

**SYSTEM
MANAGER'S GUIDE**
THE CORVUS CONCEPT

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SCOPE

INTRODUCTION

Welcome to "The Corvus Concept System Manager's Guide"! This guide explains how to create and manage data storage areas on your hard disk. Chapter Two of this guide picks up where "The Corvus Concept Disk Drive Installation Guide" left off.

Constellation II software is made specifically for the care and management of the Corvus hard disk system. The Constellation II software system allows you to create and maintain a multi-user system consisting of one or more Concepts or other computers in conjunction with a Corvus hard disk subsystem.

In the case of a single computer, the Constellation II system can be used to control access to data on the disk. Each person using the computer can be set up with a separate account that defines his access to various portions of the disk. If desired, portions of the disk may be designated as public, and be available to all users.

The Constellation II software also provides the disk, data, and printer sharing that is possible on a multi-computer network. Even if the network is comprised of different types of computers running different operating systems, they can all share the resources of central hard disks and printers, as well as being able to transmit data to each other. Up to 64 devices can be used on the Corvus Omninet network.

A computer network requires management, and one or two persons should be appointed as system managers. A system manager's job is to keep the system running smoothly, assign and maintain user accounts, and allocate space on the disks.

PURPOSE

The purpose of this guide is to describe the operation and maintenance of a Corvus disk system. It is intended as a reference guide to be used whenever a question arises pertaining to the software associated with a Corvus network system. While no special computer knowledge is required on the part of the reader, you are assumed to have read the following Corvus guides:

- * The Corvus Concept Personal Workstation Installation Guide
- * The Corvus Concept Disk Installation Guide

CONVENTIONS

The word "Type" is used throughout this guide to mean that two or more characters are to be entered on the Concept keyboard. All words, symbols, spaces and punctuation to the right of the word Type should be typed exactly as shown. Do not add or delete punctuation at the end of a statement you are typing, and type all spaces that appear within the statement. For example,

Type /FCCGEN/SYSGEN

would request you type "/FCCGEN/SYSGEN"; the spaces between the word Type and the first character to its right (a slash character here) need not be typed. Characters may be typed in either upper or lower case.

The word "Press" is used throughout this guide to mean that a single character or keytop symbol is to be entered on the Concept keyboard. For example,

Press [RETURN]

instructs you to press the carriage return on the keyboard. When a keytop symbol is used, press the key to which it refers; do not type out the individual letters of the word shown within the keytop symbol.

Function key labels are used in a way similar to keytop symbols. There are ten function keys at the top of the Concept keyboard, numbered F1 through F10. The functions of these keys display across the bottom of the Concept screen, and are also graphically depicted throughout this guide.

The function key labels change with each program. Within a program, each function key may represent up to four separate functions.

Function key instructions in this guide are always given in terms of the labels at the bottom of the Concept screen. An instruction such as "Press [ListVol]" leaves no doubt that the function to be performed is listing a volume; if the instruction said "Press [F5]," which is the function key corresponding to the [ListVol] label, this guide would give no clear indication of what function is being performed.

Pressing the [COMMAND] key displays up to 20 new functions. The original function key labels on the screen will vanish and be replaced by new labels. If some or all of the new labels are blank, it just means that the corresponding keys do not have any functions assigned to them.

TALKING TO THE COMPUTER

All your communication to the computer will be done with the keyboard. Many of the system manager's utilities and programs described herein will ask questions, such as the following, and wait patiently for an answer:

OK to remove volume (Y/N)?

Basically, your responses on the keyboard fall into two groups: function keys and everything else. The primary

difference is that function keys take effect immediately when they are pressed. But in cases such as the example above, you must enter a reply and then press the [RETURN] key.

You will not always be explicitly told to press the [RETURN] key in this guide. If you enter a response, but nothing seems to happen, it probably means that the system is waiting for you to press the [RETURN] key.

If, in the example above, you meant to press Y but accidentally pressed U instead, you could salvage the answer by pressing the [BACK SPACE] key, and then pressing Y. This is also true for situations where you are asked to enter more than one character, such as the following:

Enter drive name:

After typing a word, each press of the [BACK SPACE] key erases one character.

In some instances, it may not be necessary to press the [RETURN] key, even though the input required is not a function key, as in the following example:

Press <space> to continue, or A to add another volume:

In this case pressing either the space bar or the A key will result in the program continuing execution, even though the [RETURN] key was not pressed. Although the various possibilities presented here may seem confusing, the appropriate action is generally apparent from the context.

Corvus is constantly working to update and improve the Constellation II software. Therefore, the screens and commands given in this manual may not correspond exactly to what you see on your system. Generally, the differences will be insignificant as far as changes to the operating procedures described in this manual, or will be self-evident. If you have any questions, contact an authorized Corvus Service Center.

EXPLANATION OF TERMS

In describing the use and maintenance of the Constellation II networking system, a small vocabulary of specialized terms is necessary. These terms are listed below and will be used throughout the manual.

Account: To use a computer on a Corvus network, you must have an account. An account on the network consists of a name, a password, and an access table. You log-on to the system by entering your account name and password, after which you may use the facilities of the system. An account is not necessarily restricted to a single computer in the network environment, but may be used from any computer of a particular type.

Attributes: Some of the Constellation II utility programs will refer to attributes of a volume, a user, or user account. The attributes of a volume would be things such as its name and location on the disk, while the attributes of a user account would be its name, password, boot operating system, volumes to which the user has access, and which type of access for each volume.

Boot: A boot, short for bootstrap, is the process by which a computer loads its operating system and begins operation. Some computers boot automatically when they are turned on. The Concept boots automatically and can boot from a diskette drive or hard disk.

Boot volume: A special volume on the disk that contains the operating system boot code, which a station uses to boot. Some computers do not require boot volumes; the Concept does.

Block: A unit of disk storage. All space on the disk

(i.e. volumes) is allocated in blocks. A block holds 512 bytes, or characters, of information.

CCOS: An acronym for Corvus Concept Operating System.

Constellation II: Software system that allows multiple users and computers to access the resources of a Corvus network. Sometimes shortened to Constellation or Const II.

Disk: A Corvus hard disk unless otherwise noted.

Disk Server: See Server.

