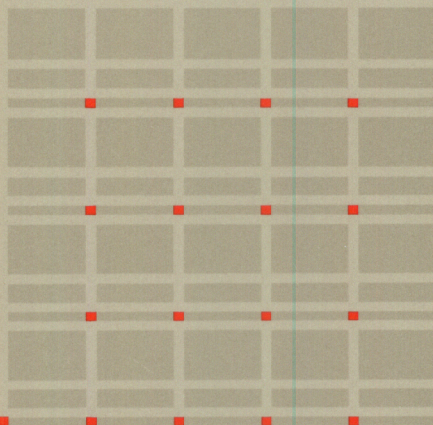


Disk Diagnostic
Guide

Apple II



CORVUS

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Disk Diagnostic Guide

Apple II

Part Number: 7100-06202-01
Release Date: November 1984
Revision: A

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GETTING STARTED

This guide explains the diagnostic program for OmniDrive™ and Corvus B- and H-series mass storage systems. For clarity, B- and H-series systems are referred to in this guide as Corvus drives.

The mass storage diagnostic program is used to detect and correct certain types of hardware and software problems that may develop in the drive. While this program operates on both Corvus drives and the OmniDrive, some screen displays and control options differ. When necessary, differences are noted.

Back up the drive 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. For certain options, a backup is required to preserve the data on the drive.

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

When possible use the diagnostic program with the drive attached locally to the computer, or through a convenience connector with no other drives attached.

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

CHAPTER OVERVIEW

Chapter 1 describes tools used to determine and correct problems with the drive. This chapter also explains entering the diagnostic program from floppy diskette and from Constellation II.

Chapter 2 explains checking and updating the firmware.

Chapter 3 outlines how to exercise the drive, find media defects on the mass storage system, and prepare the drive for shipment.

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

Chapter 5 discusses formatting the drive.

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

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 ODRV.FIRMWARE

Type DSRV.DIAG.DATA

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 a sentence or paragraph, enter the information indicated.

Example:

Type the drive name and **press** RETURN .

HARDWARE AND SOFTWARE REQUIRED

To use the disk diagnostic program, the system manager must have an Apple® IIe with 128 kilobytes of memory, an extended 80-column card, and two floppy diskette drives.

Running the diagnostic program requires the following software:

- Corvus utilities (two diskettes)
A2C2.1
A2C2.3

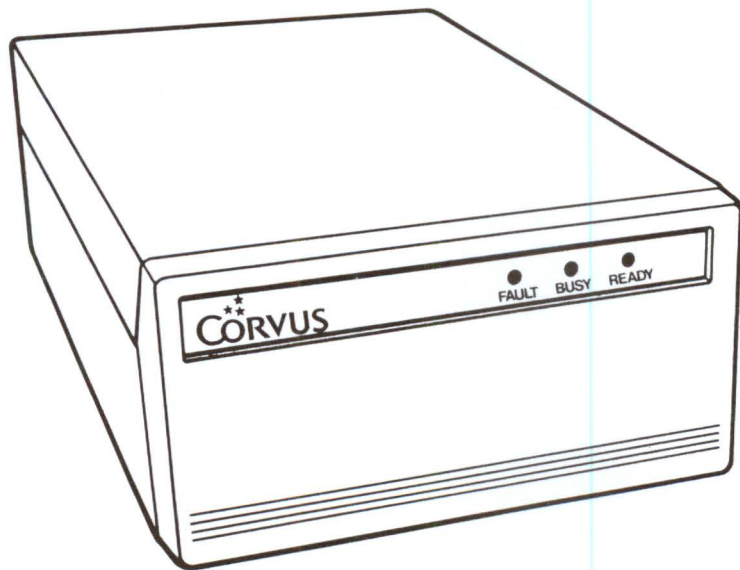
OVERVIEW OF DISK DIAGNOSTICS

1

This chapter describes methods of diagnosing mass storage system problems. A chart of possible problems and their solutions is presented. This chapter also explains how to enter the diagnostic program from either floppy diskette or Constellation II.

DIAGNOSTIC TOOLS

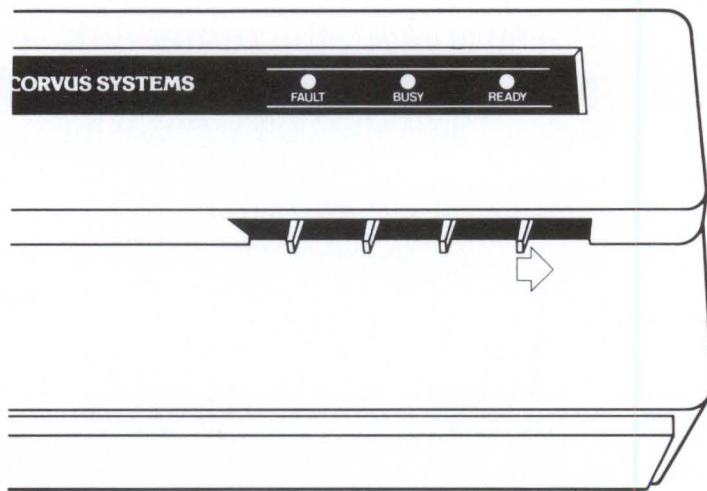
The drive has three lights on the front panel to indicate its status. The left light is the fault indicator light, the center is the busy light, and the right light is the ready light. The patterns displayed by these lights can help identify some problems.



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 mass storage system 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. To reset Corvus drives, flip the reset switch. The reset switch is located under the front panel lights on the far right. The drive is reset by pressing the switch to the right and releasing it.



Reset Switch

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 below. This chart lists some common drive problems and possible solutions. Note however that many problems can be caused by some kind of improper equipment connection. Be certain to plug in all equipment properly.

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 off and fan is on.		Reset drive.
Indicator lights on, but drive does not become ready.	Faulty drive	Reset drive. Check with Corvus service; if suggested, perform format.
Indicator lights on, but computer cannot communicate with the drive.	Faulty Omninet connection. Incorrect Omninet address settings.	Check all Omninet connections. Check Omninet address setting. Reset drive.
Disk read or write errors occur.	Media defects.	Check for bad tracks.
Drive ready but does not respond to computer.	Incorrect interleave factor.	Change interleave factor.
Fault light on.	No firmware or faulty firmware	Run a version check. Update firmware.

After finding a possible remedy, go to the appropriate section for more information and instructions for use.

