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* * CORVUS SYSTEMS
* *

MIRROR SERVER
MANAGER'S GUIDE

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**MIRROR SERVER
MANAGER'S GUIDE**

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Revision: A**

FCC WARNING

This equipment has been tested with a Class A computing device and has been found to comply with Part 15 of FCC Rules. Operation in a residential area may cause unacceptable interference to radio and TV reception requiring the operator to take whatever steps are necessary to correct the interference.

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Mirror (R), U.S. Patent #4,380,047 International patents pending
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GETTING
STARTED

The Mirror (R) Server backup interface system provides an efficient and inexpensive way to back up information stored on Corvus disk systems. This guide explains how to use the Mirror Server and a video cassette recorder (VCR) to back up and restore data.

The Mirror Server can back up or restore a single volume, an entire disk system or a specified number of blocks on a disk system.

When backing up data, a copy of the information on the drive is transferred to the VCR tape. Once on the VCR tape, the data copy is considered an image. An image is a copy of a single volume, an entire disk system or a specific number of blocks. An image resides only on the VCR tape.

When restoring data, a copy of the information on the VCR tape is transferred to the destination volume, drive, or area on the disk.

The Mirror Server is a network device--it must be connected to an Omninet (TM) local area network. Chapter 1, "Installing the Hardware and Software," explains how to connect the Mirror Server to your network and the VCR.

HOW THIS GUIDE IS ORGANIZED

This guide is divided into seven chapters and two appendices.

Chapter 1 explains how to install the Mirror Server hardware and software.

Chapter 2 describes the basics of network backup, including some definitions and general information.

Chapter 3 explains the transfer table, including how to

build a table, save a table, and list a table.

Chapter 4 explains how to back up data from a drive. This chapter also explains how to verify the results of the backup.

Chapter 5 explains how to restore data from the VCR tape to a drive.

Chapter 6 explains the two ways to indentify the contents of a VCR tape, the list tape directory option and the identify tape image option.

Chapter 7 shows in a step-by-step sample session how to back up and restore information.

Appendix A explains several error messages and the procedures to correct the errors.

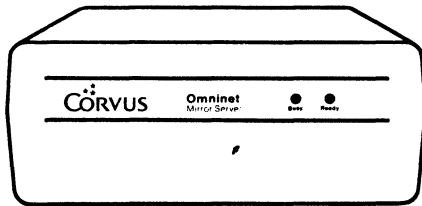
Appendix B explains how to change the fuse on the Mirror Server.

HARDWARE AND SOFTWARE REQUIRED

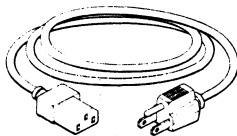
Only the system manager should use the Mirror Server. To install the Mirror Server, the system manager will need the following equipment: a video cassette recorder, a Mirror Server, and a computer connected to an Omninet network that is running Constellation II software.

To add the Mirror Server to an Omninet network, use these items:

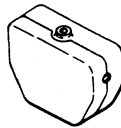
- o Mirror Server
- o Power cord
- o Network tap box
- o Tap cable
- o Three-foot video cable



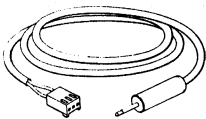
Mirror Server



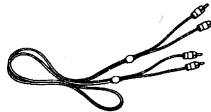
Power Cord



Network Tap Box



Tap Cable



Video Cable

To install the Mirror Server software, use these diskettes:

- o Constellation II Mirror Server Software
Volume 1: Boot Diskette
- o Constellation II Mirror Server Software
Volume 2: Update Diskette

PREPARING THE VCR

This guide assumes that you are familiar with your video cassette recorder. There are several requirements concerning your VCR when using it with a Mirror Server. Always use the same video cassette recorder to back up and restore data. Never use a battery operated VCR; if the VCR has the battery option, use a standard wall outlet. To avoid errors, use high-quality tape. Also, follow the manufacturer's recommended maintenance schedule for cleaning the recorder's heads.

Use a recorder without the color enhancement feature or turn this feature off when using the Mirror Server. Always make sure the VCR tracking switch is set to the center position. Below is a chart showing how the VCR switches should be set for the Panasonic NV 8200. Of course, VCR settings will vary from recorder to recorder. Refer to your VCR manual to set the switches to the equivalent positions.

```
Power.....ON
TV/VTR.....VTR
Audio Monitor.....MIX
Timer.....OFF
Tape Memory.....OFF
Input.....LINE
Audio Limiter.....OFF
Play Speed.....Midway between Slow and Fast
Audio Level.....MINIMUM
Tracking.....At FIX oval
```

USAGE

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

Example:

Type DIR C:

Do not type the spaces between *type* and the first character to its right. Enter characters in either upper or lower case.

Throughout this guide, *press* means to enter a single character or symbol on the keyboard. When a keypad symbol is used, press the key to which it refers. Do not type out each letter of the word in the keypad symbol.

Examples:

Press Y

Press [RETURN]

When the command *press* or *type* applies to information supplied by you, enter the information indicated.

Examples:

Type the filename.

Press the slot number.

To exit a Mirror program option, press [ESC] to return to the previous menu.

INSTALLING THE
HARDWARE AND SOFTWARE | 1

To use the Mirror Server backup interface system on an Omninet local area network, you must install the Mirror Server hardware and copy the Mirror Server software to a network disk system. Once installed, the Mirror Server provides an efficient way to back up the data on network disk systems.

Installing the Mirror Server hardware involves three steps. First, install a network tap for the Mirror Server. Second, connect the Mirror Server to the network. Third, connect a video cassette recorder to the Mirror Server.

Installing the Mirror Server software involves two steps. First copy the software from the update diskette supplied with the Mirror Server to a network disk system. Second, make a copy of the Mirror Server boot diskette.

The software will be copied to a system volume that was created during system generation. The volume name will vary depending on the computer type, but the last three letters of the volume will be SYS. For example, if using the Mirror Server with an IBM (R) Personal Computer, the system volume is IBMSYS.

The boot diskette must be duplicated before use. The diskette supplied by Corvus is write-protected, but the program needs to write to the floppy that is used. Copy the supplied diskette to a blank diskette and store the original. Run the program from the duplicate floppy.

Disk servers on the network must be updated to ROM version DSD9B or later before installing the Mirror Server. The disk servers need to be updated, or data may be lost during Mirror backup. To update a disk server, contact the Corvus Customer Service department or your local Corvus dealer.

INSTALLING A NETWORK TAP BOX

The first step in setting up a Mirror Server is to install a network tap box for it. Follow the steps below.

1. Turn off all network equipment.

The network cannot be used when installing hardware.

2. Decide where to place the Mirror Server.

Choose a spot within 15 feet (4.5 m) of the Omninet trunk cable with enough space for both the Mirror Server and the VCR.

3. Remove the insulation from the Omninet cable.

Find the point on the Omninet cable closest to where the server will be placed. Use a knife to cut through the outer insulation of the cable. Remove about 2 inches (5 cm) of this insulation, but do not cut the inner wires or remove their insulation.

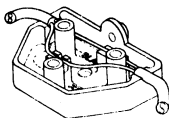
If the wires are accidentally cut, they can be repaired. To repair the wires, refer to steps 4 through 8 in the section "Extending the Omninet Cable" of the *OmniDrive Setup Instructions*. After completing steps 4 through 8, go to the next section, "Connecting the Mirror Server to the Network," in this chapter.



Inner Wires of Omninet Cable

4. **Open a tap box.**
5. **Put the cable wires into the tap box.**

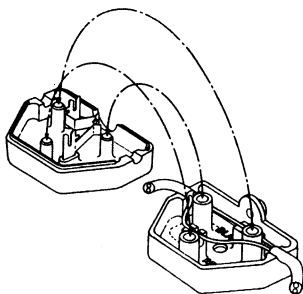
In one of the tap box halves are two wire guides. Push the black wire from the Omnet cable into the BLACK wire guide and the red wire into the RED wire guide.



Cable Wires in Tap Box

6. **Close the tap box.**

Make sure none of the colored or stripped portion of the wires is visible when the tap box is closed.



How Tap Box Closes

This completes installing a network tap box. Go to the next section to learn how to connect the Mirror Server to the Omninet network.

CONNECTING THE MIRROR SERVER TO THE NETWORK

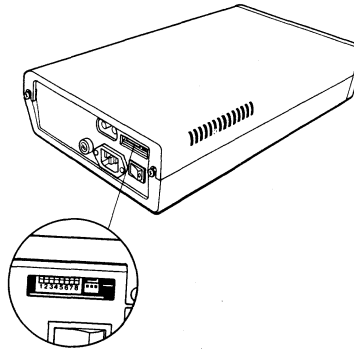
The second step in setting up a Mirror Server is to connect it to the network. Follow the steps below.

- 1. Unpack the Mirror Server.**

Save the packing materials to use when transporting the Mirror Server.

- 2. Set the network address.**

Face the back panel of the Mirror Server. In the upper right hand corner of the back panel is a switch unit.



Switch Unit on Mirror Server Back Panel

Choose an address from 0 to 63 for the Mirror Server. The address must be different from the addresses of all other devices on the network. Use a pen to set the address on the switches. The table below shows the switch settings for each address. Set switches 7 and 8 down.

