, and 18.6 or greater for Corvus drives. The firmware file is on the same diskette as the diagnostic program.

The diagnostic main menu should be displayed.

Select the update firmware option from the main menu.

Press U

The screen display is similar to:

```
The selected option may destroy data on the drive.  
Ensure the correct device is selected.
```

```
Selected device is slot 1, server 0, drive 1
```

```
Continue? [Y/N]:
```

To proceed with the update, press Y.

The screen displays:

Change drive tables? [Y/N]: N

The drive tables are a segment in the firmware block and are updated throughout the diagnostic process. Drive tables group together parameter information such as drive capacity, spare track table, interleave factor and read after write status. For Corvus drives, the virtual drive offset table is included.

Changing the drive tables can destroy data on the drive. Unless all data on the drive has been backed up or is not needed, do not change the drive tables.

When these tables are changed, the spare track table is cleared, the interleave factor is set to 9, the read after write is set to OFF, and the virtual drive offset table is set to 0.

It is suggested that you keep the current tables.

Press [RETURN]

The screen displays:

Enter firmware file name: ODRV.FIRMWARE

The diagnostic program will read the firmware data file from the floppy diskette when the diagnostic program is run from the diskette.

Press [RETURN]

Once the correct names are entered, the screen displays:

```
Firmware file message: ODRV.1.7 -- CONST II - 09/84
```

```
Continue? [Y/N]:
```

Recall that the firmware version number for OmniDrive systems must be 1.7 or higher.

If the firmware version is correct, update the firmware.

Press Y

The screen displays:

```
Moving firmware from file ODRV.FIRMWARE to drive
.....
Drive firmware updated.
Reset device -- Turn drive power off then on again.

Press <space> to continue
```

In order for the firmware to be updated on the drive, the OmniDrive must be reset. Press [SPACE] to return to the diagnostic main menu. The firmware is now updated. To reset the drive, turn it off, then on again.

Chapter 3

Hardware Diagnostics

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Introduction

In this chapter, three hardware diagnostics options are detailed. Two options, exercising the drive and checking for bad tracks, check drive hardware for problems in data storage. A third option prepares the drive to be shipped or moved.

Exercising the Drive

Exercising the drive checks the movement of the read-write heads across the platters in the drive mechanism. This test makes sure the heads move freely while also checking for hard and soft data errors. A hard error in this test indicates the read-write heads could not find the track on the platter surface. A soft error is a read-write error that has been detected by the drive controller.

The detection of hard and soft errors indicate media problems that can result in data loss. Keep a record of errors. Follow the steps on the next page to determine hard and soft errors.

To exercise the drive,

Press X

The test begins. To stop the exercise manually, **press [SPACE]**.

After the test is finished, the screen display is similar to:

Test results summary:

Drive	1
Pass	80
Soft Errors	0
Hard Errors	0

.....

Press <space> to stop test

If several hard errors are detected, back up all data and check for bad tracks. Hard errors usually indicate media damage that results in data loss.

If few or no soft errors appear, the drive should be in good operating condition.

If a large number of soft errors are detected, update the firmware and exercise the drive again. If soft errors persist, check for bad tracks and refer to the following section.

To return to the diagnostic main menu,

Press [SPACE]

To check for bad tracks, follow the instructions in the next section.

Checking for Bad Tracks

This test performs a cyclical redundancy check (CRC) of the magnetic media on the drive platter surfaces. The test is designed to read all sectors on a particular cylinder, advancing through the entire drive. A CRC determines if an error has occurred in the reading, writing, or transmission of data. If errors are discovered, bad tracks are noted.

Media defects causing 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.

Also check for bad tracks if soft errors have noticeably increased and a firmware update does not prevent further increases.

Check for bad tracks at least three consecutive times if any are discovered in the first test. If a track is designated as bad after a third check, it is defective and should be corrected.

If bad tracks appear within tracks 0 through 7, the OmniDrive is defective. Refer to Chapter 5 and follow steps to format your OmniDrive. Remember to back up all the data on the OmniDrive before formatting it. Also record tracks that have been spared in the Spare Track Table in Appendix B. Record the interleave factor also.