THE MASS STORAGE DIAGNOSTIC PROGRAM

The mass storage diagnostic program checks the storage system 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 incorrect hardware setup, drive firmware, and media defects.

The diagnostic program should be operated by the system 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 mass storage system connected to the network. However, Corvus engineers suggest using the diagnostic program with the drive attached locally to the computer, or through a convenience connector with no other drives attached. Isolating a drive ensures the correct drive is subjected to diagnostic operations and helps prevent accidental data loss.

For the OmniDrive, run the diagnostic program from a computer connected directly to the drive. No users should be working from the network since the OmniDrive will not be available for regular operation.

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.

For more information on the convenience connector, refer to the *OmniDrive Setup Instructions* and the *Apple II Network Station Installation Guide*.

FROM DISKETTE

To enter the diagnostic program from diskette, follow the instructions below. Make sure that the floppy controller card is in slot 6 before beginning.

1. Insert the floppy boot processing diskette.

Insert the A2C2.1 diskette in the boot drive, slot 6, drive 1.

2. Turn on the Apple IIe.

3. **Boot the computer.**

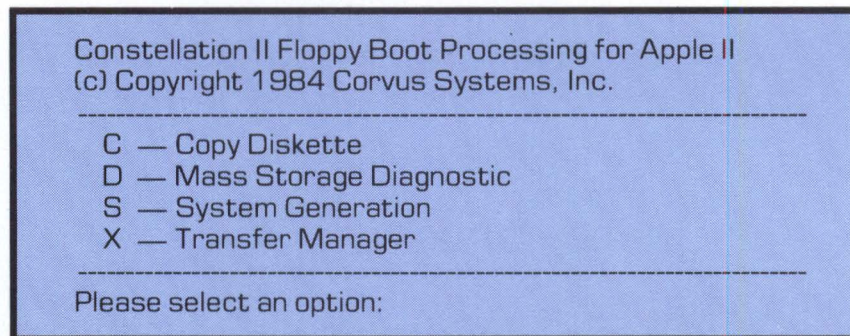
Hold down **CTRL** and **press RESET** .

The screen displays the operating system prompt.

Type PR#6

Press RETURN

The screen displays the floppy boot processing main menu:



4. Select the mass storage diagnostic program.

Press **D**

The screen displays:

```
Insert the A2C2.3 diskette in the second floppy drive.  
Press <space> after inserting the diskette.
```

Insert the A2C2.3 diskette in the second drive.

Press **SPACE**

The screen display is similar to:

```
MDIAG [x.xx]: Corvus Mass Storage Diagnostic  
Select Drive                               Slit:7  Srv:0
```

```
-----  
Slot 1: .....  
Slot 2: .....  
Slot 3: .....  
Slot 4: .....  
Slot 5: .....  
Slot 6: .....  
Slot 7: Corvus Omninet interface
```

```
-----  
Select slot number: [0]
```

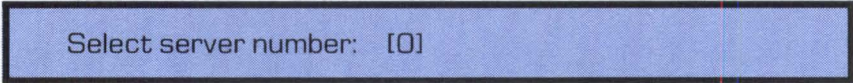
5. Select the slot number.

Press the slot number of the Omninet interface and **press** .

For this example, the slot number is 7.

Press

The screen display is similar to:



Select server number: [0]

6. Select the server number.

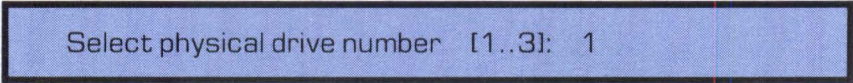
The server number is the Omninet address of the mass storage system. This address was determined in the section “Setting the Omninet Address” of the *OmniDrive Setup Instructions* or in the *Disk Server Installation Guide*.

Enter the address for the OmniDrive system or Corvus drive.

Press

For the OmniDrive, the screen displays the diagnostic main menu. See Step 7.

For Corvus drives, the screen display is similar to:



Select physical drive number [1..3]: 1

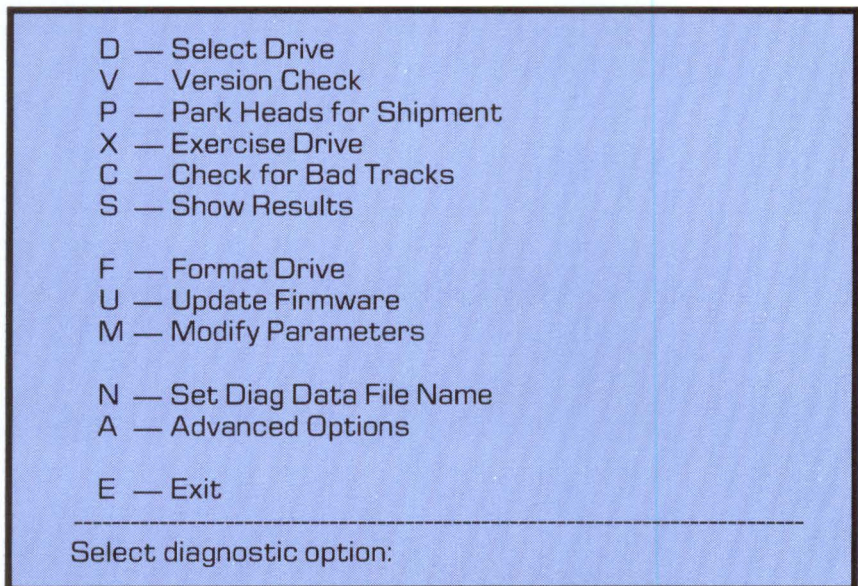
To accept the default drive number,

Press RETURN

To select a different drive, **press** the correct number and **press** RETURN .

7. **Review the diagnostic main menu.**

Following the correct entry of the OmniDrive server number, or the correct physical drive entry for Corvus drives, the screen displays the diagnostic main menu:



Go to the appropriate chapter using the option addressing the apparent problem with the storage system.

FROM CONSTELLATION II

The diagnostic program can also be run from Constellation II without a diskette. Make sure to run the program from a drive other than the one exhibiting problems. If there is only one drive on the system, run the program from diskette.

The Constellation II main menu is displayed when the computer is turned on. Log on as A2MGR with the password HAI.