Dispatcher: The dispatcher is a program through which the Concept and its operating system are controlled. The main function of the dispatcher is to allow various system programs, such as EdWord, LogiCalc, or Const II to be called with a function key. The dispatcher is running whenever the Concept is not performing other tasks such as EdWord or compiling a Pascal program. The dispatcher gets its name from its function: the dispatching, or calling and running of, other programs.

At many places in this manual, phrases such as "From the Dispatcher, press ..." will appear. This means that the Concept should be idle (i.e. not running a program) and awaiting a command. You are in the dispatcher immediately after the Concept has been booted.

LAN: An acronym for Local Area Network. A local area network is comprised of nodes that are located within the confines of a single building. Nodes on a LAN are usually connected physically. The Corvus Omninet and Corvus Multiplexer are LANs.

Local Peripheral: A local peripheral is connected directly to a station instead of being accessed through the network. Other stations on the network have no access to local peripherals. The built-in disk drive of an Apple /// is an example of a local peripheral.

Mount: Volumes assigned to a user account are not accessible unless they are mounted. Mounting a volume means assigning the volume to a logical unit number. Mounting a volume may be performed by the system manager from the access manager program or by the user from the mount manager program.

Mount tables: Tables, associated with each user account, that list the volumes to which the account has access as well as the attributes (read access, mount status, unit

number) of each volume.

Multiplexer: An older type of Corvus network where each computer is connected to a central multiplexer box by means of flat cable. A multiplexer is also referred to as a Mux.

Node: A single computer on the network. This is a technical term that isn't often seen in this guide. Station and node are equivalent terms in this guide.

Omninet: A Corvus LAN system using twisted pair wire. New stations may be added to the network by adding a tap onto the trunk cable.

Pipes: A pipe is a data structure that resides in a special pipes volume on the disk. The pipes area on the disk is similar to an IN and OUT basket on your desk. A pipe may be created and filled with data by any station on the network. Another station can then retrieve this data. The Constellation II system uses pipes to implement print spooling.

Private account: An account whose password is known to only a single user. Users who are careless with their passwords may suddenly find that their private accounts have become public accounts! (See definition below)

Private volume: A disk volume that may be accessed by only one user. The user normally has unrestricted read-write access.

Public account: An account with a password known to many users, or an account that does not have a password.

Public volume: A disk volume that may be accessed by all the users on the network. Public volumes are a special case of shared volumes. Public volumes are normally read-only volumes to all users.

Semaphores: Signals or flags that can be set and read from application programs. They are generally used to prevent two or more programs from modifying data at the same time. However, for a program to use semaphores, the semaphores must be written into the program when it is being created. Some of the Constellation utility programs use semaphores.

Server: A special hardware device on the network dedicated to a certain network function. For example, a printer server is a computer with a local printer to which other stations on the network can send files. The special hardware device that allows a Corvus Winchester disk system

to attach to Omninet is a disk server. A disk server is a dedicated controller; so are some printer servers. A printer server may also be an ordinary station running spooler software, which can be used as a regular station when not being used as a server.

Shared volume: A volume that can be accessed by more than one user, although access is generally restricted to a fairly small number of users. A volume containing financial data accessible by only three accounts would be a shared volume, while a system volume accessible to all stations would be referred to as a public volume.

Spooling: The process of sending a file intended to be printed to a storage area in memory or disk. This frees the host computer from having to oversee the printing process. Corvus provides a spooling facility that allows stations on the network to spool files to a special area on the disk. A printer server station may then print the data.

Station: An individual computer connected to the network.

Sysgen: Short for system generation. In this context, the sysgen is the process whereby a system is established on a hard disk. A sysgen erases data on the disk, and establishes an area for user and volume tables.

Volume: A given area of the Corvus disk formatted for a particular operating system. Volumes may be considered virtual floppies, but depending on the operating system in use, may store much more data than a single floppy.

CONSTELLATION II OVERVIEW

The Constellation II system is a software package that allows multiple computers to share resources on a Corvus network. The type of physical networking used, twisted pair cable in the case of Omninet or flat cable in Multiplexer networks, is irrelevant since the software operates in the same fashion on either network. Each computer connected to the network is called a node or station.

Each station on a network is functionally identical to any other station in terms of the network software. Access is

managed through user accounts.

A user account can be thought of as a window into the Constellation system. The scope of the account is defined by the system manager when the account is created. If desired, it may later be modified. Each user account consists of a name, a password, and a list of volumes.

For each account, the Constellation system keeps a list of the volumes on the disk to which the user is permitted access. This may be one volume, several volumes, or all the volumes on a disk. The user's access to each volume is defined as none, read-only, or read-write (i.e. full access). In many systems, it is common to set up a volume of system utilities and give all users read-only access to it.

Generally, each user on the network has a private account. Although public accounts accessed by many users are sometimes set up, such as a LESSONS account in a school. The network perceives no difference between public and private accounts; a public account is merely one log-on which many people know the account name and password. Any number of users may be logged-on under a given account at the same time.

Public accounts should be monitored in some organized fashion in order to keep a shared read-write area trouble-free. A user-by-user semaphore scheme using the honor system might be wise.

Private users should be made to understand that the privacy and security of their accounts and data is their responsibility. If the password to an account becomes known, anyone can log-on with it. It is especially important to keep the system manager's password secure, since the system manager has complete access to the system!

As system manager, you can alter an account's password if it should inadvertently become known.

Accounts are not tied to any one machine. The only restriction is the type of machine for which the account's volumes are configured. Obviously, Joe User will not be able to get to his Apple /// volumes if he tries to sign onto his account at an Apple][. In the same fashion, any Concept on the network can be used to log-on to any Concept account. Accounts, users, and the manipulation thereof are discussed in Chapter 2. However, some computers are able to access volumes configured for another machine. This is dependant on the type of operating system in use. After

booting, for instance, a Concept can access Apple][UCSD data files but not Apple][DOS files.

In general, any computer of one type can be allowed to a volume created for any other computer of the same type.

USES OF SYSTEM

The power of a computer network exceeds the sum of the power of the individual machines that make up the network. This extra power comes primarily from the ability of different machines on the network to communicate.

Obviously, there are savings with such things as print spooling. Other uses of a network include the following:

Inter-office communications, i.e. electronic mail.

Sharing of programs. With common system utilities on a single write-protected volume, one copy of a program can serve a number of users.