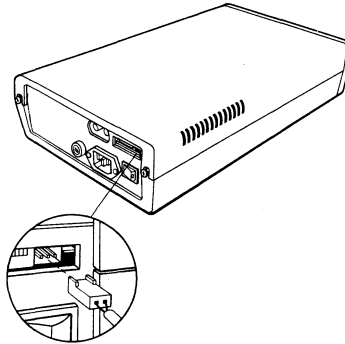
Address	Switch Setting						Address	Switch Setting					
	1	2	3	4	5	6		1	2	3	4	5	6
0	*	*	*	*	*	*	32	*	*	*	*	*	▲
1	▲	*	*	*	*	*	33	▲	*	*	*	*	▲
2	*	▲	*	*	*	*	34	*	▲	*	*	*	▲
3	▲	▲	*	*	*	*	35	▲	▲	*	*	*	▲
4	*	*	*	▲	*	*	36	*	*	*	*	*	▲
5	▲	*	▲	*	*	*	37	*	▲	*	▲	*	▲
6	*	*	▲	▲	*	*	38	*	*	▲	*	*	▲
7	▲	▲	▲	*	*	*	39	▲	▲	▲	*	*	▲
8	*	*	*	▲	*	*	40	*	*	*	*	*	▲
9	▲	*	*	▲	*	*	41	▲	*	*	▲	*	▲
10	*	▲	*	▲	*	*	42	*	▲	*	*	*	▲
11	▲	▲	*	▲	*	*	43	▲	▲	*	▲	*	▲
12	*	*	*	▲	*	*	44	*	*	*	▲	*	▲
13	▲	*	▲	▲	*	*	45	▲	*	▲	▲	*	▲
14	*	▲	▲	▲	*	*	46	*	▲	▲	▲	*	▲
15	▲	▲	▲	▲	*	*	47	▲	▲	▲	▲	*	▲
16	*	*	*	*	▲	*	48	*	*	*	*	▲	▲
17	▲	*	*	*	▲	*	49	▲	*	*	*	▲	▲
18	*	▲	*	*	▲	*	50	*	▲	*	*	▲	▲
19	▲	▲	*	*	▲	*	51	▲	▲	*	*	▲	▲
20	*	*	▲	*	▲	*	52	*	*	*	▲	▲	▲
21	▲	*	▲	*	▲	*	53	▲	*	▲	*	▲	▲
22	*	▲	▲	*	▲	*	54	*	▲	▲	*	▲	▲
23	▲	▲	▲	*	▲	*	55	▲	▲	▲	*	▲	▲
24	*	*	*	*	▲	*	56	*	*	*	▲	▲	▲
25	▲	*	*	▲	▲	*	57	▲	*	▲	▲	▲	▲
26	*	▲	*	▲	▲	*	58	*	▲	▲	▲	▲	▲
27	▲	▲	*	▲	▲	*	59	▲	▲	*	▲	▲	▲
28	*	*	▲	▲	▲	*	60	*	*	▲	▲	▲	▲
29	▲	*	▲	▲	▲	*	61	▲	*	▲	▲	▲	▲
30	*	▲	▲	▲	▲	*	62	*	▲	▲	▲	▲	▲
31	▲	▲	▲	▲	▲	*	63	▲	▲	▲	▲	▲	▲
Address	1	2	3	4	5	6	Address	1	2	3	4	5	6
	Switch Setting							Switch Setting					

▲ = switch up
* = switch down

*Mirror Server Addresses
and Switch Settings*

3. Connect the tap cable to the Mirror Server.

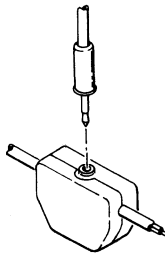
To the right of the switch unit on the back panel of the Mirror Server is a three-pronged plug marked *TAP*. Plug the three-slot connector end of the tap cable into this plug.



*Connecting Tap Cable to
Mirror Server*

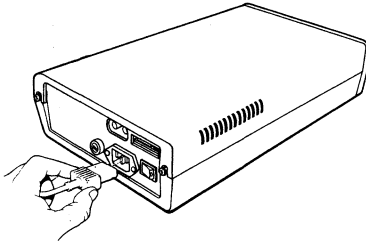
4. **Connect the tap cable to the server tap box.**

Connect the other end of the tap cable into the network tap box.



Plugging Tap Cable into Tap Box

5. **Attach the power cord to the server.**



*Attaching Power Cord to
Mirror Server*

6. **Plug the cord into a power outlet.**

This completes connecting the Mirror Server to the network. Go on to the next section to connect the Mirror Server to the VCR.

CONNECTING THE VCR TO THE MIRROR SERVER

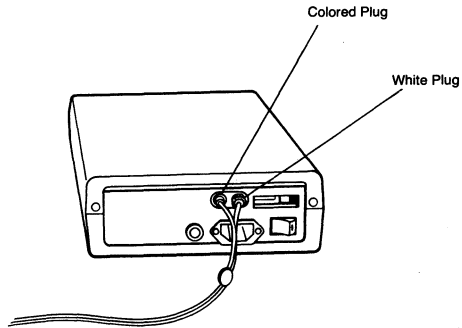
The final step in setting up the Mirror Server is to connect a VCR to it. Follow the steps below.

1. **Plug the white video plug into the right jack.**

The video cable has two plugs, white and colored, on each end. Plug the white plug at one end of the Corvus video cable into the right (*VIDEO IN*) jack on the back panel of the Mirror Server.

2. **Plug the colored video plug into the left jack.**

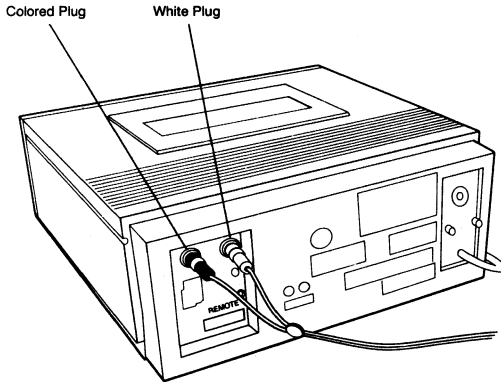
Plug the colored plug at the same end of the Corvus video cable into the left (VIDEO OUT) jack on the back panel of the Mirror Server.



*Attaching Video Cable to
Mirror Server*

3. Connect the video cable to the VCR.

Find the video jacks on the VCR. Plug the white video plug at the loose end of the video cable into the VCR's *VIDEO OUT* jack. Plug the colored video plug at the same end of the cable into the VCR's *VIDEO IN* jack. The illustration below shows the connections on a Panasonic NV 8200.



Attaching Video Cable to VCR

This completes installation of the Mirror Server hardware. Go to the next section to install the Mirror Server software.

COPYING THE SOFTWARE TO THE DRIVE

Copying the software to the drive requires using the update option in Constellation II with volume 2, the update diskette, of the Mirror Server software. The diskette contains the files that must be copied before running the Mirror Server software.

1. Turn on the drive.

Turn on the system manager's home disk server.

2. Turn on your computer.

3. Log on as the system manager.

After you log on with the system manager's name and password at most computers, the Constellation II main menu will appear. If it does not, enter the Constellation II utilities.

4. Enter the maintenance utilities.

To enter the maintenance utilities,

Press M

The screen displays:

CORVUS UTILITIES [x.xx] DS
Maintenance Utilities Drive

P - Parameter Manager
D - Disk Diagnostic
O - OmniDrive Diagnostic
B - Bank Diagnostic
T - Omninet Test
U - Update Utilities
S - Select Drive
L - List Drives
E - Exit

Please select an option:

5. Select the option to update utilities.

To select the update option,

Press U

The screen display is similar to:

Please insert the update diskette in the floppy drive.
Press <SPACE> after inserting the diskette.

6. Insert the update diskette in the computer.

Insert the diskette labeled *UPDATE* in the floppy drive. The update diskette is volume 2 of the Mirror Server diskettes.

After inserting the diskette,

Press [SPACE]

The screen displays:

Copying contents of floppy . . .

Update complete
Please Reboot.

7. Reboot the computer.

After rebooting, go to the next section to make a copy of the boot diskette supplied with the Mirror Server.

COPYING THE BOOT DISKETTE

The diskette labeled *BOOT DISKETTE*, volume 1 of the diskettes supplied with the Mirror Server, cannot be used to run the Mirror Server program. Make a copy of the diskette to use for booting the Mirror Server program from floppy.

Use a new, unformatted diskette for the copy. Use the MS(TM)-DOS DISKCOPY program, the CP/M (R) COPY program, or an equivalent block copy program to make an exact duplicate of the source diskette.

Do not use a write-protect tab or otherwise write-protect the duplicate diskette because the Mirror Server program must write to the diskette.

Label the new diskette "Mirror Server Bootable Diskette." Store the original in a safe place so that it will be available if another copy is ever needed.

Go to Chapter 2 for a complete description of backing up and restoring data on your network disk systems.

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OVERVIEW OF
NETWORK BACKUP 2

Network backup refers to the task of backing up, or copying, information stored on Corvus network disk systems. The Mirror Server is used to back up information to video cassette recorder (VCR) tape. With the Mirror Server and a VCR, you can back up data in a variety of ways. The Mirror Server can back up data in units ranging from several blocks on one drive to all the drives on your Omninet network.

Backups are a safety measure that are intended to protect network users from losing data should a problem develop with a Corvus disk system. As system manager, you should develop a schedule for making backups on a regular basis. The frequency (once a week, twice a week, daily) will depend upon how the Omninet network is used. For maximum protection from data loss, make backups whenever the information on the disk system changes. In other words, if network users are making daily entries in a database, make daily backups. If network users update patient records weekly, make weekly backups.

Backups should not be needed in the normal course of system management, but not having one when it is needed can be disastrous. Make the backup a routine part of system management to avoid the frustrating situation of not having a backup when one is needed.

The Mirror Server software included with the Mirror Server replaces the previous Corvus backup utilities. The new software is intended to work with either a Mirror Server or an internal Mirror on an older model Corvus drive. If the program cannot find a Mirror Server on the network, it can use an internal Mirror.

The new software also assumes a familiarity with the terminology of Omninet networks. The next several paragraphs review and define some of the more important terms and concepts.

One word that appears frequently is *server*. In general, a server connects another device to the Omninet network.

Networks currently can have disk servers for older model Corvus drives, printer servers, and the Mirror server. Both The Bank (TM) and the OmniDrive have internal servers, eliminating the need for an external device. The term server is most frequently used to identify the mass storage systems: the older Corvus drive with external disk server, the OmniDrive, or The Bank.

This specific use of the word server stems from the assignment of server names. During system generation, mass storage systems are assigned a server name. The server name identifies the device to Constellation II, the network management software. Each server has a unique Omninet address (set on the address switches) and a unique server name. System generation also gives each mass storage system a server password, drive name, and drive password.

Constellation II uses server name, drive name, and drive password to identify the mass storage system and to control access to it. To use the Mirror Server, you are required to know these names and password because the Mirror Server uses them to identify the disk systems to be backed up or restored. Because some occasions may require using the Omninet address and drive number instead of the server and drive names, the Mirror Server program will also accept the numbers. However, the program will still request the drive password if it can read it on the disk.