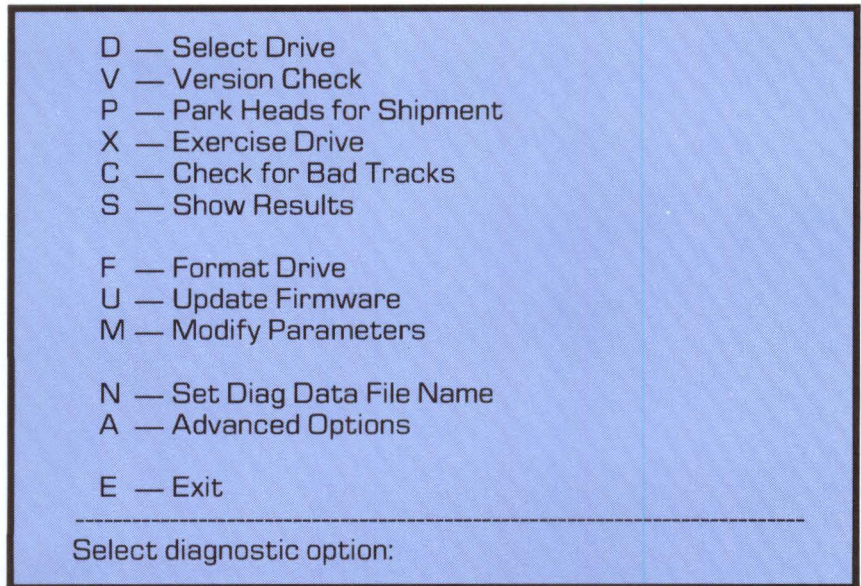
From the Corvus management utility main menu, press **M** to select the maintenance utilities option. When the maintenance utility menu appears, press **D** to run the mass storage diagnostic program.

At the screen's prompt, enter the correct slot number of the Corvus Omninet interface and press **RETURN** . If the default number is correct, press **RETURN** .

Next select the server number of the drive to be diagnosed: press the number and press **RETURN** .

The screen then displays the selected drive's password and name. If the correct drive has been selected, press **Y**. If the intended drive was not selected, press **N** and re-enter the correct drive information as requested.

After the correct drive information has been entered, the screen displays the diagnostic main menu:



Before selecting an option, refer to the corresponding chapter for specific information and instructions.

This chapter presents two diagnostic procedures for mass storage system 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 storage system. 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 Corvus drive or OmniDrive. Update the firmware after a format, if there is no firmware on the drive, or if suggested by a Corvus service representative.

CHECKING THE VERSION

The version check should be performed before other diagnostic tests. Save the results to another file for future reference or printout.

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/O	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.

For Corvus drives, the screen display is similar to:

DRV	P/V	Capacity	SPT	TPC	CPD	ROM	DB
1	P	35860	20	6	306	63	3

Firmware		
DSRV.18.6	—	CONST II — 09/84

SPT = Sectors (512 bytes)
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, either **ODRV.1.7** for OmniDrive systems, or **DSRV.18.6** for Corvus drives. The version number should be 1.7 or higher for OmniDrive systems, and 18.6 or higher for Corvus drives. The firmware is the drive's operating system software and is replaced when firmware is updated. Keep a copy of the firmware version and release data 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. Corvus drives that are divided into virtual drives will display the letter V. **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, return to the diagnostic main menu or save the check to another file.

To return to the main menu,

Press

To list the version check to a file, **press F**.

The screen displays:



```
Enter name of file: PRINTER:
```

Enter the name of a file to send the version check for future reference or printout.

Type `volname:filename`

where `volname` represents the name of any accessible volume other than `A2SYS`, and `filename` is the name of a file. If a volume is not named, the file is sent to the current volume.

Note that if there is data in the above named file, it will be overwritten. Be sure to save any wanted data before sending new information to the file.

To send the version check to the file,

Press `RETURN`

The screen displays:

```
Sending output to file.
-----
Press <space> to continue, or press F to list to a file.
```

Unless a duplicate file is needed, **press** `SPACE` to return to the diagnostic main menu.

UPDATING THE FIRMWARE

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 OmniDrive, and 18.6 or greater for Corvus drives. The firmware file version for all Apple operating systems should be 1.7 or higher. The firmware file is on the same diskette as the diagnostic program.

If there is a pipes area, it must be reinitialized after the firmware is updated.

The diagnostic main menu should be displaying.

Select the update firmware option from the main menu.

Press U

A bell sounds and the screen display is similar to:

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 7, server 1, drive 1

Continue? [Y/N]:

Make sure that the drive to be updated is not running the diagnostic program. The drive requiring a firmware update cannot both read and write the necessary file without losing data.

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, for OmniDrive systems, read after write status. For Corvus drives, the virtual drive offset table is included.

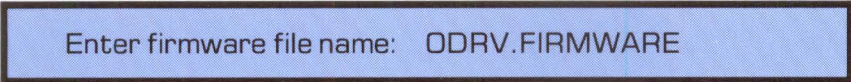
Changing the drive tables can destroy data on the drive. Unless all data on the drive has been backed up or is not needed, do not change the drive tables.

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.

For this example, keep the current tables.

Press `RETURN`

The screen displays:



```
Enter firmware file name: ODRV.FIRMWARE
```

For Corvus drives, the firmware file name is DSRV.FIRMWARE.

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 must be specified as well as the firmware file name. Make sure the diskette is in the floppy drive. Enter the file name A2C2.3:ODRV.FIRMWARE for OmniDrive systems, and A2C2.3:DSRV.FIRMWARE for Corvus drives.

If the firmware file name is correct,

Press

If the file name is not correct, enter the new file name and **press** .

Once the correct names are entered, the screen displays:

```
Firmware file message:  ODRV.1.7 — CONST II - 09/84
Continue?  [Y/N]:
```

The firmware file message for Corvus drives is DSRV.18.6.

Recall that the firmware version number for OmniDrive systems should be 1.7 or higher, and for Corvus drives, 18.6 or higher.

If the firmware version is correct, update the firmware.

Press **Y**

For OmniDrive systems, the screen displays:

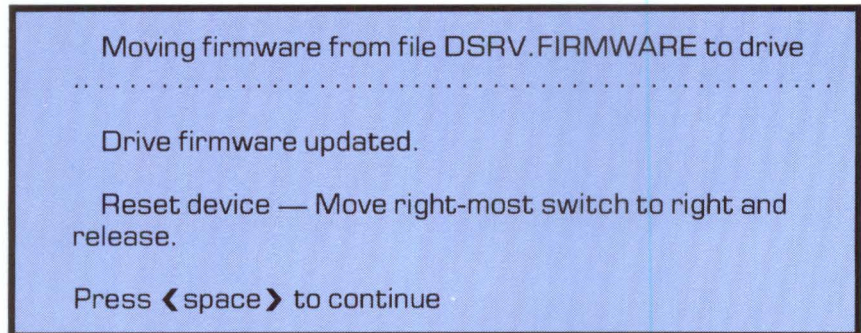
```
Moving firmware from file ODRV.FIRMWARE to drive
.....
Drive firmware updated.
Reset device — Turn drive power off then on again.

Press <space> to continue
```

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

Remember to reinitialize the pipes area if necessary.