Correcting a bad track involves a process known as sparing. When a bad track is spared, an entry in the spare track table tells the drive controller to skip that track when data is written to the drive. Since all subsequent tracks are bumped up by one, data *must* be backed up before tracks are spared.

For example, if track 280 is spared, it will no longer exist. Track 281 will become 280, 282 will become 281, etc.

The diagnostic program can automatically correct or spare bad tracks if so designated. The network manager can choose to automatically correct bad tracks at the end of a CRC, or use a separate option and manually spare them. All data on the drive should be backed up if any tracks are to be spared.

For specific information and directions on manually correcting bad tracks, refer to the section "Sparing Bad Tracks" in Chapter 4.

The diagnostic main menu should be displayed. To check for bad tracks,

Press C

The screen display is similar to:

```
Check for bad tracks? [Y/N]:
```

To begin the test,

Press Y

The screen display is similar to:

```
This test takes about 2 minutes.
```

```
Test in progress ....
```

Very large drives will require more time for the test. The test is performed automatically. The busy light flashes during the test.

If no bad tracks are discovered, the screen display is similar to:

No blocks with CRC errors found

Press <space> to continue

If bad tracks are discovered, 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, or press F to list to a file.

It is a good idea to keep a record of bad tracks found during a CRC. Write down the results in the Appendix B for future reference. After recording the results,

Press [SPACE]

The screen displays:

Add indicated track(s) to spare track table? [Y/N]: N

The diagnostic program can automatically spare bad tracks found in the CRC. However, if you choose to automatically add tracks, data is destroyed from the point of the first added track to the end of the drive. Only add tracks automatically to the table if you have already backed up data on the drive.

If data has not been backed up or if you would rather manually add tracks, press N. The diagnostic main menu reappears. Go on to Chapter 4 to learn how to spare bad tracks. Remember to back up data that cannot be replaced before sparing tracks.

Go to Chapter 4 under the section "Adding Tracks to the Spare Track Table" to add the bad tracks that you have written down to the spare track table.

Parking the Heads

Use this option before shipping or transporting the drive for extended distances. Parking the heads moves them over an area on the disk containing no data so that a sudden impact will not damage any media surfaces containing data.

Parking the heads deactivates them and all the indicator lights go out. Before the drive can be used again, it must be reset by turning the OmniDrive off and on to activate the heads.

To park the heads,

Press P

The screen displays:

```
Park heads? [Y/N]: Y
```

Press [RETURN]

The indicator lights go out, and the screen displays:

Heads parked.
Drive must be reset or turned on to be used.

Press <space> to continue

To return to the main menu,

Press [SPACE]

Exit the diagnostic program and prepare the drive for shipping or transportation.

Chapter 4

Modifying Drive Parameters

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- 65 Saving Changes**

Introduction

In this chapter, options used to alter drive parameters and correct media defects are discussed.

The options available to change drive parameters and correct media defects are found in the modify parameters option of the diagnostic main menu.

Modifying OmniDrive Parameters

Three OmniDrive parameters can be changed: the interleave factor, spare track table, and 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 or not to read each sector after it is written.

For an OmniDrive, these three parameters are stored in the drive tables in the firmware. The default settings are as follows:

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

Also contained in the modify parameters option is the add tracks to spare track table option. This option is used to spare bad tracks.

To change drive parameters or correct bad tracks, select the modify parameters option.

From the diagnostic main menu,

Press M

For OmniDrive systems, the screen display is similar to:

```
Parameters for Slot 1, Server 0, Drive 1
Interleave: 9
Read After Write: NO
No track(s) currently spared. 28 more track(s)
may be spared.
```

- I - Modify Interleaving
- R - Modify Read After Write

- A - Add Track to Spare Track Table
- D - Delete Track from Spare Track Table
- C - Clear Spare Track Table

- E - Exit to Main Level

Select diagnostic option:

The number of tracks available to spare will vary according to the size of the drive. In the above example, 28 tracks can be spared on a 16-Megabyte (MB) OmniDrive.