Another commonly used term, *multiple server*, means that more than one mass storage system is operating on the same Omninet network; it does not include other server types. For example, a network with one OmniDrive, a printer server, and a Mirror Server is still considered a single server network. Adding another OmniDrive would make it a multiple server network. Older model disk systems chained together behind the same server are considered a single server. The Mirror Server requires the drive name and password for each drive in the chain to back up and restore data.

Now that you are familiar with network terminology, it's time to discuss the Mirror Server's own terms and concepts. When the Mirror Server program copies the contents of one drive, one volume, or a group of blocks to the VCR tape, the copy is referred to as an image. An image exists only on the VCR tape, and it can only be restored to a disk system. Each image has its own image name to identify it in the tape directory.

The tape directory indicates what the tape contains. The directory includes all the image names on the tape, as well as the date and time of the backup and a tape title. The directory is created during a backup, and it is used for restoration. The Mirror Server program copies the directory and the images to the VCR tape using a table, called the transfer table.

The transfer table determines what images are copied to the VCR tape. The transfer table consists of one or more entries; each entry specifies one image to be created on the VCR tape. An entry includes an image name, server name, drive name, and drive password, and sometimes volume name or block address and number of blocks to transfer. You must create the transfer table before the Mirror Server can copy the information to the VCR tape. A table can hold up to 30 entries, each one specifying a different drive, volume, or group of blocks to copy. The length of the VCR tape determines how much information can be transferred with one transfer table.

Once a transfer table exists, the Mirror Server can back up or restore data.

To use the Mirror Server program, you must either enter Constellation II and select the backup utilities option or boot your computer with the copy of the boot diskette. After reaching the main menu, you can create a transfer table, back up data, restore data, and identify the contents of a tape.

When using the Mirror Server to transfer data, note that the indicator lights on the disk system and the Mirror Server are lit to indicate what is occurring. When the OmniDrive receives a command from the Mirror Server, the FAULT and READY lights are lit, and when information is being backed up or restored, all three lights flash. When an older model Corvus drive receives a command from the Mirror Server, all three indicator lights go out, and when information is being backed up or restored, only the BUSY light flashes. The Mirror Server's READY light is lit when it is turned on, and when it issues commands or transfers data, both the READY and BUSY lights are lit.

Go to the next chapter, "Creating a Transfer Table," to learn about the first step in backing up or restoring data.

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**THE TRANSFER
TABLE** | 3

The first step in backing up or restoring particular data is to build a transfer table. The transfer table serves as a road map for the Mirror Server program. The table tells the Mirror Server program what data to transfer and where to transfer it.

This chapter is divided into three sections:

- o "Building a Table" describes how to create a table for the three different types of data transfer.
- o "Listing a Table" explains how to list the transfer table to check the transfer parameters.
- o "Saving a Table" explains how to save the transfer table. The table must be saved before it can be used to back up and restore information.

BUILDING A TABLE

This section describes how to build a transfer table to use in backing up and restoring data. For step-by step instructions on building a transfer table, go through the sample session in Chapter 7.

The Mirror Server program allows three types of transfer. All three different types--drive, volume, and block--can be built into one table. Up to 30 entries can be made in a table. Each entry identifies a separate image on the VCR tape. For example, if there are 10 entries in the table, 10 images will be created on the tape.

A transfer table must be saved before it can be used. Note that only the last table created can be used again; each time a new table is saved, the existing table is destroyed. Also, when running the program from floppy

diskette, the desired table will not be found if it was saved when the program was run from Constellation II. Be sure to check tables carefully when running the program from floppy.

This fact is important because the same table can be used more than once. In many cases regular backup involves only creating the table once. After creating the table for the first backup, simply enter the program and select the backup option the next time; the same table will still be available. If the copy on the tape must be restored to the drive, the same table can again be used.

Create a transfer table from the transfer table menu. After you select the create a table option, the screen display is similar to:

```
-----  
MIRROR Server [x.xx]           DS SERVERO  
Create Transfer Table         DRIVE Drive1  
-----
```

```
D - add Drives to table  
V - add Volumes to table  
B - add Blocks to table  
  
L - List table  
E - Exit
```

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

To make a transfer table to back up all data on a drive or restore an image to a drive, use the add drive option of the transfer table menu. See the section "Drive Transfer" below.

To make a transfer table to back up a single volume from a drive, or restore an image of a volume to a drive, use the add volume option. First read through the drive transfer section, then see the section "Volume Transfer" below.

To make a transfer table to back up a specific number of blocks from a drive, or to restore a specific number of blocks to a drive, use the add block option. First read through the drive transfer section, then see the section "Block Transfer" below.

DRIVE TRANSFER

Each transfer table consists of different parameters that describe the specific information to be backed up or restored. The term *pathname* is used to describe all the parameters for a particular transfer table entry.

The pathname for drive transfer includes the server name, drive name, drive password, image name and comment. The same pathname can be used to back up and restore information, as long as the same parameters are desired.

The server name, drive name and drive password identify the particular disk system to be backed up or restored. On a multiple server network, the program displays the names of all active servers.

The image name and the comment are written in the directory of the VCR tape, so that the image can be identified. Be sure to use a unique name; no two images on a VCR tape can have the same name. The program suggests the drive name as the default, but you can create any name up to 10 characters long. Messages can be up to 80 characters long.

If the network has several drives, back them up by adding them to the list. The number of drives that can be backed up depends upon the size of the tape being used. See Chapter 4, "Backing Up Data," for a discussion of tape size requirements.

To enter the parameters for another type of transfer in the same table, follow the appropriate steps in the section "Volume Transfer" or "Block Transfer."

After you create a transfer table, you must save it before using it. First check the accuracy of the table by listing the table on screen. To list a transfer table, refer to the section "Listing A Table" in this chapter.

If the table is correct, save it by following the steps in the section "Saving A Table" in this chapter.

VOLUME TRANSFER

Volume transfer uses a pathname similar to drive transfer, with the addition of a field for volume name. The volume name identifies the particular volume to be backed up or restored.

Since a transfer table can hold up to 30 entries, it is possible to enter up to 30 volume names. The number of volumes that can be backed up depends upon the size of the tape being used. See Chapter 4, "Backing Up Data," for a discussion of tape size requirements.

The image name for a volume transfer can also have 10 characters, but the default name is the volume name. Accept the suggested name or create your own.

Remember that after you create a transfer table, you must save it before using it. First check the accuracy of the table by listing the table on screen. To list a transfer table, refer to the section "Listing A Table" in this chapter.

If the table is correct, save it by following the steps in the section "Saving A Table" in this chapter.

BLOCK TRANSFER

Block transfer also has a pathname similar to drive transfer, with the addition of two fields: starting block address and number of blocks to transfer.

Block transfer backs up or restores a specific amount of information on the drive, regardless of volume boundaries or any other divisions. Blocks are units of measure, used to describe the location of information on the disk. Block transfer simply transfers exactly the number of blocks specified.

Find block addresses with the Constellation II volume manager: select the desired server and drive, then list volumes. Each entry shows the starting block address and length of all volumes on the disk.

Use block transfer to back up information not contained within volume boundaries, or to transfer data between drives of different sizes. One common application is in backing up the special data Constellation II uses to manage the information on the disk system. The sample session in Chapter 7 deals with backing up this data with block transfer.

Since a transfer table can hold up to 30 entries, it is possible to transfer other groups of blocks by adding them to the list. The number of groups that can be backed up depends upon the size of the tape being used. See Chapter 4, "Backing Up Data," for a discussion of tape size requirements.

The image name for a block transfer can also have 10 characters, but the default name contains the letters BK for block and the address. For example, if you specified a block transfer from block 8, the default image name would be BK8. Accept the suggested name or create your own.

After you create a transfer table, you must save it before using it. First check the accuracy of the table by listing the table on the screen. To list a transfer table, refer to the section "Listing A Table" in this chapter.

If the table is correct, save it by following the steps in the section "Saving A Table" in this chapter.

LISTING A TABLE

The list table option lists the transfer table on the screen. Use this option to check the accuracy of a table's parameters.

After the list table option is selected, the screen display is similar to:

```
-----
MIRROR Server [x.xx]          DS SERVER0
List Table                    DRIVE Drive1
```

Image Name	Server Name	Drive Name	Volume/Address	Length/Blocks
IMGSRV1	SERVER1	DRIVE1	0	35860
IMGWSVOL	SERVER0	DRIVE1	WSVOL	1024
IMGBK8COR	SERVER1	DRIVE1	8	301

```
-----
Press <space> to continue,
press E to erase table.
```

```
-----
The table lists the parameters of each transfer. The
parameters are image, server and drive names, volume name
or starting block address and length of transfer in
blocks. If the table is correct, press [SPACE] to return
to the transfer table menu.
```

```
If the table is incorrect, press E to erase the table.
The screen will display the transfer table menu.
Re-create the table with the correct information.
```

SAVING A TABLE

If you exit the transfer table menu without saving the table, the newly created table is cleared from memory and cannot be used for backup or restoration. From the transfer table menu, select the exit option to either save or clear the table.

Remember that only one transfer table can be saved. If you already have an existing transfer table and save a new table, the old table will be destroyed and replaced by the new table.

After the exit option is selected, the screen displays:

Save transfer table (Y/N) ?

To save the transfer table, press Y. To clear the table, press N. If the table is saved, the screen displays:

Transfer table saved.
Press <space> to continue

The transfer table is saved to a file, either in the system volume with the name ending in SYS or on the floppy diskette, if you booted from the Mirror Server bootable diskette. To return to the Mirror Server main menu, press [SPACE].

To learn about using a transfer table to back up or restore data, go to Chapter 4, "Backing up Data" or Chapter 5, "Restoring Data."

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This chapter describes how to copy data from a disk system to a VCR tape. The chapter is divided into two parts:

- o "Backing Up to a Tape" explains how to copy information from a drive to a VCR tape.
- o "Verifying a Backup" explains how to check the image on the tape to make sure that it can be read.