For Corvus drives, the screen displays:



In order for the firmware to be updated, the Corvus drive must be reset. Reset Corvus drives by flipping the reset switch to the right. The reset switch is located under the front panel on the right.

To return to the main menu,

Press **SPACE**

The firmware is now updated.

If necessary, reinitialize the pipes area.

In this chapter, three diagnostic hardware options are detailed. Two options, exercising the drive and checking for bad tracks, checks drive hardware for problems in data storage. A third option prepares the drive for shipment.

EXERCISING THE DRIVE

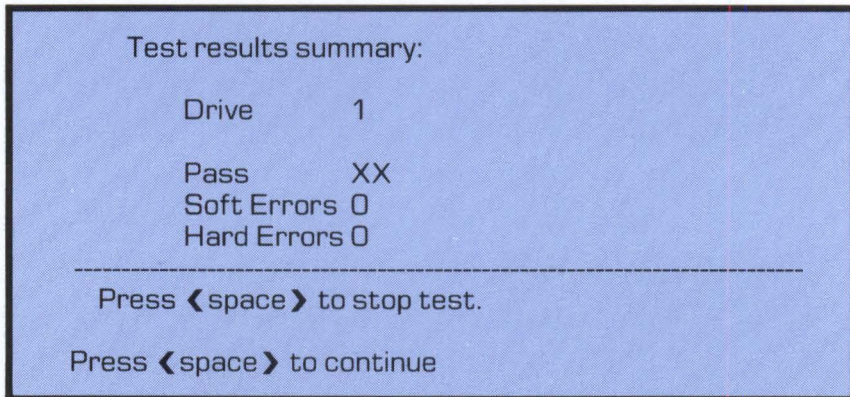
Exercising the drive checks the movement of the read-write heads across the platters in the drive mechanism. This test makes sure the heads move freely while also checking for hard and soft data errors. A hard error in this test indicates the read-write heads could not find the track on the platter surface.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

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

To exercise the drive,

Press X

The test automatically begins and the screen displays:



The number of passes continues increasing until the test is suspended by pressing SPACE. Allow fifteen to twenty seconds to elapse before stopping the test.

If several hard errors are detected, back up all data and check for bad tracks. Hard errors usually indicate media damage that could result in data loss. To check for bad tracks, follow the instructions in the next section.

If few or no soft errors appear, the drive should be in good operating condition. However, many soft errors can indicate a problem with the firmware. 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

CHECKING FOR BAD TRACKS

This test performs a cyclical redundancy check (CRC) of the magnetic media on the drive platter surfaces for possible defects. 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. While one test can indicate bad tracks, additional passes may correct some. Note however, if a track is designated as bad after a third check, it is probably defective and should be corrected.

Correcting a bad track involves a process known as sparing. When a bad track is spared, another track is added over the defective one to prevent data storage.

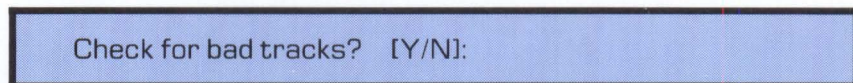
The diagnostic program can automatically correct or spare bad tracks if so designated. The system manager can choose to automatically correct bad tracks at the end of a CRC, or use a separate option and manually spare them. For specific information and directions on manually correcting bad tracks, refer 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 . . . .
```

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.

List the results of the CRC to a file.

Press F

The screen displays:

```
Enter name of file: PRINTER:
```

Enter the name of a file to send the CRC for future reference or printout.

Type `volname:filename`

where `volname` represents the name of any accessible volume other than `A2SYS`, and `filename` is the name of a file. If a volume is not named, the file is sent to the current volume.

Note that if there is data in the above named file, it will be overwritten. Be sure to save any wanted data before sending new information to the file.

To send the results of the CRC to the file,

Press `RETURN`

The screen displays:

```
Sending output to file.
-----
Press <space> to continue, or press F to list to a file.
```

Unless a duplicate file is wanted, **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. Note 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.

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

To automatically spare bad tracks, **press Y**.

After bad tracks have been spared, return to the diagnostic main menu.

Press SPACE

Check for bad tracks again as necessary.

PARKING THE HEADS

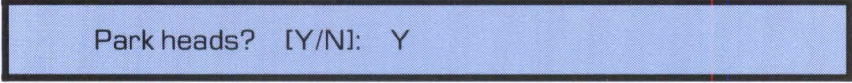
Use this option before shipping or transporting the drive for extended distances. When the heads are parked they are moved over an area on the disk containing no data. A sudden impact will not cause them to bounce against a media surface containing data.

Parking the heads deactivates them, and all the indicator lights go out. Before the drive can be used again, it must be reset by either turning the OmniDrive off and on, or flipping the reset switch on Corvus drives. The heads are automatically activated when the drive is reset.

To park the heads,

Press P

The screen displays:

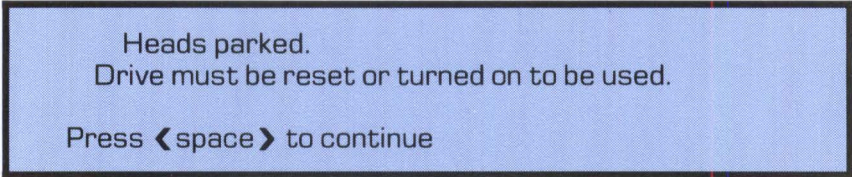


Park heads? [Y/N]: Y

To park the heads,

Press

The indicator lights go out and the screen displays:



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

To return to the main menu,

Press

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

In this chapter, options used to alter drive parameters and correct media defects are discussed. Although general operation of both an OmniDrive and Corvus drive is very similar, some options used to change drive parameters differ. These differences are noted whenever necessary.

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

Because the drive parameters for an OmniDrive and a Corvus drive are different, overviews of modifying parameters for both types are included below.

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, the following 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

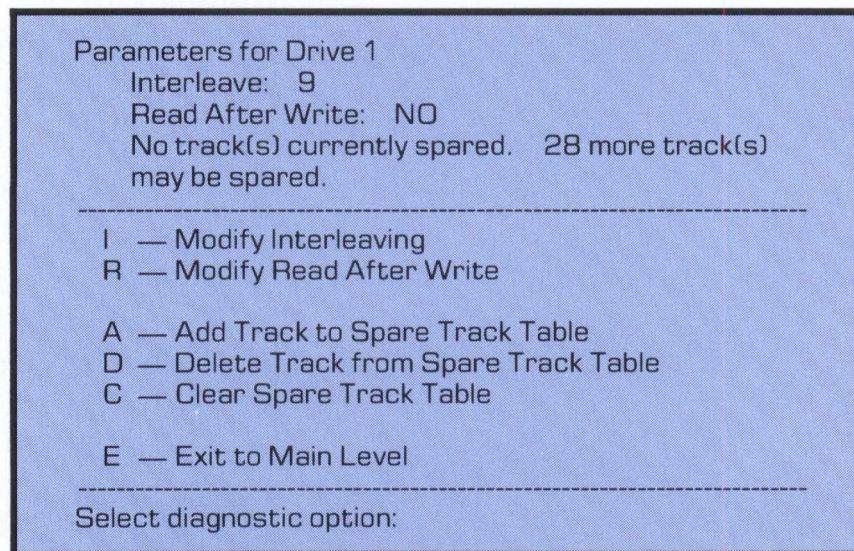
Also contained in the modify parameters option is the add tracks to spare track table option. This option is used to spare (correct) bad tracks.

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:



Note that 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 displays, go on to appropriate sections to learn how each option works.

MODIFYING CORVUS DRIVE PARAMETERS

Like OmniDrive systems, Corvus drives also have three parameters which can be modified: the interleave factor, spare track table, and virtual drive offset table. The interleave factor determines how many sectors on the 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 third Corvus drive parameter is a virtual drive offset table that denotes the starting address of drive divisions. The virtual drive allows an artificial division to be made in the physical drive.

For Corvus drives, the following three parameters are stored in the drive tables in the firmware. The default settings are as follows:

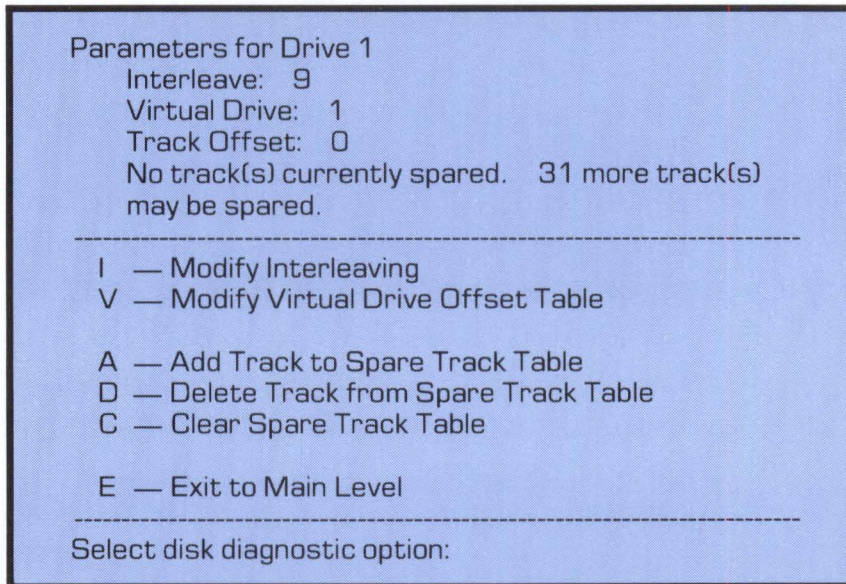
Interleave Factor — 9
Spare Track Table — No Spared Tracks
Virtual Drive Offset Table — 1

Also like the OmniDrive, the add track to spare track table is used to spare (correct) bad tracks.

To change Corvus drive parameters and correct bad tracks, select the modify parameters option from the diagnostic main menu.

Press M

The screen display for Corvus drives is similar to:



The number of tracks available to spare will vary according to the size of the drive. In this example, a 20-Megabyte (MB) H-series Corvus drive permits sparing up to 31 tracks.

For specific information and instructions on changing drive parameters, continue on to appropriate sections as required.

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

Back up the drive before changing the interleave factor; changing the interleave will render all data inaccessible.

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.

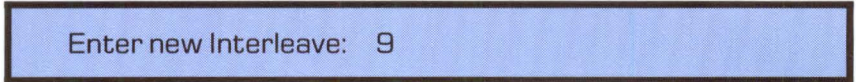
Do not change the interleave factor unless instructed to do so by an authorized Corvus service representative.

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

Press 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.

CORRECTING BAD TRACKS

When a bad track is found, it must be corrected. The process used to correct a bad track is known as sparing; a track is added over the bad one to prevent it from storing data.

To correct a bad track, use the add track to spare track table option. This option removes a bad track from use by masking it with another track. The added track prevents data from being written to the bad track. Review the section below to learn how to spare bad tracks.

Two other options are available when correcting bad tracks. One is deleting tracks from the spare sector table, the other is clearing the spare sector 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.

To delete a track or clear the spare track table, refer to the appropriate section below.

SPARING BAD TRACKS

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, go to Chapter 5, "Formatting the Drive." When a drive is formatted, the number of bad tracks may be reduced.

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

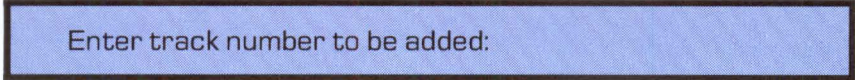
If a track is spared by mistake, delete it immediately. Data will not be lost if no data is placed over or beyond the added track. Use the delete a track option following the instructions in the next section.

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,

Press 321

Press RETURN

For OmniDrive systems, the screen display is similar to:

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

For Corvus drives, the screen display is similar to:

```
Parameters for Drive 1
Interleave: 9
Virtual Drive: 1
Spared Tracks: 321
1 track(s) currently spared. 30 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."

Remember that if the number of added tracks reaches the maximum entry, refer to Chapter 5.

DELETING TRACKS

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 not be permanently lost if (1) no data was sent over or beyond the track, and (2) that exact track is deleted.

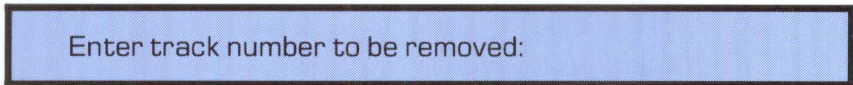
Generally, tracks should not be deleted. Do not remove tracks unless instructed to do so by an authorized service center.