After the modify parameters main menu appears, go on to appropriate sections to learn how each option works.

Modifying 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 every ninth sector is read, while an interleave factor of 6 means every sixth sector is read. The default interleave setting of 9 is designed to optimize drive performance for most computer types.

Do not change the interleave factor unless instructed to do so by your Corvus dealer. Back up the drive before changing the interleave factor; changing the interleave will render all current data inaccessible.

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

The modify parameters main menu should be displayed.

To change the interleave factor,

Press I

The screen display is similar to:

Enter new Interleave: 9

Type the new interleave factor number and **press** [RETURN].

The new interleave factor is then displayed in the drive parameters section.

To keep the current interleave factor of 9,

Press [RETURN]

If changes were made, go to the section "Saving Changes" at the end of this chapter.

Sparing Bad Tracks

When a bad track is found, it must be corrected or added to the spare track table. The process used to add a bad track to the spare track table is known as sparing. When a track is added, it is flagged as bad to prevent data from being stored there.

To spare a bad track, use the add track to spare track table option. Two other options are available when sparing bad tracks. One is deleting tracks from the spare track table, the other is clearing the spare track table.

Use the delete track from spare track table option if a track is spared in error. Only one track may be deleted at a time. The clear spare track table option may be used to delete all spare tracks at once.

ADDING BAD TRACKS TO THE SPARE TRACK TABLE

Check for bad tracks (CRC) to verify the condition of all tracks on a drive. Use the add track to spare track table option when bad tracks are discovered during the CRC. However, if the maximum number of tracks are already spared (28), go to Chapter 5, "Formatting the Drive." When a drive is formatted, the number of bad tracks may be reduced.

Data will be lost when using the add track option. Always back up data before sparing tracks and restore it when finished.

If a track is spared by mistake, delete it immediately. Data will not be lost if no data is placed over or beyond the added track. Use the delete a track option following the instructions in the next section.

The modify parameters main menu should be displayed.

To spare a bad track,

Press A

The screen displays:

Enter track number to be added:

Enter the track to be spared. For example, if the CRC found track 321 defective,

Type 321

Press [RETURN]

The screen display is similar to:

```
Parameters for Slot 1, Server 0, Drive 1
Interleave: 9
Read After Write: NO
Spared Tracks: 321
1 track(s) currently spared. 27 more track(s)
may be spared.
```

Add all tracks to be spared by repeating the above process.

If spare tracks were added, go on to the section "Saving Changes."

DELETING TRACKS FROM THE SPARE TRACK TABLE

This option may be used to remove a track if one was spared in error. If a track is added by mistake and data was not backed up, data may be saved if (1) no data was sent over or beyond the track, and (2) the track is deleted from the spare track table.

Generally, tracks should not be deleted. Do not remove tracks unless instructed to do so by an authorized Corvus service center or unless you put a track in the spare track table accidentally.

The modify parameters main menu should be displaying.

To delete a track,

Press D

The screen displays:

Enter track number to be removed:

Enter the track number to be deleted. From the previous example, remove track 321.

Type 321

Press [RETURN]

The screen display is similar to:

```
Parameters for Slot 1, Server 0, Drive 1
Interleave: 9
Read After Write: NO
No track(s) currently spared. 28 more track(s)
may be spared.
```

After removing tracks, go on to the section "Saving Changes."

CLEARING THE SPARE TRACK TABLE

When the spare track table is cleared, all spared tracks are removed. Record all spared tracks before clearing the table. Use this option if all spare tracks are to be deleted.

However, when a drive is formatted and the firmware updated, the spare track table is cleared. If all tracks must be cleared but a format is not necessary, use this option. Add spare tracks again as needed.

Do not clear the table unless instructed to do so by an authorized Corvus service center.

The modify parameters main menu should be displayed.

To clear the table,

Press C

The screen displays:

This option deletes all tracks from the table.