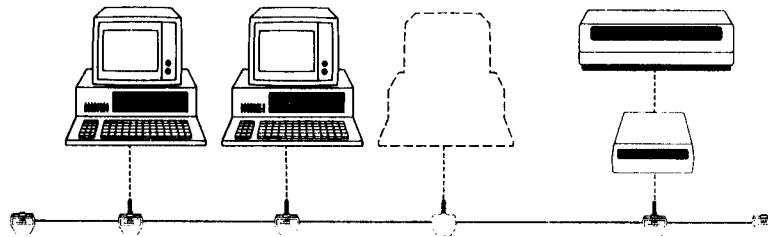
Multiple accesses to a single database. This is one of the most useful aspects of the network. Corvus supplies Pascal procedures that allow the construction of programs that can be used on several separate computers to simultaneously access data files. For example, several persons can be entering data into a common inventory file.

POSSIBLE NETWORK CONFIGURATIONS

Corvus supplies two basic network types: the Omninet twisted-pair cable network, and the Multiplexer flat cable network.

Omninet

The Omnet shared disk networking hardware consists of a Corvus Winchester disk system connected to the network by an Omnet disk server with twisted pair wire extending from it. Computers tap into the network at any point on this wire, which may be up to 4000 feet long.



Each computer on the network must have an Omnet interface. The Concept has a built-in Omnet interface. The Omnet interface receives and transmits data at up to 1 million bits per second. Up to 64 devices may share an Omnet network.

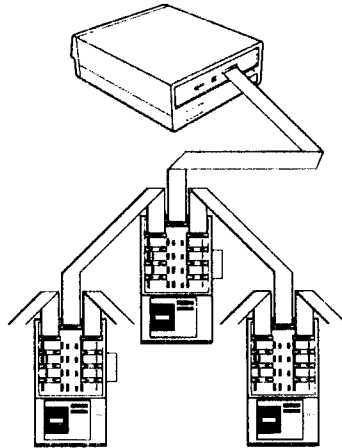
Since all computers share the same physical communications channel, the possibility of collisions arises. A collision occurs when two or more computers on the network attempt to send data at the same time. The data is garbled since the messages overlap. The Omnet system resolves this problem by sending a checksum with each message and performing a checksum computation as the message is received. If the computed checksum and the transmitted checksum don't match, the message is retransmitted.

This error detection and retransmission is transparent to the user and whatever software he may be running. Since Omnet messages are transmitted at such a high rate of speed, times to transmit individual messages are very short and collisions are relatively rare. Like the operation of the multiplexer, the operation of the Omnet is never

visible to the user.

Multiplexer

The Multiplexer flat cable network hardware consists of a small box containing the actual multiplexer circuitry. The multiplexer box connects a Corvus disk and up to 8 computers. Each computer requires a multiplexer interface card and connecting cable. The cables run directly from the card to a connector inside the multiplexer box.



Optionally, the 8 connectors in a multiplexer may each in turn be connected to another multiplexer, called a master multiplexer, forming a two-level network with up to 64 computers. The two-level aspect of such a system is from a hardware viewpoint and doesn't affect the software.

Cable length from computer to multiplexer is limited to a maximum of 50 feet. If longer cables are used, data transmission accuracy cannot be guaranteed.

The multiplexer box allows several computers to access the disk by handling one data request at a time. As one computer's request is handled, all others are locked out, and the next computer in the system polling sequence is serviced when the previous request is completed. Of course, the request locking and polling occurs very rapidly and users are not aware of the processes occurring.

Single Computer Systems

A Constellation II system may be implemented on a local hard disk with a single Corvus Concept or other computer. Multiple users are still possible, the restriction being that only one person may use the system at a given time.

The Constellation II software is used to give each system user a defined area of access. For example, personnel from the accounting department may have access to volumes of the disk that the executive secretaries do not. Each user has an individual account and password, just as on a multi-computer system.

Combination Networks

Combination networks consisting of both Omninet and Multiplexer systems can easily be configured. If, for example, an office has a Multiplexer system with six computers but wants to add an Omninet system and a Corvus Concept, the original Multiplexer system may be left intact. A disk server can be attached to the multiplexer, which in turn is connected to an Omninet network.

Many possible network configurations with multiplexers and Omninets are possible. The Concept can handle both Omninet and a Multiplexer interface card at the same time. If you have any questions about network configurations, contact an authorized Corvus Service Center.

The first four sections of this chapter pick-up where "The Corvus Concept Disk Drive Installation Guide" left off. They tell you how to create volumes, users, and user accounts. The last three sections of this chapter cover the management of user accounts.

ABOUT USERS AND VOLUME SETUP

Before creating users and adding volumes to your system, you need to plan. You need to decide how many users your system will have and what the volume space requirements will be for these users. Once this is decided, it will indicate how many and what type volumes your system will have. After users and volumes are created, user accounts will tie the two together.

The following are the general steps followed in setting up a system:

1. Decide on users and volumes.
2. Create volumes.
3. Create users.
4. Create user accounts.

About Creating Volumes

Usually volumes are created before users and user accounts. There are several things to keep in mind when creating volumes:

1. Name of the volume.
2. Size of the volume.
3. Whether the volume will be read-write or read-only. Keep in mind which users will use a volume.
4. To use pipes, you must create a volume named PIPES.

About Creating Users

After creating volumes, users are created. Keep in mind the following:

1. Decide on the user's name.
2. Decide on the user's password; generally the person's first and last name will work quite well for name and password, respectively.
3. What the user's boot operating system will be.

About Creating User Accounts

User accounts define user access rights. When setting up these accounts keep the following in mind:

1. To which volumes a user will have access.
2. What type of access users will have to each volume included in their account.
3. The volume CCSYS must be mounted on unit number 4.
4. The volume mounted on unit number 5 will become the user's default current volume.