The modify parameters main menu should be displayed.

To delete a track,

Press D

The screen displays:



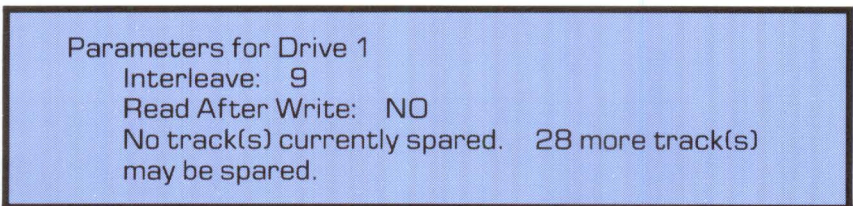
Enter track number to be removed:

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

Press 321

Press RETURN

The screen display for OmniDrive systems is similar to:



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

The screen display for Corvus drives is similar to:

```
Parameters for Drive 1
Interleave: 9
Virtual Drive: 1
No track(s) currently spared. 31 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.

Note 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 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.

Note that this option is available for OmniDrive systems only.

Change the setting from the modify parameters main menu.

Press R

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 Drive 1
Interleave: 9
Read After Write: YES
No track(s) currently spared. 28 more track(s)
may be spared.
```

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

MODIFYING THE VIRTUAL DRIVE OFFSET TABLE

Corvus drives include a virtual drive option that enables users to artificially create a division in the physical drive. By creating or assigning different addresses on the physical drive, one drive simulates two smaller ones. The virtual drive offset (VDO) table denotes the starting address of drive divisions.

This option is not available for OmniDrive systems. It is not necessary with Constellation II systems, and does not need to be used except in special circumstances.

If a virtual drive already exists, do not change the offset value unless instructed to do so by an authorized service center. Modifying virtual drive offset tables can result in permanent data loss. Therefore, prior to modifying the VDO table, back up all data on the drive.

The modify parameters main menu should be displayed.

To modify the offset tables,

Press **V**

The screen displays:

```
Enter -1 to terminate entry:  
Track offset for virtual drive 1: 0  
  
Track offset for virtual drive 2: -1
```

If a second virtual drive exists, the screen display is similar to:

```
Enter -1 to terminate entry:  
Track offset for virtual drive 1: 0  
  
Track offset for virtual drive 2: 900  
  
Track offset for virtual drive 3: -1
```

In the first example, no virtual drive division exists. Accepting the default of -1 avoids creating a second virtual drive: do not add a virtual drive. If however, a track offset was entered or existed for a second virtual drive, as in the above example, the address of the division is listed. A prompt to enter a division address for a third drive appears.

To accept the default values,

Press **RETURN**

To change the track offset, enter the new values.

Do not change the virtual drive setting or add virtual drive offset values unless instructed to do so by a Corvus service representative.

If the VDO tables were modified, go to the next section, "Saving Changes."

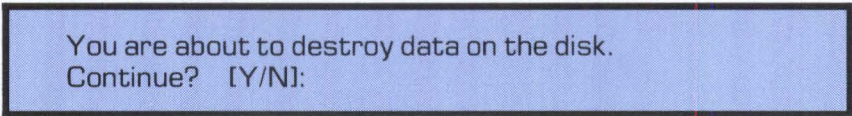
SAVING CHANGES

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

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]:

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 main menu,

Press **E**

If changes have been made but the program is exited 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,

Press **Y**

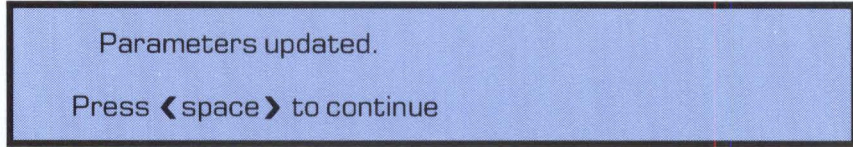
The screen displays:

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

For this example, choose to save the changes.

Press **Y**

The screen displays:



To return to the diagnostic main menu,

Press **SPACE**

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.

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

Run the diagnostic program from diskette to format the mass storage system if the drive to be formatted contains the diagnostic program or is the only drive on the network. The ODRV.DIAG.DATA and the ODRV.FIRMWARE files for OmniDrive and the DSRV.DIAG.DATA and DSRV.FIRMWARE files for Corvus drives are on the floppy diskette containing the diagnostic program.

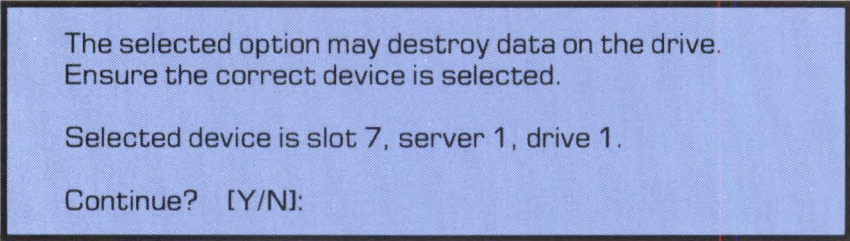
Some formatting procedures for Corvus drives and the OmniDrive differ. Differences are noted where appropriate.

FORMATTING THE DRIVE

Format the drive from the diagnostic program main menu.

Press F

A bell sounds and the screen displays:



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

Selected device is slot 7, server 1, drive 1.

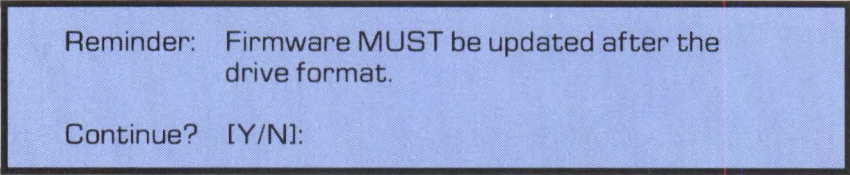
Continue? [Y/N]:

If an additional warning appears that format and update options must be on a drive other than the selected drive, be sure to heed the warning. It is important to remember not to run the format (and update) program from the drive to be formatted (and updated).

To continue the format,

Press Y

The screen displays:



Reminder: Firmware MUST be updated after the drive format.

Continue? [Y/N]:

Press **Y**

For an OmniDrive system, a bell sounds and the screen displays:

Enter the format password:

The password is ODFORMAT.