Continue? [Y/N]:

To clear the spare track table,

Press Y

All spared tracks are cleared from the table.

If changes were made, go to the section "Saving Changes."

Setting Read After Write

If read after write is set to ON, the OmniDrive reads each sector after writing to it, verifying that data sent was written correctly. This adds to data reliability but slows down the operating speed. The drive normally has the read after write option OFF.

Change the setting from the modify parameters main menu.

Press W

The screen displays:

Read after Write? [Y/N]:

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

Press Y

The screen displays:

```
Parameters for Slot 1, Server 0, Drive 1
Interleave: 9
Read After Write: YES
No track(s) currently spared. 28 more track(s)
may be spared.
```

Pressing Y or N returns you to the modify parameters main menu with the new read after write setting. If a change was made, go to the section "Saving Changes."

Saving Changes

Changes made to the interleave factor, spare track table or read after write option must be saved to become permanent. If you exit without saving changes, the changes will not be made.

Once changes are made, a save changes option appears in the modify parameters main menu. To save changes before exiting,

Press S

The screen displays:

```
You are about to destroy data on the disk.  
Continue? [Y/N]:
```

Selecting the save changes option after setting read after write will not produce the screen above.

Parameter modifications are not actually written to the drive until changes are saved. This is the last opportunity to prevent changes from being made.

To retain the original values, press N. The diagnostic main menu reappears. To save the changes,

Press Y

The screen displays:

Parameters updated.

Press <space> to continue

Press [SPACE]

The modify parameters menu reappears. To return to the diagnostic program main menu,

Type E

If you make changes and try to exit the program before exercising the save changes option, the screen displays:

Warning: Changes have not been saved.
Do you wish to save changes? [Y/N]:

To retain the original values, press N. The diagnostic main menu reappears. To save changes permanently,

Type Y

The screen displays:

```
You are about to destroy data on the disk.  
Continue? [Y/N]:
```

For this example, choose to save the changes.

Type Y

The screen displays:

```
Parameters updated.  
Press <space> to continue
```

To return to the diagnostic main menu,

Press [SPACE]

Chapter 5

Formatting the Drive

Contents

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Introduction

The format option can correct some drive problems and errors. Formatting structures a drive by laying down patterns. Some of these patterns enable the disk to pick up data at specific points on a drive. Formatting also provides patterns for error detection. However, before these patterns are placed on a drive, the formatting procedure clears all data from the drive, including the volume and file structure. To save data stored on a drive, back up the drive before formatting; there is no way to recover data destroyed during formatting.

Format a drive when (1) a check for bad tracks (CRC) lists many errors, (2) a notable and continuous increase in soft errors occurs before and after updating the firmware and sparing bad tracks, and (3) the spare track table reaches its maximum entry capacity. If the spare track table does reach its maximum capacity, you should call an authorized Corvus service center for additional instructions.

Before you format a drive, you should record the bad tracks and respare them to the spare track table after the format is completed.

After the drive has been formatted, update the firmware. Then, run several CRC checks for bad tracks and spare bad tracks as necessary. Finally, initialize the drive with the system generation program before restoring data.

Formatting the Drive

Format the drive from the diagnostic program main menu.

Type F

The screen displays:

The selected option may destroy data on the drive.
Ensure the correct device is selected.

FORMAT and UPDATE options require the firmware file
to be on a controller other than the selected device.

Selected device is slot 1, server 0, drive 1.

Continue? [Y/N]:

After making sure you have selected the correct server and
drive, continue the format.

Type Y

The screen displays:

**Reminder: Firmware MUST be updated after the
drive format.**

Continue? [Y/N]:

Type Y

The screen displays:

Enter the format password:

The password is ODFORMAT.

Type ODFORMAT

The password will not appear on the screen.

Press [RETURN]

The format procedure begins immediately. The screen displays:

Format in progress.
Format takes about 1 minute.

For large capacity drives, the format takes longer than one minute.

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

Format complete.