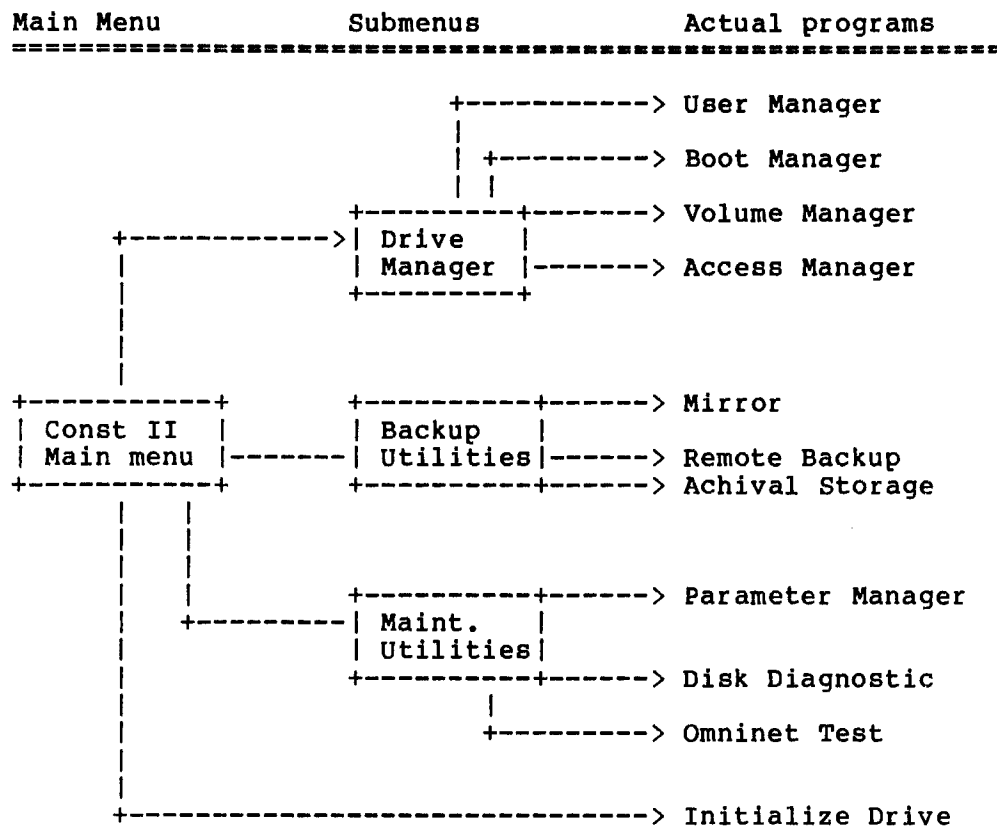
About System Management

Management of the system is performed through a utility called Const II. It is activated by the function key corresponding with the Const II label. After it is activated, the Const II utility displays a menu of choices from which the system manager can select the function desired. After [Const II] is pressed, the screen will display the following:

```
+-----+
|          CORVUS MANAGEMENT UTILITY          DS          |
|          Version [2.2b]                      Drive        |
|-----|
|          D - Drive Management                 |
|          B - Backup Utilities                 |
|          M - Maintenance Utilities            |
|          I - Initialize Drive                 |
|
|          H - Help                             |
|          E - Exit                             |
|-----|
+-----+
```

All the Constellation utilities are accessed through this menu. As with most of the Corvus utility programs, commands may be given by pressing the single key shown to the left of each function or by pressing the function keys.

The heirarchy of the Const II utilities is shown below:



Note that the programs surrounded by boxes don't actually do anything; they just serve as paths to the programs that do perform the system functions.

Functions of the user manager, volume manager, access manager, and boot manager utilities, whose operations are the subject of this chapter, are as follows:

- User manager: Creation, modification, and deletion of users.
- Volume manager: Creation, modification, and deletion of volumes.
- Access manager: Creation and modification of user accounts.
- Boot manager: Controls boot files for various computers on the network.

Use of the maintenance and boot manager sections of the Const II utility is covered in Chapter 5.

CREATING VOLUMES

To create a volume on a drive, we use the Add Volume function, which is found in the Volume Manager labels.

To get the Drive Manager labels, press [Const II] from the Dispatcher level. Next, press [Drive Manager]. The following displays on your screen and then the Drive Manager labels display.

```
+-----+
| CORVUS UTILITY [2.2b]   DS
| Drive Management      Drive
|-----|
|           U - User/Device Manager
|           V - Volume Managere
|           A - Access Manager
|
|           B - Boot Manager
|
|           S - Select Drive
|           L - List Drives
|           H - Help
|           E - Exit
|-----|
+-----+
```

When the Drive Manager labels display, press [Volume Manager]. The program will ask for a drive identifier, which could include server name, server password, drive name, and drive password.

If you have a disk server, you will be asked to enter a server name. This is the name given to the disk server during system generation. If you have no disk server, the program defaults to the name SERVER.

If the disk server name is the same as the one you selected when initializing the drive, press [RETURN] and the program will accept the default name. Otherwise, type the name of the disk server and press [RETURN].

Whether or not you have a disk server, you will be asked for the name of the drive. The program defaults to the name of the drive from which it was executed.

If the drive name is the same as the one you selected when initializing the drive, press [RETURN] and the program will accept the default name. Otherwise, type the name of the drive and press [RETURN].

The program will then ask for a drive password, type the password that you selected when initializing the drive and press [RETURN].

If the drive name or password was not correct and you get stuck in the name password loop, pressing the [ESC] key instead of typing the drive name releases you. However, we suggest you try again before giving up.

If the password was correct, you will then be presented with the following:

```
+-----+
| Volume Manager [2.2b]    DS SERVER
| Main Menu              Drive DRIVE1
+-----+
|
|       A - Add a volume
|       R - Remove a volume
|       C - Change volume attributes
|       L - List volumes
|       F - Free space list
|
|       H - Help
|       E - Exit
+-----+
```

Press [Add a Volume]. The following displays in the System window:

```
+-----+
|
|       Enter attributes of new volume:
|
|               Name:
+-----+
```

At this point, you should type the name you want the volume to have. The volume name may be up to 7 characters long.

and must begin with a letter, as opposed to a number or special symbol. The remainder of the name may be letters, digits, or any of these characters: _ - . # \$ ' () ^ . Letters in the volume name will be translated to uppercase by the system, so that typing Demo as in the example will result in a volume called DEMO.

The system will ask additional questions about the volume. A typical screen would be the following:

```
+-----+
|                                     |
|   Enter attributes of new volume:   |
|                                     |
|           Name: Demo                |
|      Size (blocks): 1024            |
|         Location: 7376              |
|      Volume type: UCSD/Pascal       |
|                                     |
|   Select from:                      |
|                                     |
|      UCSD/Pascal                    |
|      CP/M 80                        |
|      MSDOS                          |
|      Corvus Concept                  |
|                                     |
+-----+
```

In the screen pictured above, the system asked four questions about the attributes of the new volume. Taken one at a time, these are as follows:

Name The name chosen to represent the volume.