All the information on a Corvus disk system can be copied to a VCR tape, provided the tape is large enough. It takes about one and a half minutes to back up one megabyte (MB) of data from an OmniDrive, while an H-series or older model drive requires about two minutes. Use these estimates when calculating the time required. One megabyte of data is equal to 2048 blocks. The storage capacity of a VCR tape is measured in minutes, so convert megabytes to minutes to determine the correct tape size.

For example, to back up a 45 MB OmniDrive, multiply the capacity, 45 MB, by the transfer rate, one and a half minutes per MB, to compute the time required, 68 minutes. In this example, the smallest tape size that should be used is 90 minutes, although any larger tape can be used. Always overestimate and use a tape that is greater than the calculated time for backup.

Note that an image of a drive does not function as a drive. In other words, an image does not have random access, and programs cannot be run from it. If a copy of a drive is needed for actual use, the image must be restored using the restore to drive option. For more information on restoring an image, refer to Chapter 5, "Restoring Data."

Using the drive transfer method to back up a drive copies all the blocks on the drive--even those that have not been allocated for use. If the drive being backed up has a lot of

unused blocks, consider using a different backup method to save tape and time.

One way to avoid backing up unused portions of the drive is to back up individual volumes rather than the entire drive.

If the drive has so many volumes that volume transfer is impractical, use the block transfer option. Block transfer not only saves time when backing up complete drives but also allows backing up data from one drive and restoring it to another that is not identical. Moving data from an H-series drive to an OmniDrive and restoring data to a drive that is larger than the source drive are two examples of block transfer's use.

Another use for block transfer is in backing up the CORVUS volume and block 8. The CORVUS volume and block 8 are integral to managing the disk system. Once block 8 or the CORVUS volume is damaged, the entire drive loses its organizational structure; all volumes are rendered useless. If this happens only a block transfer can be used to restore the drive. Always keep block images of each drive's block 8 and CORVUS volume. The sample session in Chapter 7 details how to back up this critical information. Always make new backups after changing users, volumes, or access on a drive.

Corvus does not recommend that a VCR tape be used to hold the images from more than one backup. If another tape directory is added later, existing information may be overwritten. As a precaution, only reuse a tape that contains unwanted images.

When a backup is in progress, the network cannot be used for any other tasks. Also, the computer cannot perform other functions while it is transferring data. Plan to back up at a time when the computer is not doing other tasks and when users do not need access to the network.

It is a good idea to keep current and previous backups on alternate VCR tapes. For example, keep the most current backup on one tape and the previous backup on another. Then if the tape containing the most current backup is damaged, the previous backup is still available for use.

Backing up data from a drive to a tape is a three step procedure:

- 1) Build a transfer table
- 2) Back up the data
- 3) Verify the backup

Refer to Chapter 3, "Creating the Transfer Table," to learn about transfer tables.

After the desired transfer table is built, label the tape with a title, the tape length, and the date and time of the transfer. Once the tape is ready, begin the transfer.

After the data has been transferred, verify the backup.

To learn how to transfer information and verify the transfer, read through the sections below. For a step-by-step explanation of backing up data and verifying the backup, see the sample session in Chapter 7.

BACKING UP TO A TAPE

Select the backup option from the Mirror Server main menu. After the backup option is selected, the screen displays the saved transfer table, then displays:

```
-----  
Is transfer table OK (Y/N) ?  
-----
```

If the saved table is not correct, press N and re-create the table. If it is OK, press Y to continue.

Backing up information to a tape is affected by the types of disk systems on the network. The program checks the drives involved in the transfer, and if the source of each the transfers listed in the table is an OmniDrive, the screen displays:

Will this tape be used exclusively to
backup and restore OmniDrives? (Y/N):

Remember that the OmniDrive transfers data at a much faster rate than other Corvus disk systems. OmniDrive throughput, the amount of data read or written in a period of time, is 30 blocks per second. Other Corvus disk systems have a throughput rate of 20 blocks per second.

If an OmniDrive backup is restored to another type of disk system, data will be lost. If there is any chance that an image may be restored to an older model Corvus drive, press N to have the data transferred at the slower throughput rate. Otherwise, press Y. The screen displays:

Spool errors to a results file? (Y/N):

The Mirror Server program can create a results file to record the number of disk read errors--the blocks on the drive that the Mirror Server program could not read. To save this file for future reference, spool it to the network pipes area. The program automatically looks for the pipes area on the disk system at Omninet address 0. Do not select this option if no pipes area exists at server 0. If using the bootable diskette, this option does not appear. If a file is spooled, it can be despoiled to a printer or a volume.

The screen will always display the results after all data is backed up, whether a file is spooled or not.

If selecting the spool option, answer the program's questions about pipe name, file name and comment.

The program asks for a tape title next. Choose a title for the tape of up to 10 characters. Use a title that reflects the contents of the tape. This title is written

in the tape directory. After the title is entered, the screen displays:

Tape length in minutes: 30

The length of the tape indicates how much drive data can be stored on the tape. This information also appears in the tape directory. Accept the suggested length if correct or enter the length of the tape in minutes. Tape length is marked on the tape package. After the length is entered, the screen displays:

Current date [DD-MMM-YY]: 02-APR-84

The date appears in the tape directory, and it is an important identifying feature of the images on a VCR tape.

Enter the date in the form DD-MMM-YY, where DD is day, MMM is month, and YY is year. After the date is entered, the screen displays:

Time: 14:30

Enter the time using the 24-hour clock. The screen displays:

Rewind tape and start recording.
Then Press <return>.

Set the VCR to standard play speed. Insert a tape and rewind it to its beginning.

When the VCR is ready, press the recorder's [PLAY] and [RECORD] buttons at the same time. Wait a few seconds until the leader tape has cleared the heads. On the computer, press [RETURN].

The program first creates the tape directory. Once the directory is created, the screen displays:

Backup in progress...
Writing tape directory

After the program finds and backs up the first image, it looks for the next image. Each image name is listed on screen as the image is being backed up.

When the backup is complete, the screen display is similar to:

Backup finished.
Error status:
 Disk read errors: 0

Press <space> to continue.

Once the backup is done, stop the VCR.

If the results file was sent to the pipes area, the Mirror Server program now spools the file. Be sure to despool the file.

If the error status shows any disk read errors, go to the section "Disk Errors" in Appendix A. Otherwise, return to the Mirror Server main menu.

VERIFYING A BACKUP

The verify option performs an important function: checking to make sure the image on the tape is readable.

Corvus recommends that a tape be verified immediately after the backup. If the tape has been mixed with others before verification, identify the contents of the tape to make sure you are verifying the proper tape. There are two methods to identify the contents of a tape: the list tape directory option and the identify tape image option. To use one of these options, turn to Chapter 6, "Identifying a Tape."

To verify a tape after a backup, press V from the main menu to select the verify option.

If the Mirror program has not already loaded the tape directory into the computer's memory, the screen displays:

Rewind the tape and start playback
then press <return>.

After rewinding the tape to its beginning and pressing [PLAY] on the VCR, press [RETURN]. The screen displays a message indicating that it is searching for the tape directory. Once the tape directory is loaded into the computer's memory, the screen displays:

Verify all images? (Y/N) N

It is a good idea to verify all images on the tape. If you choose to verify all images, the screen displays a message indicating that the verification is in progress. If you choose not to verify all images, the screen display is similar to:

Press Y to accept image name,
or N to reject.

Image name: BK8COR

The program automatically suggests the name of the first image on the tape.

If you do not want to verify the first image, press N. The program then replaces the name of the first image with the name of the second.

To verify the first image on the tape, press Y. The name remains on the screen, and the name of the second image appears just below it.

Decide about verifying the second image; press Y or N as needed. If the verification is requested, the name remains on the screen; if it is not requested, the name is replaced by the name of the next image on the tape. The program continues to ask about each image in the tape directory and stops at the last name in the directory.

Once the images to be verified are determined, the screen displays:

Spool to a verify file? (Y/N) Y

When verifying a tape, the Mirror Server program can create a verify results file. The verify results file contains important information: it lists the names of all the verified images and the number of errors the verify procedure found in each image. To save the results for later reference, spool them to the network pipes area. Remember that the pipes area must exist on server 0. If using the bootable diskette, this option does not appear. After verification, despool the results to a printer or a volume on the drive.

Whether or not the file is spooled, the screen will display the results after all data is verified.

If selecting the spool option, answer the program's questions about pipe name, file name and comment. After the comment is entered, the screen displays:

Rewind the tape and start playback
then press <return>.

Rewind the tape to its beginning and press [PLAY] on the recorder and [RETURN] on the computer. If all images on the tape are being verified, the screen display is similar to:

Verify in progress...
Searching for BK8COR

where BK8COR is the name of the first image on the tape.

After each image is verified, the next image name appears on the screen.

If only specific images are being verified, and the first image to verify is not the first image on the tape, the screen display is similar to:

```
-----  
Searching for VOL1 ...  
[v _____ X _____ .....]  
-----
```

where VOL1 is the name of the first specific image to be verified.

Use the scale on the above screen to locate the image on the tape. The v symbol on the scale shows the position of the tape read head. The underline mark represents a step, or one fortieth of the VCR tape. The X shows the position of the image to identify. The dotted line shows the last unused space on the tape.

In the above example, the image to identify is six steps from the tape read head. In this case, use the fast forward option on the VCR to move closer to the desired image.

To stop the play function, press [STOP]. Then press [FAST FORWARD]. After five seconds, press [STOP] and compare the positions of the symbols. Repeat this procedure, increasing the time spent in fast forward as necessary, but not exceeding 20 seconds. Once the v is one or two steps from the X, again press [PLAY], and wait until the program finds the image. When the program reads the image header, a pound sign (#) appears on the scale.

If the tape is accidentally wound to a point beyond the beginning of the image, the screen displays:

Overshot image...

If the above screen appears, estimate where the image might be on the tape and rewind to that point. Keep rewinding until the tape read head is a few steps before the image. Be more careful using the fast forward function next time.

Also, if the fast forward function is run for more than 20 seconds or if the tape read head finally stops in the last unused portion of the tape, the screen may display:

Unable to read tape position
Keep trying? (Y/N)

If the above screen appears, press Y and rewind the tape. The image locator scale should again appear on the screen.