Type **ODFORMAT**

The password will not appear on the screen.

Press **RETURN**

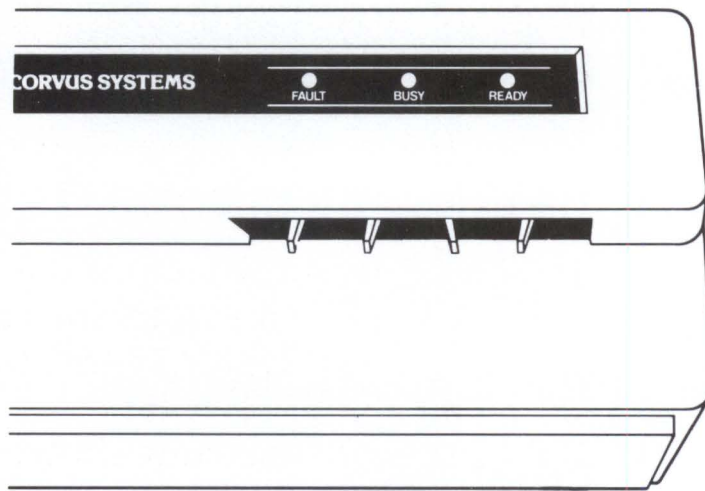
The format procedure begins immediately.
The screen displays:

Format in progress.
Format takes about 1 minute.

For Corvus drives, a bell sounds and the screen displays:

Turn on the format switch and press **<RETURN>** . . .

The format switch is one of four switches located under the front panel lights. It is second from the right.



Format Switch On

Flip the switch toward the right, then

Press

When the format switch is on, the ready light is out and the busy light flashes.

The screen displays:

Format in progress.
Format takes about 2 minutes.

For both the Corvus drive and the OmniDrive, 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
```

The file name shown above is for the OmniDrive. The firmware file name for Corvus drives is DSRV.FIRMWARE.

If the firmware file name shown is correct,

Press

For OmniDrive systems, 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,

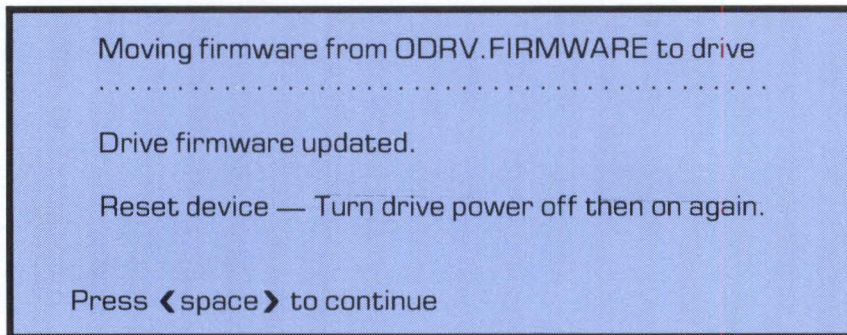
Press

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

For Corvus drives, the firmware file message should be DSRV.18.6 or higher. If the version number is correct, **press** . If a different firmware version is to be placed on the drive, enter that version and **press** .

Note that all Apple operating system firmware versions should be 1.7 or higher.

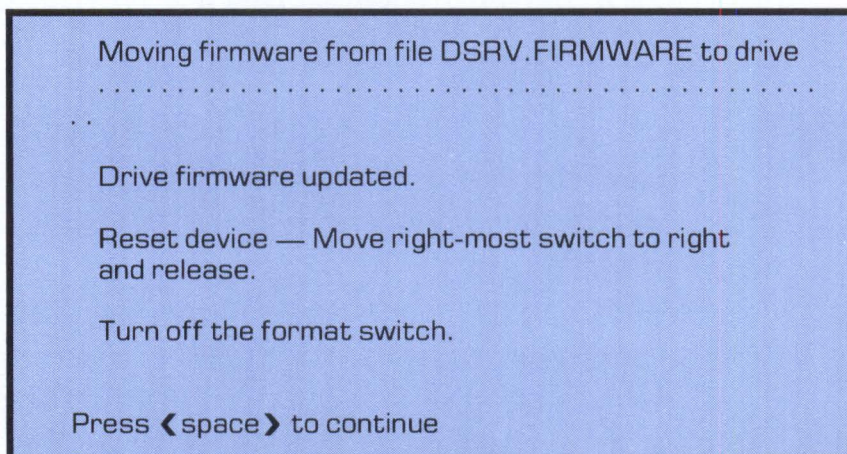
After making sure the correct firmware version is entered for OmniDrive systems, the screen displays:



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.

Once the correct firmware version has been entered for Corvus drives, the screen displays:



The drive must be reset so that the firmware will be loaded into the drive.

Reset the Corvus drive by flipping the reset switch. The reset switch is the right-most switch of four, located under the front panel just below the indicator lights.

Next, turn the format switch off (located next to the reset switch) by flipping it to the left.

After resetting the drive and turning off the format switch, return to the diagnostic main menu.

Press SPACE

For both the OmniDrive and Corvus drive, 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 reinitialize the pipes area if necessary.

This chapter discusses the remaining diagnostic functions; 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 service center. These functions are generally relied upon for testing purposes by Corvus engineers. Use of these options can result in permanent data loss.

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

The default file name for Corvus drives is DSRV.DIAG.DATA.

To accept the current file name,

Press

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

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 service center. Use of these options can result in permanent data loss.

Two other advanced options include filling drive with pattern and 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.

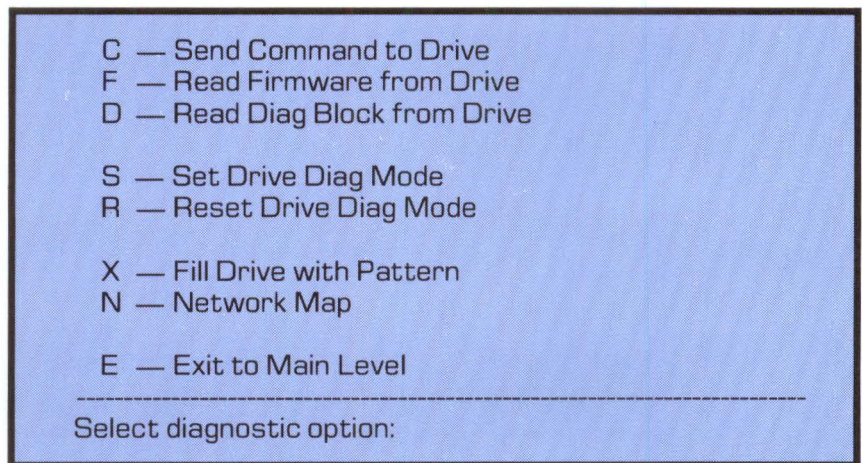
The filling drive with pattern option is used primarily by Corvus engineers to test the reliability of data patterns.

The network map option may be used to show what device addresses are recognized on the network.

To select advanced options,

Press A

The screen displays:



Choose the appropriate option and go to the corresponding section below.

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

A bell sounds and the screen displays:

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

Selected device is slot 7, server 1, 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

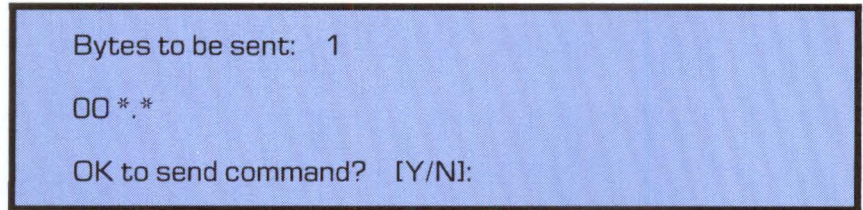
The screen displays:

Byte 1 = 0

To accept the default,

Press RETURN

The screen displays:

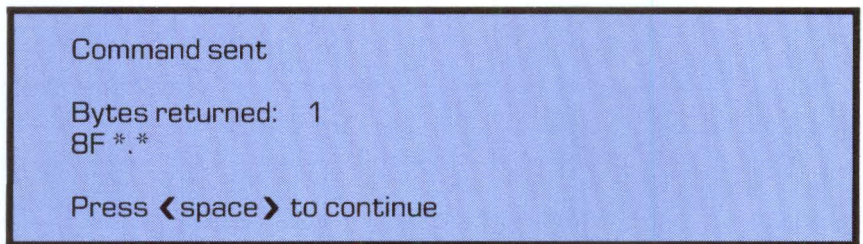