Size You must specify the size of the volume in blocks. Remember, a block holds 512 bytes of information. The system defaults to 1024 blocks (about half a megabyte). This is a good standard size, and you can accept this default by just pressing [RETURN]. You may also enter any size, up to the number of blocks remaining on the drive.

If you are creating volumes for CCOS, the maximum effective size will be about 2048 blocks or about one megabyte. CCOS permits a maximum of 77 files per volume regardless of the file size. Volumes larger than 2048 blocks will tend to run out of directory space before they run out of file space. Exceptions might be a volume with an EdWord

workspace or a data base, which can grow to be very large.

- Location** This is the location on the disk where the new volume will be placed. Location is specified by block number; the start of the disk is block 0. This defaults to the start of the largest free space on the disk. Unless you have some reason to change this, accept the default by pressing [RETURN].
- Volume type** This is the type of volume you are creating. The default is UCSD/Pascal, which can be accessed by both the Corvus Concept operating system and the UCSD P-System.

In most cases, you will create UCSD/Pascal volumes. The difference between CCOS and UCSD volumes are the order of bytes in a word; CCOS has the order high byte then low byte, UCSD has the order low byte then high byte. CCOS has provision to read both UCSD and CCOS volumes; However, UCSD cannot read CCOS volumes.

After you have specified the volume attributes, the system will display the following:

```

+-----+
|
|      OK to add volume (Y/N)? Y
|
|      Volume added.
|      Access added for user 1.
|
|      Does the new volume need to be formatted (Y/N)? Y
|
|      Constellation II directory written.
|-----|
|      Press <space> to continue, or
|      press A to add another volume.
|
+-----+

```

You will be asked if it is OK to add the new volume. At this point, take a look at the attributes you have entered. If everything is OK, press [RETURN], if not press N and press [RETURN].

You will then be told that access is added for user 1, which is you, the system manager. As the system manager, you generally want every volume in your account.

Next, you will be asked if the new volume needs to be formatted. Press Y. This formatting process establishes a directory of the appropriate type for the operating system selected. You will not always want to format a new volume. If you are creating a Constellation II volume over an existing Constellation I volume and you want to save the contents of the Constellation I volume, it is very important NOT to format the volume. If you format the volume, all existing data within the area specified will be erased.

After this, you can press [SPACE] to return to the volume manager main menu, or press A to add another volume. After adding the demo volume in this example, pressing [List Volumes] would show something similar to the following:

```

+-----+
| Volume Manager [2.2b]          DS SERVER |
| List Volumes                   Drive DRIVE1 |
+-----+
| Volume   Address Length  RW Type |
| <unused>      9    1023 |
| 1. CORVUS    1032   200  x  UCSD/Pascal |
| 2. CCSYS     1232  3072  x  Corvus Concept |
| 3. CCUTIL    4304  3072  x  Corvus Concept |
| 4. DEMO      7376  1024  x  Corvus Concept |
| <unused>     8400  2820 |
|                                     |
| Total free blocks on drive:      3843 |
| Total free areas on drive:       2 |
| Largest free space (blocks):     2820 |
|                                     |
| Total volumes on drive:          4 |
| Total blocks allocated on drive: 7368 |
| Largest volume size (blocks):    3072 |
+-----+
| Press <space> to continue, or |
| press F to list to a file. |
+-----+

```

There is a 1023-block section of space labeled "unused" at the start of the disk, immediately followed by a volume called CORVUS. The 1023 block space may not be unused, it can be the Corvus volume that contains Constellation I system information. (see Appendix D for more information.)

After creating all the volumes you want, use the F option of the List function to make volume list in a file. Later, print this file. This will come in handy if for some reason (e.g. power failure during a write to disk) you ever need to reconstruct the volumes on your drive.

If you want to use pipes, you must create a volume named PIPES. This volume can be any size. We recommend using the default size of 1024 blocks.

Continue adding volumes until all unused space is sectioned into volumes or until you have created all the volumes you currently need.

Once all your volumes are created and you've listed them in a file, you can add users.

CREATING USERS

To create a user, we use the Add User function, which is found in the User Manager labels. If you are still in the Volume Manager labels, press [Exit] to return to the Drive Manager labels. Next, press [User Manager].

You will be presented with the following:

```

+-----+
| User Manager [2.2b]      DS SERVER |
| Main menu              Drive DRIVE1 |
+-----+
| A - Add a user/device  |
| R - Remove a user/device |
| C - Change user attributes |
| L - List users/devices  |
|                          |
| H - Help               |
| E - Exit                |
+-----+
+-----+

```

To add a new user to the system, press [Add User]. The screen will display the following:

```
+-----+
|
| User Manager [2.2b]      DS SERVER
| Add a user/device      Drive DRIVE1
|-----|
|   U - User addition
|   D - Device addition
|
|   E - Exit
|-----|
|
+-----+
```

Press [User]. Note that [Device] is used to add dedicated system devices such as disk servers. The screen will display the following:

```
+-----+
|
| Please enter attributes of new user:
|
| Name:
|
+-----+
```

In this example, we'll add a user called Joe, with a password of MANN. User names may be up to ten characters long and the password may be up to eight characters long. Answering the system's queries about the new user gives us the following:

```
+-----+
|
| Please enter attributes of new user:
|
| Name: JOE
| Password: MANN
| Name of home disk server: SERVER
| Boot operating system: CORVUS CONCEPT
|
| Select from:
|   Apple Pascal
|   MSDOS
|   CP/M 80
|   Corvus Concept
|   UCSD IV.0
|
+-----+
```

The name of the home disk server defaults to the disk server from which the program is being executed. If the

program was executed from a local disk, with no disk server, the name defaults to SERVER.

The boot operating system defaults to Corvus Concept, meaning CCOS. When creating users for the Concept, this default must always be selected.

Your system may show other operating systems in addition to the ones shown here.