Enter firmware file name: ODRV.FIRMWARE

If the firmware file name is correct,

Press [RETURN]

The screen displays:

Firmware file message: ODRV.1.7 -- CONST II - 09/84

Continue? [Y/N]: Y

If the firmware version is 1.7 or higher,

Press [RETURN]

If a different firmware version is to be placed on the drive, enter the correct version and press [RETURN].

The screen displays:

```
Moving firmware from ODRV.FIRMWARE to drive
.....
Drive firmware updated.
Press <space> to continue
```

In order for the firmware to be loaded into the drive, the drive must be reset. Turn the OmniDrive off, then on again. Press [SPACE] to return to the diagnostic main menu.

The formatting and firmware updates are now complete. The ready light reappears, and the screen displays the diagnostic main menu.

After formatting, check for bad tracks (sparing any if necessary). Then, initialize the drive with the system generation program before restoring data. Remember to use the add option from the pipes management menu in the Maintenance Utilities program after restoring the data if you have a PIPES volume in the data being restored.

Chapter 6

Advanced Options

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81	Advanced Options
83	Sending Commands
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89	Reading Diag Block File
90	Filling the Drive with a Pattern

Introduction

This chapter discusses setting the disk diagnostic file name and advanced options. Some of these options may be used to manually construct disk commands. Advanced options may also be needed when writing application software. However, use of these options should be restricted to those with advanced knowledge of Corvus equipment and software.

Do not access the set diagnostic data file name option or the advanced options unless instructed to do so by an authorized Corvus service center. These functions are generally relied upon for testing purposes by Corvus engineers. Use of these options can result in permanent data loss.

For more information regarding advanced diagnostics options, refer to the *Mass Storage General Technical Information Guide* that is available from Corvus Customer Service.

Setting the Diagnostic Data File Name

This option contains the diagnostic data file name. The default file name can be changed so that the diagnostic program will look to a different file for diagnostic information. Setting the file name is sometimes used in conjunction with the advanced options. Unless otherwise instructed, do not change the file name.

To set the diagnostic data file name from the main menu,

Press N

The screen displays:

```
Enter diag data file name: ODRV.DIAG.DATA
```

To accept the current file name,

Press [RETURN]

To change the file name, type in the new name and **press [RETURN]**.

The new name is now set until the program is exited or a different device is selected.

Advanced Options

Advanced options contain five command blocks which allow manual operation of the diagnostic program; send command to drive, read firmware from drive, read diag block from drive, set drive diag mode, and reset drive diag mode. Do not access these commands unless instructed to do so by an authorized Corvus service center. Unsupervised use of these options can result in permanent data loss.

Two other advanced options include filling the drive with a pattern and the network map. The filling drive with pattern option may be likened to a format—and is as destructive as a format. Also like a format, data must be backed up, firmware updated, a CRC run, and the drive must be initialized with the system generation program before data can be restored.

The filling drive with pattern option is used primarily by Corvus engineers to test the reliability of data patterns.

To select advanced options,

Press A

The screen displays:

- C - Send Command to Drive
- F - Read Firmware from Drive
- D - Read Diag Block from Drive

- S - Set Drive Diag Mode
- R - Reset Drive Diag Mode

- X - Fill Drive with Pattern
- N - Network Map

- E - Exit to Main Level

Select diagnostic option:

Choose the appropriate option and go to the corresponding section on the following pages.

SENDING COMMANDS

This option asks for specific data to send to the drive. Necessary data to send includes the command's length (i.e., number of bytes in a command) and value.

To send a command to the drive,

Press C

The screen displays:

The selected drive option may destroy data on the drive. Ensure the correct device is selected.

FORMAT and UPDATE options require the firmware file to be on a controller other than the selected device.

Selected device is slot 1, server 0, drive 1.

Continue? [Y/N]:

To return to the advanced options main menu, press N.