```
Bytes to be sent: 1
00 *.*
OK to send command? [Y/N]:
```

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.

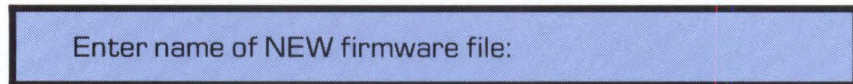
READING FIRMWARE

This option reads the firmware from the drive and writes it to a file.

To read the firmware,

Press **F**

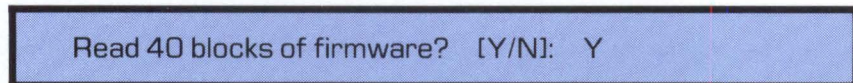
The screen displays:



```
Enter name of NEW firmware file:
```

Type the name of the new file and **press** **RETURN** .

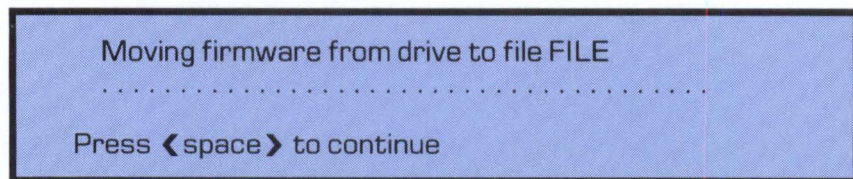
The screen display is similar to:



```
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 diagnostic 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.

To read the diagnostic block file,

Press **D**

The screen displays:

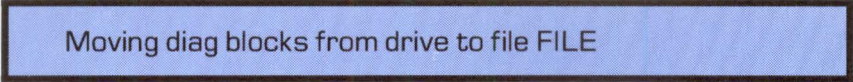


Enter name of NEW diag block file:

Type the name of the new file and **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**

SETTING AND RESETTING THE DRIVE DIAG MODE

This option is used when commands cannot be recognized unless the drive is in the diagnostic mode.

To set the drive to the diagnostic mode,

Press S

The screen displays the message (**Diag Mode**) in the upper right-hand corner.

The drive is now set.

To reset the drive to its previous state,

Press R

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 a Corvus service representative.

Use of this option does destroy 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 7, 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** .

The screen displays:

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

Enter the value of byte 2 and **press** .


For Corvus drives, the screen displays:

Turn on the format switch and press . . .

The format switch is located second from the right under the front panel. Flip the format switch to the right to turn it on.

Press `RETURN` to continue.

For both the OmniDrive and Corvus drive, the screen displays:



Filling drive with pattern.

When the pattern has been written, the screen displays:



Finished . . .

Enter firmware file name: ODRV.FIRMWARE

For Corvus drives the screen displays:



Finished . . .

Turn off the format switch.

Enter firmware file name: DSRV.FIRMWARE

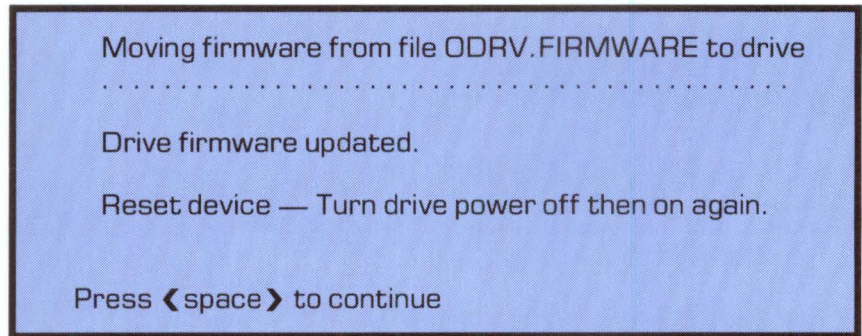
Turn off the switch by flipping it back to the left.

For both drive types, 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. Corvus drive versions should be DSRV.18.6 or higher.

If the file is correct, **press** `RETURN` .

For OmniDrive systems, the screen displays:



Reset the OmniDrive by turning it off then on again.

Press `SPACE` to return to the advanced options main menu.

For Corvus drives, flip the reset switch to reset the drive. Recall that the reset switch is the right-most switch.

After the drive is reset, return to the advanced options main menu.

Press `SPACE`

Reinitialize the pipes area if necessary.

DISPLAYING THE NETWORK MAP

Use the network map option to display what device addresses are recognized on the network.

The advanced options main menu should be displayed.

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	

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