After the program finds and verifies the first image requested, it looks for the next. The program continues in this way until it finds and verifies all the images requested.

The program displays the error status for all the verified images. The screen display is similar to:

Error Status:
Recovered errors: 0
Tape read errors: 0

Press <space> to continue.

Once the above screen appears, stop the VCR.

If a verify results file was named, the file is now spooled to the pipes area. Be sure to despool the file.

If any errors are reported, refer to Appendix A. Otherwise, press [SPACE] to return to the Mirror Server main menu.

This chapter describes how to restore an image from a VCR tape to a drive or a volume. When restoring a drive image, make sure the drive receiving the image is exactly the same size as the one from which the image was made. In most cases, the drive receiving the image is the same one that was copied in the first place.

However, if the original drive must be replaced, the new drive must be identical in order to receive a drive image. For example, to restore an image of a 16 MB drive, the destination drive must also be 16 MB. If you try to restore an image of a 16 MB drive to a larger or smaller drive, the drive transfer option will not transfer the data. You can use the block transfer option to transfer the image to a larger drive, though.

It is also not possible to transfer a drive image from an older model Corvus drive to an OmniDrive; the block transfer option must be used. Block transfer and volume transfer are independent of the model of Corvus drive, and both will work between different models.

If the drive to be restored does not have a server name and drive name, use the Omninet address and the drive number to specify the disk system that will receive the image. A drive will not have a server name, drive name, or password if it has never been through system generation, if it has been formatted, or if block 8 has been damaged.

If you are not sure that the server name and drive name exist or have been damaged, use the list drives option from the Constellation II main menu to check. If the server name exists, it will be listed among the valid servers. Select the server, and the drive name or names should also be displayed.

If a disk system cannot be recognized by Constellation II, and the Mirror Server program will be used to restore it, simply enter the Omninet address and drive number when asked

for server name and drive name. This feature will not override password protection. In other words, if the drive does have its names and password, using the address will not bypass the password--you must still enter it before continuing.

Although all restorations will proceed without server or drive name, volume restoration does have a restriction. To restore an image of a volume, the destination drive must have a CORVUS volume and the volume to be restored must exist in the list of volumes on the drive. In other words, if the image is not being restored to the same drive from which it was copied, the volume must first be created using the Constellation II volume manager.

For example, to restore an image of a 1024-block volume called VOL1 from the VCR tape, the destination drive must also have a 1024-block volume called VOL1. The volume cannot be one block more or less, or else the Mirror Server program will not transfer the data.

A volume can be restored not only from a volume image but also from within a drive image. To restore a volume that resides within a drive image, refer to the section "Volume Transfer" in Chapter 3. When the program requests the image name, enter the name of the drive image containing the volume rather than a volume image name. The program will look for the volume within the drive image and transfer it to the drive.

There are no specific requirements for restoring an image of a group of blocks. The drive only needs its names and enough space to receive the information. Blocks are usually restored from a block image, but part of a drive image can also be restored. To restore a specific number of blocks from a drive image, refer to the section "Block Transfer" in Chapter 3. When asked the image name, enter the name of the drive image containing the blocks to transfer. Just the specified number of blocks from the image will be transferred.

When a restoration is in progress, the network cannot be used for any other tasks. Also, the computer cannot perform other functions while it is transferring data. Plan to restore at a time when the computer is not doing other tasks and when users do not need access to the network.

Do not restore data to the volume from which the Mirror Server program is running. To restore data to that volume, run the Mirror Server program from the copy of the bootable

diskette supplied with the Mirror Server.

Restoring an image from the VCR tape to a drive is a three step procedure:

- 1) Build a transfer table
- 2) Identify the tape
- 3) Restore the image

The first requirement for restoring an image is a transfer table. The original table will most likely be used, but if it has been replaced or a block transfer will be made from a drive image, make a new table. To build a new transfer table, refer to Chapter 3, "The Transfer Table."

Once the correct transfer table has been saved, identify the contents of the tape to make sure that a given image contains the needed data and that it will fit on the destination drive. To learn how to identify the contents of a tape, refer to Chapter 6, "Identifying a Tape."

Once the correct image is found, transfer the image from the tape to a drive or a volume.

To learn how to restore an image, read through the rest of this chapter. For a step-by-step explanation of how to restore an image, refer to the sample session in Chapter 7.

After identifying the tape, make sure that the destination drive has a drive name and server name (use the list drives option from the Constellation II main menu). If restoring a volume or a group of blocks, also check to see that the drive has enough free space or the right volume name. After all checks have been made, start the restoration.

After the restore to a drive option has been selected, the screen first displays the transfer table that will be used, then displays:

Is transfer table OK (Y/N) ?

If the saved table is not correct, press N and re-create the table. If it is OK, press Y to continue. If the computer doesn't have the table loaded into memory, the screen displays:

Rewind the tape and start playback
then press <return>.

Rewind the tape to its beginning and press [PLAY] on the recorder and press [RETURN] on the computer. The screen may display:

Searching for tape directory ...

The program asks one or more questions after it finds the tape directory. Once the tape directory is loaded into the computer's memory, the screen displays:

Spool errors to a result file? (Y/N) Y

The result file includes the name of each image containing errors and the numbers of recovered errors and tape read errors. (See Appendix A for an explanation of the errors.) To save this file for future use, spool the file to the pipes area. The file can later be despoiled to a file or a printer. The pipes area must exist on server 0 for this option to work. The spool option does not appear when running the program from the bootable diskette.

Whether or not the file is spooled, the screen will display the results after all data is backed up.

If the spool option was selected, enter the pipe name, file name and message as requested. After entering the spool information, begin the restoration. The screen displays:

Rewind tape and start playback
then press <return>.

Rewind the tape to its beginning. Then press [PLAY] on the VCR and [RETURN] on the computer. The screen display is similar to:

Restore in progress....
Searching for VOL1 ...

where VOL1 is the first image name in the transfer table.

After the program finds the image, it begins the restoration. The screen display is similar to:

At volume VOL1 ...

The restoration takes as long as the backup did. If the transfer table has more than one image to be restored, and the images are not contiguous on the tape, the screen displays the image locator scale:

[v_____X_____.....]

Use the VCR's fast forward function to reach the next image. See the section "Verifying a Backup" in Chapter 4 for a full explanation of the scale and how to use it. The restoration begins as soon as the image is found.

If the next image follows the first on the tape, the image locator does not appear, and the restoration begins immediately.

The program follows this procedure until all restorations in the transfer table are complete.

After the last restoration is finished, the screen displays:

Restore complete.

Error Status:

Recovered errors: 0

Tape Read Errors: 0

Press <space> to continue.

Stop the VCR. If a results file was named, the file is now spooled to the pipes area. Be sure to despool the file.

If any errors are reported, refer to Appendix A. Otherwise, press [SPACE] to return to the Mirror Server main menu.

This chapter describes how to identify the contents of a tape. The chapter is divided into two parts:

- o "Identifying a Tape Image"
- o "Listing a Tape Directory"

Identifying the tape image provides the surest method of identifying the contents of a tape. Identifying checks the beginning of each image itself and reads the image header information. If the program can find the image header information, the data should also be found. For this reason, use this method to ensure that the correct data is restored.

Listing the tape directory provides the quickest method of identifying the contents of a tape. The tape directory contains the details of the image and the date it was made. To read the tape directory, the program goes only to the beginning of the tape; it does not need to find the beginning of an image. For this reason, use this method to save time.

To learn how to use the identify option, read through the section below. For a step-by-step explanation of how to use the identify option, refer to the sample session in Chapter 7.

To learn how to list a tape directory, go to this chapter's section "Listing the Tape Directory."

IDENTIFYING A TAPE IMAGE

Load the tape with the images to identify into the VCR. Select the identify tape images option from the Mirror Server main menu.

If the Mirror program has not already loaded the tape directory into the computer's memory, the screen displays:

Rewind the tape and start playback
then press <return>.

Rewind the tape to its beginning and press [PLAY] on the recorder and press [RETURN] on the computer. The screen displays a message indicating that it is searching for the tape directory. Once the tape directory is loaded into the computer's memory, or if the tape directory was already in the computer's memory, the screen displays:

Identify all images? (Y/N) N

To identify all images, press Y. The program may prompt for spooling the identify file. Skip to the corresponding screen below.

To identify only specific images, press [RETURN]. The screen displays:

Press Y to accept image name,
or N to reject.

Image name: VOL1

where VOL1 is the name of the first image on the tape.

As in the verify procedure, the program now runs through the names of all images in the directory. To identify an image, press Y; the image name remains on the screen. Otherwise, press N; the program replaces it with the next name. The program continues to ask about each image in the tape directory and stops after the last name.

Once all the images to be identified are listed on the screen, the screen displays:

```
-----  
Spool to an identify file? (Y/N) Y  
-----
```

The identify file contains the name, length and comment for each image identified. To save this information for later reference, spool the file to the pipes area. The file can later be despoiled to a printer or a volume. Remember that the pipes area must exist on server 0 for this option to work, and that the spool option does not appear when running the program from the bootable diskette.

Whether or not the file is spooled, the screen will display the results after all data is backed up.

If spooling the results file, answer the program's questions about pipe name, file name and comment. The screen displays:

```
-----  
Rewind the tape and start playback  
then press <return>.  
-----
```

Rewind the tape to its beginning, press [PLAY] on the recorder and press [RETURN] on the computer.

If all images on the tape are being identified, the screen display is similar to:

Searching for VOL1 ...

where VOL1 is the name of the first image on the tape.

If the Mirror Server program is identifying any image other than the first on the tape, the screen also displays the image locator scale. After the first image is identified, the screen displays:

Searching for VOL2 ...

[v _____ X _____]

where VOL2 is the second image to identify.

Use the scale to locate the beginning of the next image to identify. The v symbol on the scale shows the position of the tape read head, and the X shows the position of the image to identify. Use the fast forward function to move the tape read head closer to the image. Once the v is one or two steps from the X, press [PLAY] and wait until the program finds the image. Continue this procedure until the program finds and identifies all images on the tape. For more information on how to use the image locator scale, turn to the section "Verifying a Backup" in Chapter 4.