To continue,

Press Y

The screen displays:

Number of bytes to send to device: 0

Enter the correct number of bytes in the command. For example, if the number of bytes is 1,

Press 1

Press [RETURN]

The screen displays:

Byte 1 = 0

To accept the default,

Press [RETURN]

The screen displays:

```
Bytes to be sent: 1
```

```
00 *.*
```

```
OK to send command? [Y/N]:
```

To send the command to the drive,

Press Y

The screen displays:

```
Command sent
```

```
Bytes returned: 1  
8F *.*
```

```
Press <space> to continue
```

Press [SPACE] to return to the advanced options main menu.

Repeat the above process to send additional commands. Refer to the *Corvus Mass Storage Systems General Technical Information* manual for disk command definitions.

READING FIRMWARE

This option reads the firmware from the drive and writes it to a file in UCSD P-system format. You must have made a copy of the CORMS32 diskette and left the write-protect tab off, or have a volume mounted for IBMGR to be able to write the firmware to a file.

To read the firmware,

Press F

The screen displays:

Enter name of NEW firmware file:

Type the name of the file.

Press [RETURN]

The screen display is similar to:

Read 40 blocks of firmware? [Y/N]: Y

Press [RETURN]

The screen displays:

```
Moving firmware from drive to file FILE
.....
Press <space> to continue
```

where FILE is the name of the new file.

To return to the advanced options main menu,

Press [SPACE]

READING DIAG BLOCK FILE

Similar to reading firmware from the drive, this option reads the diagnostic block file from the drive and writes it to a file in UCSD P-system format. You must have made a copy of the CORMS32 diskette and left the write-protect tab off, or have a volume mounted for IBMGR, to be able to write the diag block to a file.

To read the diagnostic block file,

Press D

The screen displays:

```
Enter name of NEW diag block file:
```

Type the name of the new file.

Press [RETURN]

The screen displays:

```
Moving diag blocks from drive to file FILE
```

where FILE is the name of the new diagnostic block file.

To return to the advanced options main menu,

Press [SPACE]

FILLING THE DRIVE WITH A PATTERN

This option is generally used by Corvus engineers for checking the reliability of test patterns. Do not use this option unless instructed to do so by an authorized Corvus service representative.

Use of this option destroys all data on the drive. Make sure to back up any data you wish to save before beginning. The firmware must be updated, and a CRC should be run at the conclusion of the test. Also note that the drive must be initialized with the system generation program before data is restored.

The advanced options main menu should be displayed.

To check for writing errors,

Press X

The screen displays:

The selected option may destroy data on the drive.
Ensure the correct device is selected.

Selected device is slot 1, server 1, drive 1

Continue? [Y/N]:

To begin the program,

Press Y

The screen displays:

```
Enter byte 1 of pattern [0..255]: 0
```

Enter the correct byte value and **press [RETURN]**.

The screen displays:

```
Enter byte 2 of pattern [0..255]: 0
```

Enter the value of byte 2 and **press [RETURN]**.

The screen displays:

Filling drive with pattern.

When the pattern has been written, the screen displays:

Finished

Enter firmware file name: ODRV.FIRMWARE

If the firmware file name is correct,

Press [RETURN]

The screen displays the firmware file message. For OmniDrive systems, correct versions should be ODRV.1.7 or higher.

If the file is correct, press [RETURN].

The screen displays:

```
Moving firmware from file ODRV.FIRMWARE to drive
.....
Drive firmware updated.
Reset device -- Turn drive power off then on again.

Press <space> to continue
```

Reset the OmniDrive by turning it off then on again. Press [SPACE] to return to the advanced options main menu.

To return to the advanced options main menu, press [SPACE]. To return to the diagnostic main menu, press E.

Chapter 7

Omninet Diagnostics

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- 97 Introduction
- 98 Entering the Omninet Test Program
- 99 The ActivNet or "Who" Option
- 101 Sending Test Messages

Introduction

The Omninet test is a program used by the network manager to check network conditions. The actual name of the program is OTEST and it is found in one of the Constellation II system volumes. The Omninet test has two distinct parts.

The first part of the Omninet test locates and shows all active devices on the network, listed by their Omninet device address. This address is determined by the first six microswitches in the 8-position Omninet switch located on the Transportertm card or built into the equipment. This check can be run from any computer in the network.