After you answer the last question, the system displays the following:

```
+-----+
|          |
|  OK to add user (Y/N)?Y  |
|          |
+-----+
```

After and pressing [RETURN], the system displays the following:

```
+-----+
|          |
|  User added.          |
|-----|
|  Press <space> to continue, or  |
|  press A to add another user or device.  |
|          |
+-----+
```

If, at this point, you wanted to add more users, you would press A. However, we want to check to see that user Joe was added. Press [SPACE], then press [List Users]. The following is displayed:

```
+-----+
|          |
|  User Manager [2.2b]      DS SERVER  |
|  List users/devices      Drive DRIVE1  |
|-----|
|          |
|  user          home          boot          |
|  name          password server  op system  |
|          |
|  1. JOE        MANN          SERVER        Corvus Concept  |
|  2. SMGR       HAI           SERVER        Corvus Concept  |
|          |
|  2 users listed.          |
|          |
+-----+
```

Note that users are listed in alphabetical order. Press [SPACE] to continue. The device list displays as follows:

```
+-----+
| User Manager [2.2b]      DS SERVER
| Add a User/Device      Drive DRIVE1
|-----|
|      device      host
|      name       type
|
|      0 devices listed.
|
|-----|
| Press <space> to continue, or
| press F to list a file.
|-----+
```

Continue adding users until all you have planned or currently need are added.

When all users are added, we recommend that you list users to a file then print the file as you did with volumes. If you ever forget a user name or password, this list will be useful.

SETTING UP USER ACCOUNTS

Each user has an associated set of mount tables. A user name plus a mount table make up a user account. In terms of volumes, user mount tables define the access any given user has to the system. The tables consist of a list of the volumes the user has access to, their mount status, (mounted or unmounted, as well as unit number) and the type of access, read-only or read-write, for each volume.

When a new user account such as Joe's is created, the mount tables for that account are blank. Thus, Joe can log-on the system, but cannot do anything. As a matter of fact, the log-on operation will never run to completion, but will die when the system attempts to find Joe's boot volume. Joe will need some volumes added to his mount tables, which is done with the Access Manager utility.

Boot Volumes

Volume access parameters must take into consideration the type of computer the user account is associated with. As far as the Constellation software is concerned, there are basically two types of computers: computers that boot off of the network, such as the Concept and Apple][, and computers that boot from their own diskettes, such as the Apple ///.

A computer that boots off of the network must have access to a BOOT VOLUME, which is a special volume that contains the files and information the computer needs to boot. All Corvus Concept Users share read-only access to a common boot volume. This eliminates the need to have redundant copies of system files for each user.

The boot volume, CCSYS, must be mounted on unit number 4. Even when the UCSD P-system is run on the Corvus Concept, the Concept must first boot from the CCOS boot volume mounted on unit number 4. The UCSD P-system is then warm booted by the CCOS and the current volume becomes the boot volume for the UCSD P-system.

Mounting, Unmounting, and Units.

It is possible for a computer on the network to have access to many more volumes than its operating system will handle at one time. For example, computers running the UCSD Pascal operating system can access only six volumes at any given time. But as part of a Constellation system they can have access to many more volumes.

This potential problem is handled with the mechanism of "mounting" and "unmounting" volumes. A volume must be mounted for a user before it can be accessed. Each user account contains a mount table, which is a list of the volumes available to the user and the volume status, mounted or unmounted.

A computer running the UCSD Pascal system refers to its disks with unit numbers 4, 5, and 9 through 12 (yes, it is a strange sequence). CCOS uses a similar scheme, but unit numbers are 4, 5, and 9 to 29. CP/M uses letters 'A' through 'O' to refer to its disks. A volume is mounted by associating it with one of these unit specifiers.

Unit number 4 has special significance for the Corvus Concept in that it is the boot volume. When the Corvus Concept performs a boot operation, it looks for the needed system files on unit number 4. Thus, if there is no volume mounted on unit number 4 or that volume does not contain the proper files, the system can't boot. The volume mounted on unit number four must always be the volume CCSYS.

The system manager may mount and unmount volumes for a user with the access manager program. The configuration defined by the system manager is the default configuration for a user account, which will take effect when the user first logs-on. The user may use the mount manager program for his particular machine to alter this configuration.

Setting Up Accounts

The access manager utility is used to control volume access on a user-by-user basis. Returning to our example, we press [Exit] to leave the user manager and return to the drive manager. Press [Access Manager]. The system asks

for the name of the user whose access you wish to modify. In this case we will type JOE and press [RETURN]. The system displays:

```

+-----+
| Access Manager [2.2b]           User JOE
| Main Menu                       DS SERVER
|                                 Drive DRIVE1
|-----|
| G - Grant volume access
| R - Remove volume access
| C - Change volume access
|
| L - List volumes accessible
|
| N - Next user
| H - Help
| E - Exit
|-----+

```

The first thing we might want to do when setting up access is to get a list of the volumes a user has access to. Joe, of course, does not have access to any volumes yet, so pressing [List Volumes] merely displays the following:

```

+-----+
| Number of volumes accessible: 0
|-----+

```

Since Joe is a Concept user, he will need access to a boot volume, which for all Concept users is CCSYS. The CCSYS volume is shared with read-only access among all Concept users. So the first volume we will give Joe access to will be CCSYS.

Pressing [Grant Access] results in the following:

```

+-----+
| Please enter:
|
| Volume name:
|-----+

```

Typing CCSYS and pressing [RETURN] causes the Concept to ask questions on the type of access (read-only or

read-write), the mount status (mounted or unmounted), and the unit number (if any) on which to mount the volume. The final display looks like this:

```
+-----+
|
|           Please enter:
|
|           Volume name: CCSYS
|           Access (RO/RW): RO
|           Mount status (M/U): MOUNTED
|           Mount unit: 4
|
|           OK to grant volume access (Y/N)?Y
|           Access granted.
|
+-----+
```

The access defaults to RO, and the mount status defaults to MOUNTED. You can use these defaults by pressing [RETURN]. The mount unit defaults to 10. Joe's using a Concept, and we're adding his boot volume, so we enter a 4 instead.

Setting up CCSYS as RO and mounted on unit four is the standard setup for all Concept users whether they are using UCSD pascal or not.