When identifying only specific images, the program displays the scale shown above. Use it to locate the first image requested.

Once the program finds and identifies the first image, it looks for the next image. The program continues in this way until it finds and identifies all the images requested.

After identifying all the requested images, the program displays the image header information for each identified image. The screen display is similar to:

```
-----  
Image name: ACCT           Length: 35860  
Type: Drive Date: 02-APR-84 Time: 14:30  
Comment: Fourth Quarter/83  
-----
```

The screen displays the image name, length, and type. The type can be either drive, volume, or block. The screen also displays the date and time the image was created and the comment about the contents of the image.

After the screen displays the header information for the last identification, the screen displays:

```
-----  
Press <space> to continue.  
-----
```

Once the above screen appears, stop the VCR.

If the file was sent to the pipes area, the results will now be spooled. Be sure to despool the file. Return to the main menu by pressing [SPACE].

LISTING A TAPE DIRECTORY

Select the list tape directory option from the Mirror Server main menu. If the program is not running from the bootable diskette, the screen displays:

```
-----  
Spool to a tape directory file? (Y/N) Y  
-----
```

The tape directory file contains valuable information: the tape title, the tape length, the date the tape was made, and the name, type, and length of each image on the tape. To save this file for later use, spool the file to the network pipes area. Then, despool the results to a printer or a volume. Remember that the pipes area must exist on server 0 for this option to work, and that it does not appear when the program is run from the bootable diskette.

Whether or not the file is spooled, the screen will display the results after all data is backed up.

If spooling the file, answer the program's questions about pipe name, file name and message. Once the message is entered, the screen displays:

Rewind tape and start playback
then press <return>.

Load the tape containing the directory to be listed into the VCR and rewind it to the beginning. Then press [PLAY] on the VCR and press [RETURN] on the computer. The screen may display:

Searching for tape directory.

When the program finds the tape directory, the screen display is similar to:

Directory found.

Tape title: Tape 1		
Tape length: 120 minutes		
Date: 02-APR-84		
Restore to OmniDrive only		
Image Name	Image Type	Length Blocks
DRIVE	Drive	35860
VOLL	Volume	1024
BK8	Block	300

Press <space> to continue

If the tape directory is longer than one screen can display, press [SPACE] to display the next screen of information. If the listing is complete, pressing [SPACE] will redisplay the Mirror Server main menu.

The line below the date appears only if the option was selected during backup. If this line does appear, the data on the tape cannot be restored to a drive other than an OmniDrive. If it is, information will be lost.

If the directory includes any single image specified as more than 65280 blocks, note that it will appear as two or more images. This will occur when backing up OmniDrive disk systems of 45 MB or more. No single image can exceed 65280 blocks. Although the entries indicate multiple images, the program still uses the one name you specified originally when referring to the image.

If a tape directory file was named, the file will now be spooled. Be sure to despool the file.

Return to the Mirror Server main menu by pressing [SPACE].

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In this sample session, three separate images are backed up to the VCR tape, then one is restored to the drive. The three entries in the transfer table are a drive transfer, a volume transfer, and a block transfer. After the backup is made and verified, the block image will be transferred back to the drive.

For this sample session, assume that the network is a multiple server network consisting of network stations, a Mirror Server, and two 16 MB OmniDrive network disk systems. The drive containing the Mirror Server program has server name SERVER0, drive name DRIVE1, and password KEY. SERVER1 is the server name of the second disk system on the network, and it has drive name DRIVE1 and password LOCK. SERVER0 is at Omninet address 0 and contains the system volumes and the PIPES volume, the network pipes area. SERVER1 is at Omninet address 1 and contains only private volumes.

To get the most out of this practice session, go through all the sections in the order they are presented.

ENTER THE MIRROR SERVER PROGRAM

This section explains how to reach the Mirror Server main menu from Constellation II and from the bootable diskette. Run the program from diskette when either the drive or the volume containing the Mirror Server program will be restored. Otherwise, run the program from Constellation II. For the sample session, run it from Constellation II.

FROM CONSTELLATION II

Follow these steps to reach the Mirror Server menu from Constellation II.

1. Turn on the Mirror Server.
2. Turn on all the drives.

The drive containing the Mirror Server program must be turned on, and any other drives that will be used either in backing up or restoring data must also be on.

3. Turn on the computer.
4. Log on as the system manager.

After logging on as the system manager, the screen should display the Constellation II main menu. If it does not, enter the Constellation II utilities.

5. Enter the backup utilities.

From the Constellation II main menu,

Press B

The screen displays:

Looking for Mirror Server ...

Once the program finds the Mirror Server, the screen displays:

Looking for all disk servers ...

After the program finds all the disk servers, the screen displays the Mirror Server main menu:

BACKUP UTILITIES DS SERVERO
MIRROR Server [x.xx] DRIVE Drive1
(C) Copyright 1984 Corvus Systems, Inc.

B - Backup to tape
R - Restore to drive

C - Create the transfer table

V - Verify backup

L - List tape directory
I - Identify tape images

H - Help
E - Exit

Please select an option:

Before continuing with the sample session, go to the next section to find out how to enter the program from the bootable diskette.

FROM THE BOOTABLE DISKETTE

Enter the program from floppy whenever the drive containing the Mirror Server program is inoperable. In particular, when the drive or the volume containing the program must be restored, boot from the diskette.

First make sure that the Mirror Server and any drives that will be used either in backing up or restoring data are turned on.

Boot from the copy, labeled *Mirror Server Bootable Diskette*, made in Chapter 1. Do not use the original diskette supplied with the Mirror Server.

Follow the appropriate sequence of steps for booting your computer. After booting, the screen will display the Mirror Server main menu.

Now continue with the sample session. Go to the next section.

BUILD THE TRANSFER TABLE

The transfer table for this session will contain a drive transfer from SERVER1, a volume transfer from a volume named WSVOL on SERVER0, and a block transfer of block 8 and the CORVUS volume on SERVER1.

Corvus Systems recommends that you back up the CORVUS volume and block 8 for all your drives. If block 8 or the CORVUS volume were ever destroyed, the drive would be inaccessible, and the backup would be invaluable.

This section shows how to create the transfer table. First enter the information for the drive transfer, then the volume transfer, and finally the block transfer.

1. Select the create transfer table option.

From the Mirror Server main menu,

Press C

The screen displays:

MIRROR Server [x.xx] DS SERVER0
Create Transfer Table DRIVE Drive1

D - add Drives to table
V - add Volumes to table
B - add Blocks to table

L - List table
E - Exit

Please select an option:

- 2. Choose the drive option.

From the transfer table main menu,

Press D

The screen displays:

Please enter pathname:

Valid servers are: Server0, Server1

Server name: Server0

3. Enter the path name.

Remember that for the drive transfer, the drive to be backed up is SERVER1, DRIVE1.

Type SERVER1

Press [RETURN]

The screen display is similar to:

Valid drives are: Drive1
Drive name: Drive1
Drive password:

The drive password is LOCK

Type LOCK

Press [RETURN]

The screen displays:

Image name: DRIVE1

4. Enter the image name and comment.

Call this image IMGSRV1. Try to give all images somewhat meaningful names.

Type IMGSRV1

Press [RETURN]

The screen displays:

Comments:

When backing up data, add a comment that describes the contents of the image. A comment can be up to 80 characters. For example,

Type Drive backup for SERVER1, DRIVE1

Press [RETURN]

The screen displays:

Press <space> to continue, or
press D to enter another drive.

- 5. Return to the create transfer table main menu.**

To return to the main menu,

Press [SPACE]

The screen displays the transfer table main menu.

- 6. Enter the volume transfer pathname.**

Repeat steps 2 through 5 for the volume transfer. In step 2, press V to add the volume transfer. This time, select SERVER0 with password KEY in step 3, but note that you are prompted for volume name before image name. Enter the name WSVOL, the name of the volume to be backed up. In step 4, name the image IMGWSVOL and make a descriptive comment. Again return to the main menu in step 5, and go to step 7.

- 7. Enter the block transfer pathname.**

Repeat steps 2 through 5 again, this time for the block transfer. Again select SERVER1 in step 3, but note that before the prompt for image name appears, the screen displays:

Beginning disk address:

Enter the starting block address of the area to be copied. To copy the desired information, begin at block 8.

Press 8

Press [RETURN]

The screen displays:

Number of blocks:

To include block 8 and the CORVUS volume, transfer 301 blocks.

Type 301

Press [RETURN]

The screen displays the prompt for image name. Name the image IMGBK8COR and make a descriptive comment. Again return to the main menu in step 5. The transfer table is complete. To check that all three entries are correct, go to the next section to list the table.

LIST THE TRANSFER TABLE

This section shows how to list the parameters of the transfer table on the screen. Use this option to check the accuracy of the table.

From the transfer table main menu,

Press L

The screen displays:

```
-----
MIRROR Server [x.xx]      DS SERVER0
List Table                DRIVE Drive1
```

Image Name	Server Name	Drive Name	Volume/Address	Length/Blocks
IMGSRV1	SERVER1	DRIVE1	0	35860
IMGWSVOL	SERVER0	DRIVE1	WSVOL	1024
IMGBK8COR	SERVER1	DRIVE1	8	301

Press <space> to continue,
press E to erase table.

```
-----
Check the table and verify that the parameters are
correct. If they are, return to the transfer table
menu.
```

Press [SPACE]

The screen displays the transfer table main menu.

SAVE THE TRANSFER TABLE

This section shows how to save the transfer table. From the transfer table menu,

Press E

The screen displays:

Save transfer table (Y/N) ?

To save the the transfer table,

Press Y

The screen displays:

Transfer table saved.

Press <space> to continue

To return to the Mirror Server main menu,

Press [SPACE]

The screen displays the Mirror Server main menu. The transfer table has now been created, checked, and saved. Go to the next section to back up the data specified in the transfer table.

BACK UP THE DATA

This section shows how to back up the information. The three images will be sent to a 120-minute tape titled *SAMPLE BACKUP*.