The second part of the Omninet test requires two computers to send and receive messages from each other. These test messages are monitored and the results sent back to the originating computer. The number of messages sent and received also appears on the screen of the receiving computer.

The Omninet test does not fix problems on the network but it can help the network manager find these problems.

Entering the Omninet Test Program

The Omninet test program is included on the diagnostic utilities diskette supplied by Corvus. The program is generally accessed through the maintenance utilities menu of Constellation II or it can be run directly from the CORMS32 diskette. The Constellation II maintenance menu looks like this:

```
C2MGR [2.5]: Corvus Management Utility
(c) Copyright 1982...1985 Corvus Systems, Inc.
```

```
CORVUS UTILITY [2.5]           Server:
Maintenance Utilities         Drive:
```

```
-----
```

```
D - Mass Storage Diagnostic
O - Omninet Test
```

```
P - Pipes Management
F - Semaphore Management
M - Multiplexer Management
```

```
U - Update Utilities
```

```
S - Select Drive
L - List Drives
E - Exit
```

Select the O option to enter the Omninet Test. After a few moments, a new screen display appears. Go to the next section to read about this screen.

The ActivNet Option (also called the "Who" Option)

The first part of the Omninet test is automatically run at the beginning of the program. The sending computer polls the entire network and displays the results:

```
OTEST [1.3]: OMNINET Test Program
(c) Copyright 1982..1985 Corvus Systems, Inc.

Active hosts ("*" indicates this host)
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
. . . 2 . . . . . . . . . .
. 11* . . . . . . . . . .
. . . . . . . . . . . . . .
. . . . . . . . . . . . . .
. . . . . . . . . . . . . .
. . . . . . . . . . . . . .
.
Completed 0/Giveups: 0/Attempts: 0

Messages sent = 0 Give ups = 0 Attempts = 0

Messages received = 0

Host:11                               Trans.version:138
```

The first two lines identify the program. The table of active hosts shows the Omninet address of responding devices, with the sending host marked by an asterisk. The message counters are found below the table, and are set to zero. The host number of the sending unit, its slot number and the ROM version of the Transporter card are shown on the next line.

The ActivNet (or Who) option performs a check of all active nodes and updates the table. When a device address is not shown, that device is not active on the network. This non-active state may have several causes. The most common cause is a faulty network connection, such as a tap cable that is not connected securely. Check all connections and then run this part of the Omninet test again. The table must be updated before new active network devices are listed.

A prompt line is shown at the bottom of the screen display to run the first or second part of the Omninet test:

Select OMNINET test function:

S - Start, W - Who, E - Exit

Sending Test Messages

The **Start** option is used to send test messages between two computers. The number of messages, the number of retries per message, and the number of give-ups is counted. After ten retries, the message is aborted or given up.

Both computers must be running the **Omninet Test** when the **Start** option is selected. One computer sends messages and the other computer receives these messages.

When the **Start** option is selected, the screen displays:

```
Send a Packet to which Host: 63
```

Enter the address for the computer to which you want to send messages. Messages can be sent only between two computers, not between a computer and a drive. For example, to send a message to the computer at address 55:

Type 55

Press [RETURN]

The next screen displays:

```
Sending 256 bytes to host 55  
Sending 0 byte header
```

```
Send how many times [0 = forever]: 0
```

Messages can be sent continuously by typing 0. To stop the program, press S to stop sending messages. Another method is to send 100 messages (this takes about 2 minutes) each test. To do this:

Type 100

Press [RETURN]

The results of the test display on the screen when the test is complete. The Retry number indicates the number of times a packet had to be sent before it was successfully received. Give Ups are messages that could not be transmitted after ten retries. Typically, most messages have 0, 1 or 2 retries unless the network is over-loaded or the computers have different speeds.