After the access is granted, the system prompts us with the following:

```
+-----+
|
|           Press <space> to continue, or
|           press G to grant another volume...
|
+-----+
```

Joe can now log-on to his account at any Concept computer on the network. Of course, he can't do very much with it, since his only volume is (read-only) CCSYS. Joe likes to program in Pascal, so we will give him access to a volume called PASCAL1 as unit number 5. The volume mounted on unit number 5 for a CCOS user becomes the current volume when that user logs on. Assuming that you are still at the prompt shown above, all that is needed is to press G and answer the questions again:

```

+-----+
| Please enter:                                     |
|                                                    |
|           Volume name: PASCAL1                   |
|           Access (RO/RW): RW                     |
|           Mount status (M/U): MOUNTED             |
|           Mount unit: 5                           |
|                                                    |
|           OK to grant volume access (Y/N)?Y      |
|           Access granted.                         |
+-----+

```

Note the differences: access to the PASCAL1 volume is RW (read-write) as opposed to the RO for CCSYS; and PASCAL1 is mounted as unit number 5.

Now, pressing [List Volumes] shows the following:

```

+-----+
| Access Manager [2.2b]           User JOE         |
| List Volumes                   DS SERVER        |
|                               Drive DRIVE1      |
|-----|
|           Volume      Unit  RW  Type           |
| 1.  CCSYS             4*   | Corvus Concept |
| 2.  PASCAL1           5   x  | UCSD/Pascal  |
|                               |                 |
| Number of volumes accessible: 2. |
+-----+

```

Note the asterisk next to the 4. The asterisk indicates that the volume CCSYS is the boot volume, which is the same for all Concept users.

Note the little x in the RW column of the PASCAL1 volume. This signifies that the volume has read-write access for this user. The absence of an x, such as in the CCSYS line, means that the volume is read-only.

Before going further, we need to briefly discuss private volumes. A private volume is simply one whose access is restricted to a single user account. Most volumes will be private volumes. However, most accounts will also have access to one or more public or shared volumes, which are volumes to which many users have access.

For example, a PROGRAMS volume (e.g. CCUTIL) with read-only access might be made available to all users. In a programming environment, all programmers could have read-only access to a volume containing a compiler, debugger, and other utilities.

If you forget the names of volumes or users, pressing [Help] displays the following:

```

+-----+
| Access Manager [2.2b]           User JOE
| Help text                       DS SERVER
|                               Drive DRIVE1
|-----|
| H - Help
| V - View volumes on drive
| U - User list
+-----+

```

This allows you to list all the volumes and all the users you have created. Pressing [Exit] returns you to the access manager main level.

Continue adding volumes to the access table until it is as you planned. Continue indicating whether volumes are read-only or read-write, whether mounted or not, and, if so, on which unit number they are to be mounted. If you wish to add an unmounted volume to the volume table, indicate that it is unmounted and assign it the default unit number (10). After this, the user can mount it himself when he needs access to it.

When you are done with one user, you may go to the next. Press [Next User]. When you use this function, the access manager prompts you for a new user name. Type the user name and set up that user's account as we have just done for Joe.

CHANGING A USER ACCOUNT

Joe tells us he has been promoted to a systems programmer and needs read-write access to the CCSYS volume. The first thing we might want to do when changing access is to get a


```
+-----+
|
|      Current access information:
|
|          Volume name: CCSYS
|          Access (RO/RW): RO
|          Mount status (M/U): MOUNTED
|          Mount unit: 4
|
|      Enter new access information:
|
|          Volume name: CCSYS
|          Access (RO/RW): RW
|          Mount status (M/U): MOUNTED
|          Mount unit: 4
|
|      OK to change volume access (Y/N)?Y
|      Access information changed.
|
+-----+
```

After this, we get the familiar "Press <space> to continue..." message.

The Change Access function is also used to mount and unmount volumes for users. The configuration of mounted and unmounted volumes that is in effect when a user signs on is the configuration set by the system manager. The user can change this configuration by using the mount manager program.

If you make changes to a user account while the user is on the system, the changes you make will not take effect until the user re-boots or uses the mount manager program to access the changed volume.

Removing Volumes

Joe has decided he does not like Pascal after all, and tells us we can remove his access to the PASCAL1 volume. To oblige Joe, we will remove the volume from Joe's account. This doesn't mean PASCAL1 is removed completely from the disk; the volume will still be available to other users who have it included in their account.

Pressing the [Remove Access] function key causes the system to display:


```
+-----+
| Volume Manager [2.2b]   DS SERVER
| Main Menu              Drive DRIVE1
+-----+
|   A - Add a volume
|   R - Remove a volume
|   C - Change volume attributes
|   L - List volumes
|   F - Free space list
|
|   H - Help
|   E - Exit
+-----+
```

The "DS" notation in the example above stands for Drive Server, which is set to SERVER for stand-alone and multiplexer systems, since there is no disk server connected. If you are on an Omninet network, DS is the name of of the disk server you selected.

Each function in the volume manager may be invoked either by pressing its single key as shown in the main menu, or by pressing its function key. Pressing the function key has the same effect as pressing the single character.

The Help function displays a list of commands with brief explanations of the commands.

If you have more than one drive daisy-chained, you may have volumes on a second or third drive.

Before changing or adding any volumes, it is a good idea to take a look at what is on the disk with the [List Volumes] and [Free Space]. A [List Volumes] will return a display similar to the following:

```

+-----+
| Volume Manager [2.2b]   DS SERVER
| List Volumes           Drive DRIVE1
+-----+

```

Volume	Address	Length	RW	Type
<unused>	9	1023		
1. CORVUS	1032	200	x	UCSD/Pascal
2. CCSYS	1232	3072	x	Corvus Concept
3. CCUTIL	4304	3072	x	Corvus Concept
4. DEMO	7376	1024	x	UCSD/Pascal
5. PASCAL1	9324	1024	x	UCSD/Pascal
<unused>	10348	1796		
Total free blocks on drive:				2819
Total free areas on drive:				2
Largest free space (blocks):				1796
Total volumes on drive:				5
Total blocks allocated on drive:				8392
Largest volume size (blocks):				3072

```

+-----+

```

Notice that for each volume on the drive we are given the volume name, its starting address (in blocks), its length (also in blocks), its protection status, and the volume type. An x in the RW column means the volume is read-write. No x means the volume is read-only. In this example, only Corvus Concept and UCSD/Pascal volumes are shown, but networks with other types of computers will display the appropriate volume type, such as IBM PC-DOS and Apple /// SOS.