1. Select the backup option.

From the Mirror Server main menu,

Press B

After a moment, the screen displays:

```
-----
MIRROR Server [x.xx]          DS SERVER0
Backup to tape                DRIVE Drive1
-----
```

Current Transfer Table:

```
-----
| Image   | Server | Drive | Volume/ | Length |
| Name    | Name   | Name  | Address | Blocks |
-----
| IMGSRV1 | SERVER1 | DRIVE1 | 0       | 35860 |
-----
| IMGWSVOL | SERVER0 | DRIVE1 | WSVOL   | 1024  |
-----
| IMGK8COR | SERVER1 | DRIVE1 | 8       | 301   |
-----
```

Is transfer table OK (Y/N) ?

```
-----

After checking to make sure that the table is
correct,
```

Press Y

The screen displays:

```
-----

Will this tape be used exclusively to
backup and restore OmniDrives? (Y/N)

-----
```

The drive backup can be restored only to an
OmniDrive, since this network has no other type of
disk server.

Press Y

The screen display is similar to:

Spool errors to a result file? (Y/N) Y

2. Determine the destination of the results file.

In this example do not spool the results to the pipes area. The results will be displayed on the screen instead.

Press N

The screen displays:

Enter tape title:

3. Enter the tape title.

Type SAMPLE BACKUP

Press [RETURN]

The screen displays:

Tape length in minutes: 30

4. Enter the tape length.

The tape to be used is 120 minutes long.

Type 120

Press [RETURN]

The screen displays:

Current date [DD-MMM-YY]: 02-APR-84

5. Enter
the date.

Enter today's date. For example,

Type 13-SEP-84

Press [RETURN]

After the date is set, the screen displays:

Time: 14:30

6. Enter
the time.

Enter the correct time using the 24-hour clock. For
example,

Type 15:45

Press [RETURN]

The screen displays:

Rewind tape and start recording.
Then Press <return>.

7. Prepare the VCR.

Set the VCR to standard play speed. Insert a 120-minute tape and rewind it to the beginning.

8. Back up the data.

When the VCR is ready, press the recorder's [PLAY] and [RECORD] buttons at the same time. Wait a few seconds until the leader tape has cleared the heads.

On the computer,

Press [RETURN]

The screen displays:

```
-----
Backup in progress...
Writing tape directory
-----
```

After the program finds and backs up all three images, the screen should display:

```
-----
Backup finished.
Error status:
      Disk read errors: 0
-----
Press <space> to continue.
-----
```

Once the backup is done, stop the VCR.

Return to the Mirror Server main menu.

Press [SPACE]

The screen displays the Mirror Server main menu.

The drive image of SERVER1, the volume WSVOL on SERVER0, and blocks 8 through 309 on SERVER1 have now been backed up to the VCR tape.

VERIFY THE BACKUP

In this section the images on the tape are verified to ensure that they are readable.

1. Begin the verify procedure.

From the Mirror Server main menu,

Press V

The screen displays:

Verify all images? (Y/N) N

2. **Decide which images to verify.**

Verify all images on the tape.

Press Y

The screen displays:

Spool to a verify file? (Y/N) Y

3. **Name a destination for the verify results file.**

For this example, the results file will not be spooled to the pipes area. The results will be displayed on the screen instead.

Press N

The screen displays:

Rewind the tape and start playback then press <return>.

4. **Verify the images.**

Rewind the tape to its beginning and press [PLAY] on the recorder.

On the computer,

Press [RETURN]

The screen displays:

Verify in progress...
Searching for IMGSRV1

After the program finds and verifies the image, it searches for the next image. Since IMGWSVOL is next, both on the tape and on the list, the program does not display the scale for finding images, but instead displays:

At image IMGWSVOL

After finding and verifying all three images, the program gives an error summary. The screen display is similar to:

Error Status:
Recovered errors: 35
Tape read errors: 0

Press <space> to continue.

To return to the Mirror Server main menu,

Press [SPACE]

The screen displays the Mirror Server main menu. Stop the VCR after the menu appears.

The image verification is complete. Follow the same procedure to back up similar information on your own network drives. Make backups on a regular basis to ensure the security of data on network drives.

For this example, let's say that three days after the backup was made, a mistake by a network user damaged block 8 and the CORVUS volume on SERVER1, DRIVE1. Because block 8 contains the server name and drive name, the Omninet address and drive number must be used in the transfer table instead of server name and drive name.

To restore the volume structure so that the volumes can be used again, you now have to restore the image of block 8 and the CORVUS volume to the drive. Since the transfer table contains incorrect entries, you have to create a new table.

Although SERVER1 is not functioning correctly, SERVER0, the drive containing the Mirror Server program, is still operable. Since the program runs from SERVER0, you do not have to run it from the bootable diskette. Before restoring the blocks, though, use the identify tape images option to make sure you are using the correct tape.

IDENTIFY THE IMAGE

This section shows how to use the identify tape images option to verify that the tape loaded into the VCR contains the IMGBKSCOR image. To identify the contents of the tape, log on as system manager and follow the steps below.

1. Load the tape to identify.

Load the tape that should contain the image into the VCR.

2. Begin the identify procedure.

From the Mirror Server main menu,

Press I

The screen displays:

Rewind the tape and start playback
then press <return>.

Rewind the tape to its beginning and press [PLAY] on
the recorder.

On the computer,

Press [RETURN]

The screen may display:

Searching for tape directory . . .

After the program finds the tape directory and loads
it into the computer's memory, the screen displays:

Identify all images? (Y/N) N

3. **Decide which
images to identify.**

Identify only the desired image, IMGBKSCOR.

Press [RETURN]

The screen display is similar to:

Press Y to accept image name
or N to reject.

Image name: IMGSRV1

The program now runs through the names of all images in the directory. To identify an image, press Y. The name remains on the screen. Press N to reject an image. The name is replaced with the next name. The program continues to ask about each image in the tape directory and stops at the last entry in the list.

Accept the name IMGK8COR but reject the other two. After the last name is displayed, the screen displays:

Spool to an identify file? (Y/N) Y

4. Determine the destination for the identify file.

In this example the results will be spooled to a file. The file can be spooled because the program is not running from the bootable diskette. Also, the pipes area is on SERVER0, the drive that is still operable.

Press [RETURN]

The screen displays:

Pipe name:

File name:

Comment:

Answer the program's questions about pipe name, file name and comment. Make up a pipe name if the file will be despoiled to a volume, or use the printer's pipe name if you want it printed. The file name and comment appear on the header page of a printed file.

Press [RETURN] after each entry.

After the comment is entered, the screen displays:

Searching for IMGBK8COR ...

[v _____ X _____]

5. Move the tape to the appropriate position.

Use the scale on the screen to locate the image on the tape. The v symbol on the scale shows the position of the tape read head. The underline mark represents a step, or one fortieth of the VCR tape. The X shows the position of the image to identify. The dotted line shows the last unused space on the tape.

In this example, the image to identify is six steps from the tape read head. In this case, use the fast forward option on the VCR to move closer to the desired image.

To stop the play function, press [STOP]. Then press [FAST FORWARD]; after five seconds, press [STOP] and compare the positions of the symbols. Repeat this

procedure, increasing the time spent in fast forward as necessary, but not exceeding 20 seconds. Once the v is one or two steps from the X, again press [PLAY], and wait until the program finds the image. When the program reads the image header, a pound sign (#) appears on the scale.

After the program finds the image, the screen display is similar to:

```
-----  
Image name: IMGBK8COR           Length: 309  
Type: Blocks Date: 13-SEP-84   Time: 14:30  
  
Press <space> to continue.  
-----
```

Once the above screen appears, stop the VCR.

To return to the Mirror Server main menu,

Press [SPACE]

The screen displays the Mirror Server main menu.

The contents of the tape have been identified, and you know that the tape has the correct image.

RESTORE THE DATA

This section shows how to restore the blocks to the drive. Remember that a new transfer table must be created with Omninet address 1 for server name and drive number 1 for drive name. Before making a new table and restoring the blocks, make sure that drive SERVER1, DRIVE1 is turned on.

To start the restoration, follow the steps below.

1. Create the transfer table.

Follow the same procedure used to create the original transfer table, but include only the block transfer and use the Omninet address, 1, and drive number, 1. After creating and saving the table, go to the next step.

2. Choose the restore option.

From the Mirror Server main menu,

Press R

The screen displays the new transfer table:

```
-----
MIRROR Server [x.xx]          DS SERVER0
Restore to drive              DRIVE Drive1
-----
```

Current Transfer Table:

```
-----
| Image | Server | Drive | Volume/ | Length |
| Name  | Name   | Name  | Address | Blocks |
-----
|IMGBK8COR | 1      | 1      | 8       | 301   |
-----
```

Is transfer table OK (Y/N) ?

```
-----

Check the table. The parameters should be correct.
Note the numbers instead of server and drive names.
If the transfer table is correct,
```

Press Y

The screen displays:

Rewind the tape and start playback
then press <return>.

Rewind the tape to its beginning and press [PLAY] on
the recorder.

On the computer,

Press [RETURN]

The screen may display:

Searching for tape directory . . .

After the program finds the tape directory and loads
it into the computer's memory, the screen displays:

Spool errors to a result file? (Y/N) Y

3. Determine the destination
of the results file.

In this example the results will be spooled to a
results file. Again, this is possible because the
drive containing the pipes area still works. If the
drive being restored contained the pipes area, or if
the program was running from the bootable diskette,
the file could not be spooled.

Press [RETURN]

The screen displays:

Pipe name:

File name:

Comment:

Answer the program's questions about pipe name, file name and comment. After the comment is entered, the screen displays:

Position the tape, start playback on VCR and press <return>.

4. Prepare the VCR.

Rewind the tape to its beginning. Then press [PLAY] on the VCR.

On the computer,

Press [RETURN]

The screen displays:

Restore in progress....
Searching for IMGBK8COR ...

[v _____ X _____]

Follow the same procedure used in step 5 of the section "Identify an Image" above to move the tape to the appropriate location.

When the program finds the image, the screen displays:

At image IMGBKSCOR ...

Restoration begins. Restoration takes approximately as long as the original backup. After the restoration is complete, the screen display should be similar to:

Restore complete.

Error Status:

Recovered errors: 24

Tape Read Errors: 0

Press <space> to continue.

Stop the VCR and return to the Mirror Server main menu.