The display looks like this:

```
Retry [ 0] = 85          Retry [ 7] = 1
Retry [ 1] = 12          Retry [ 8] = 0
Retry [ 2] = 0           Retry [ 9] = 0
Retry [ 3] = 1           Retry [10] = 0
Retry [ 4] = 1           Send too long = 0
Retry [ 5] = 0           Uninitiated socket = 0
Retry [ 6] = 0           Receive errors = 0

Completed: 0/Give ups: 0/Attempts:101empts = 126

Messages received = 0

Host 43      Trans version: 155

Sending finished...

Select OMNINET test function-

S - Start, W - Who, E - Exit
```

When 0 is selected to send messages continually, the test continues to run until the S key is pressed. The stop prompt appears in the command window to remind you:

Press S to stop

When the test messages are halted, the results display on the screen in the same format as the fixed number of messages.

Multiple pairs of sending-receiving computers can be set up, but you cannot have one computer broadcasting to multiple computers at the same time for this part of the Omninet test.

When test messages are sent to a non-responding address, this error message appears:

Transporter not responding!!!

In some cases, the receiving device cannot be correctly set up, and a different error message appears:

Receive setup failed ...

The first part of the Omninet test provides a quick way to find all active devices and is a handy tool for the network manager. The second part of the test is primarily used to detect problems in message sending and receiving among computers on the network.

Appendix A

Diagnostic Error Messages

Drive Error Codes

Decimal	Hexidecimal	Signed Decimal	Description
32 128 160	20 80 A0	-224 -128 -96	Soft Error
192 224	C0 E0	-64 -32	Error in preparing read-write
129 161 193 225	81 A1 C1 E1	-127 -95 -63 -31	Seek timeout
130 162 194 226	82 A2 C2 E2	-126 -94 -62 -30	Seek fault
131 163 195 227	83 A3 C3 E3	-125 -93 -61 -29	Seek Error
132 164 196 228	84 A4 C4 E4	-124 -92 -60 -28	Header CRC error
133 165 197 229	85 A5 C5 E5	-123 -91 -59 -27	Rezero Timeout
134 166 198 230	86 A6 C6 E6	-122 -90 -58 -26	Rezero Fault
135 167 199 231	87 A7 C7 E7	-121 -89 -57 -25	Drive not online
136 168 200 232	88 A8 C8 E8	-120 -88 -56 -24	Write fault
136 168 201 233	89 A9 C9 E9	-119 -87 -55 -23	Format protected
138 170 202 234	8A AA CA EA	-118 -86 -54 -22	Read fault
139 171 203 235	8B AB CB EB	-117 -85 -53 -21	Data CRC error
140 172 204 236	8C AC CC EC	-116 -84 -52 -20	Sector locate error
141 173 205 237	8D AD CD ED	-115 -83 -51 -19	Write protected
142 174 206 238	8E AE CE EE	-114 -82 -50 -18	Illegal sector address
143 175 207 239	8F AF CF EF	-113 -81 -49 -17	Illegal command op code
144 176 208 240	90 B0 D0 F0	-112 -80 -48 -16	Spare track table overflow
145 177 209 241	91 B1 D1 F1	-111 -79 -47 -15	Overlay failure
159			Cannot read boot block
255	FF		Controller timeout

Drive error codes are generated by the drive controller. Depending on the type of device in use, the error codes may appear in decimal, hexadecimal, or signed decimal form. The error(s) will always be preceded by a message stating the drive error.

To correct most of these diagnostic errors:

1. Try the command again.
2. Reset the drive by turning it off and on again.
3. Update the firmware—remember to back up data first.
4. Check for bad tracks and then add those tracks to the spare track table.
5. Call your Authorized Corvus Service Dealer.

If you receive the error message "Drive not online," check to see if the drive has completed the self test. Check network and power connections. Use the Omninet Test to see if the drive registers as part of your network.

Appendix B

Diagnostics Records

Introduction

Appendix B is to be used as a diagnostic record of the types of diagnostic tests performed by the network manager. There is also a separate chart for recording the numbers of tracks that are added to the spare track table.

Diagnostics Records

Date	Diagnostic Performed

Spare Track Table

Date Spared	Track number

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