Press [SPACE]

The screen displays the Mirror Server main menu.

Despool the results files from the pipes area to a file or a printer to have a record of the restoration.

That concludes the sample session. Drive SERVER1, DRIVE1; volume WSVOL on SERVER0; and blocks 8 through 309 on SERVER1 have been successfully backed up, and blocks 8 through 309 on SERVER1 have been restored.

**ERROR
MESSAGES** | A

This appendix explains error messages and how to correct them.

A backup or restore operation is normally successful. However, errors do sometimes occur. If the error status at the end of a backup, verify, or restore procedure lists an error, refer to this appendix.

Errors fall into three major categories:

- o Disk read errors
- o Recovered errors
- o Tape errors

The following pages include a discussion of disk, recovered, and tape errors. At the end of this discussion, you will find a table that outlines miscellaneous problems, their causes, and possible solutions.

DISK READ ERRORS

If the Mirror Server program cannot read data from specific areas of the drive during a backup, it notes the number of the defective block or blocks. Once the backup is complete, the screen displays the error status showing the total number of disk errors for all transfers made in the backup session. If requested, the program also lists the total number of errors for each transfer.

If a disk read error is listed on the screen, data was not copied from an area of the disk system.

After the program lists the backup error status, the screen displays:

 Display disk read errors? (Y/N)

To return to the main menu, press N. To list the transfers with disk errors, press Y.

The disk error table appears. The screen display is similar to:

 Disk Read Errors

Image Name	Server Name	Drive Name	Disk Errors
ACCT	Server0	Drive1	2

Press <space> to continue.

Once all entries are listed, use the information to identify which drive has the read errors. Write down the server and drive names of any disk with errors.

Pressing [SPACE] will redisplay the main menu, or, if one screen cannot display all entries, will continue the listing.

Run through the backup procedure again. If the program again reports disk errors, the disk system may be defective. To repair the disk, refer to the disk diagnostic guide for your computer.

RECOVERED ERRORS

A recovered error is a mistake that was corrected. Recovered errors, if any, are reported in the verify or restore error status.

During a backup, the Mirror Server program copies each block of data to the tape four times. If during the verify or restore procedure, the Mirror Server cannot read one copy from the tape, it can refer to another copy for a correct block of information. For the Mirror Server to recover, or correct, an error, it must find a complete block of information among the four copies.

Bad copies of data are created when the VCR recording heads are dirty or the tape is too old or defective. First clean the heads on the VCR. If the program continues to report recovered errors at the end of verify or restore procedures after the heads are cleaned, the tape may be too damaged to use and may need replacing.

TAPE ERRORS

When a tape read error is listed in the error status of a verify or restore procedure, all four copies of the specific block of data are incorrect or incomplete. The Mirror Server cannot find a correct copy of the needed information on the VCR tape.

If tape read errors occur, the verify or restore procedure changes slightly. Once the program lists the error status, the screen displays:

Display tape read errors? (Y/N)

To return to the main menu, press N. To list the images containing defective blocks of data, press Y.

The tape read error table appears. The screen display is similar to:

```
Image Name: ACCT
Recovered errors:    2
Tape read errors:   2
```

Press <space> to continue.

The table shows the first image with tape read errors. If more images have tape read errors, press [SPACE] to list them.

Be sure to note the name of each image with tape errors. Then, once all entries are listed, return to the main menu by again pressing [SPACE].

If the tape read errors occur during the verify procedure, redo the backup using a new tape; the old tape may be too worn out to use. Before backing up the data, clean the recording heads. Also, make sure the VCR color enhancement feature is turned off.

If errors occur during the restore procedure, run through the procedure again. This time, however, build a separate transfer table for each image containing tape errors; then try to restore each image to the drive.

If, after the second restore procedure, the error status still contains tape read errors, the screen displays:

```
Retry pass needed...
```

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

A retry pass is an attempt to rebuild the incorrect blocks of data from the four copies made during backup. The program takes good pieces of each of the four block copies and combines them to create complete blocks of information.

To request the retry pass, press [SPACE]. The screen displays:

```
-----  
Rewind tape and start playback  
Then press <RETURN>  
-----
```

The screen displays:

```
-----  
Retry in progress...  
-----
```

Once the retry pass is done, the screen displays the retry summary:

```
-----  
Checking for errors  
Tape read errors: 1  
Retry pass needed ...  
  
Press <space> to continue  
-----
```

Note that the program lists the remaining tape read errors and again indicates that a retry pass is needed. It may take many retry passes to rebuild the incomplete blocks of data. Follow the above procedure until no more tape read errors are listed.

If the program continues to list tape read errors after 10 retry passes, the tape is too damaged to use. Use an earlier backup tape to restore the volume or drive.

Another tape error message, "image not found," may appear on the screen when the verify, identify or restore option is first run. If this happens, make sure that:

- o The VCR is correctly connected to the Mirror Server.
- o The VCR is started in the correct mode and the color enhancement feature is turned off.
- o The VCR is started at or before the beginning of the image.
- o A tape with a directory is being used.

The error message "image size mismatch" indicates that the size of the area being restored does not match the image's size. One example that will cause this error is restoring a drive image to a drive with a different block size than the source drive. If this message appears on the screen, use the list tape directory option of the Mirror Server program to check the size of the image on the tape. Then use the list volumes or version check option of Constellation II to check the size of the volume or disk system to restore. If the two sizes do not match, find the correct image or restore to a drive or volume of the correct size.

The error message "tape dropout during playback" indicates that a portion of the tape being read was not recorded or has been partially erased. Possible causes are that:

- o Someone accidentally stopped or paused the VCR while it was running.
- o The cable connecting the VCR to the Mirror Server was loose or came unplugged while the Mirror program was running.
- o The VCR heads are dirty and need cleaning.
- o The tape is defective and has gaps where data could not be recorded.
- o The tape was placed near a strong magnetic field.

Check for hardware problems and take appropriate action to remedy them. If the tape is defective or damaged, replace it. In any circumstance, make another backup, if

possible, or use the latest available to restore data. Do not restore data from a tape that has dropout errors.

The error message "image ID mismatch" indicates that the Mirror Server program did not find the expected image. This message usually appears on the screen when the program or the user misjudges the position of the image on the tape and rewinds the tape to the wrong starting point. If this happens, begin the procedure again.

MISCELLANEOUS PROBLEMS

The table below lists miscellaneous problems and error messages that may occur when the Mirror Server is used. It also lists the possible causes and remedies of the problems.

Problem/Message	Possible Cause	Remedy
Mirror Server indicator lights do not work	Power cord not properly connected	Properly connect power cord
	Power not on	Turn power switch to ON
	Fuse blown	Replace fuse (see Appendix B)
Drive BUSY light does not flicker but returns to READY during backup	Improper firmware	Update firmware (see the diagnostic guide for the computer)
Drive BUSY light on after backup is complete	Improper firmware	Update firmware
Invalid opcode: Error 5	Mirror Server controller card can not read or understand operating system code	Update firmware and retry backup
Controller time out: Error 255, 86 (Mirror Server receiving no incoming data)	Loose or incorrect connections between Mirror Server and VCR	Check hardware setup
	Blank or defective tape	Check tape to make sure it is the correct one
	Incorrect VCR settings	Check VCR manual for correct settings
	Color enhancement feature on	Turn off color enhancement
	VCR started in middle of image	Start VCR at correct point
Position error: Error 8	Mirror Server procedure begun in middle of image	Restart procedure at correct point on VCR tape
Invalid restore command: Error 2	Mirror controller card cannot read code sent	Update firmware and restore again

CHANGING	
THE FUSE	B

The Mirror Server has a slow-blow fuse to protect its electronic components from harm. If the indicator lights on the front panel of the Mirror Server backup interface system do not work, the fuse may need to be changed. Check the fuse and replace it if it appears burned out. The unit will not work without a fuse.

To change the fuse, follow the steps below.

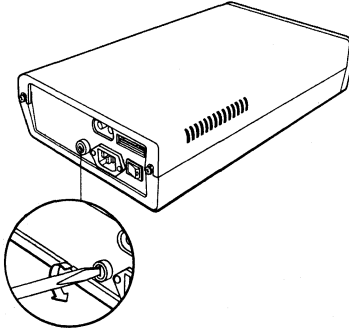
1. Turn off the Mirror Server.

2. Unplug the Mirror Server.

Never change a fuse with the Mirror Server plugged in.

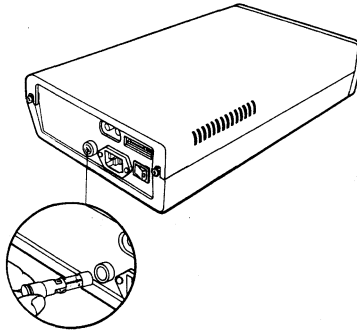
3. Unlatch the fuse cylinder.

On the back of the Mirror Server is a circular fuse holder. Using a screwdriver, push the central cylinder in and turn it counter-clockwise. The cylinder will pop out.



Unlatching Fuse Cylinder

4. Remove the cylinder from the holder.



Removing Cylinder

5. Check the fuse.

The fuse is defective if its internal wire is broken or its casing is clouded.

6. Remove the defective fuse.

If the fuse is defective, remove it. Pull gently to remove it from the cylinder.

7. Insert a good fuse.

The Mirror Server uses 1/2 AMP 250V fuses, available from computer dealers or electronics stores. Gently push a good fuse into the cylinder.



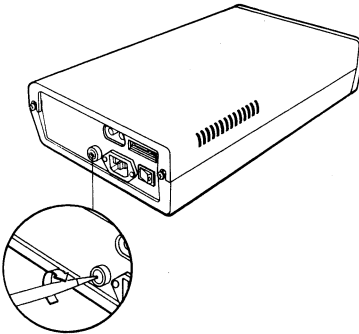
Inserting Fuse in Cylinder

8. Return the cylinder to the holder.

Press the fuse cylinder into the fuse holder.

9. Latch the cylinder in place.

Using a screwdriver, push the cylinder in and turn it clockwise.



Latching the Cylinder

Plug in the Mirror Server and turn it on. The indicator lights should light up. If they do not, the unit should be checked by an authorized Corvus service center.

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