The difference between CCOS and UCSD volumes are the order of bytes in a word; CCOS has the order high byte then low byte, UCSD has the order low byte then high byte. CCOS has provision to read both UCSD and CCOS volumes, however, UCSD cannot read CCOS volumes.

In addition, we are given the total number of free blocks on the drive, the total free areas with their sizes and locations, and the largest single chunk of free space. The free space information can also be obtained with the Free Space function. Press [Free Space] and the following displays:

Volume	Address	Length	RW	Type
1. <unused>	9	1023		
2. <unused>	10348	1796		
Total free blocks on drive:			2819	
Total free areas on drive:			2	
Largest free space (blocks):			1796	

Returning to the volume display for a moment, consider the information that we have been given. There is a 1023-block section of space labeled "unused" at the start of the disk, immediately followed by a volume called CORVUS. The 1023 block space may not be unused; it can be the Corvus volume that contains Constellation I system information such as user and volume tables, boot blocks, and so on. This area should not be modified if a Constellation I and Constellation II network are to share a Corvus disk, as the information here is necessary for correct system operation. (see Appendix D for more information.)

The CORVUS volume should never be removed, moved or changed. If it is removed or moved, it would lock all users, including the system manager, out of the system, which would necessitate a new system generation.

Changes made with the volume manager are system wide, whereas changes made with the access manager or user manager are user-specific.

Volumes are globally protected by making them read-only or not accessible. A read-only volume can have its files examined, but not modified. Volumes can be protected both globally (i.e. for all users, including the system manager) or locally (i.e. for a given user or set of users). A volume that is marked not accessible is completely inaccessible. This option is useful in the following cases:

1. When you are not sure a given volume is being used. You can mark it NA and see who complains about not being able to access it. If no-one complains, you can remove it and use the space for something else.

2. If you, as the system manager, want to have exclusive access to a volume for adding data to it, restoring it with the Mirror, or for another reason, you can mount the volume and mark it NA. Anyone who boots or tries to mount the volume while it is NA will be unable to access the volume. Of course, if you re-boot, you will no longer have access to it either; change it back before you re-boot.

Global volume protection is easiest to implement. Select the [Change Volume] function from the volume manager main menu. The screen will display the following:

```

+-----+
|               |
| Enter name of volume:  |
|               |
+-----+

```

In this case, we will use the volume PASCAL1 as an example. Typing PASCAL1 and pressing [RETURN] causes the system to display the following:

```

+-----+
| Current attributes of volume: |
|                               |
|           Name : PASCAL1     |
|           Size (blocks) : 3096 |
|           Location : 9324    |
| Access (RO/RW/NA) : RW      |
|           Volume type : UCSD/Pascal |
|                               |
| Enter new attributes:       |
|                               |
|           Name : PASCAL1     |
|                               |
+-----+

```

You can change only two attributes of a volume: its name and its access.

If you wish to change the size, location, or volume type of an existing volume, you must first remove the volume, then recreate it with the desired attributes.

The default presented for the volume name will be the current name of the volume. You can keep it by pressing [RETURN], or enter a new name. The system will then display the following:

```
+-----+
| Current attributes of PASCAL1:
|
|           Name : PASCAL1
|       Size (blocks) : 3096
|           Location : 9324
| Access (RO/RW/NA) : RW
|       Volume type : UCSD/Pascal
|
| Enter new attributes:
|
|           Name : PS1
|       Size (blocks) : 3096
|           Location : 9324
| Access (RO/RW/NA) : RW
+-----+
```

The size and location attributes will be displayed, but you will not be allowed to change them. The current access will be presented as the default, which you may accept by pressing [RETURN] or change by entering a new access.

The system will then display the following:

```
+-----+
|           OK to change volume attributes? Y
+-----+
```

Press [RETURN] to implement your changes, or press N and [RETURN] to abort the procedure. The system will then display the following:

```
+-----+
|           Press <space> to continue, or
|           press C to change another volume ...
+-----+
```

The other way to protect a volume allows you to control the access individual users have to it. This is done with the access manager program.

Removing Volumes

Occasionally, you will want to remove a volume. This might occur when a user is removed from the system, or when certain volume attributes need to be changed.

The only way to change the size of a volume is to delete and recreate it. Of course, all files on the volume will be lost, unless they are duplicated elsewhere.

To remove a volume, just press [Remove Volume]. The screen will display the following:

```
+-----+
|                                     |
|   Enter name of volume to remove:   |
|                                     |
+-----+
```

Enter the name of the volume you want to remove and press [RETURN]. In this example, we will remove the volume DEMO. After you enter the volume name, the screen will display the following:

```
+-----+
|                                     |
|   Attributes of volume to be removed:   |
|                                     |
|           Name : DEMO                 |
|      Size (blocks) : 1024              |
|      Location  : 12420                 |
| Access (RO/RW/NA) : RW                 |
|      Volume type : UCSD/Pascal         |
|                                     |
|   OK to remove volume (Y/N)? Y         |
|                                     |
+-----+
```

At this point, you can back out by pressing N then [RETURN]. Y is given as the default, which you can enter by pressing [RETURN]. After you press [RETURN], the screen will display the following:

```
+-----+
|       |
| Volume removed. |
|-----|
| Press <space> to continue, or |
| press R to remove another volume ... |
|       |
+-----+
```

CHANGING USER ATTRIBUTES

Users are managed like volumes. A user can be created, modified, and deleted. Users are managed through the User Manager utility, which, like the volume manager utility, is called up through the [Const II] key.

After pressing [Const II], select the [Drive Manager] option as you did when managing volumes. Next, select the [User Manager] option. You will be asked for a server name, drive name, and drive password. When you have entered these, the system will display the following:

```
+-----+
| User Manager [2.2b]      DS SERVER |
| Main Menu                Drive DRIVE1 |
|-----|
```

```
  A - Add a user/device
  R - Remove a user/device
  C - Change user attributes
  L - List users/devices
```

```
  H - Help
  E - Exit
```

Pressing [Help] will result in a display that gives a brief explanation of each user manager command.

Pressing [List Users] results in this display:


```

+-----+
| User Manager [2.2b]      DS SERVER
| List users/devices      Drive DRIVE1
|-----|
|
| user          password  home      boot
| name          server    server     op system
|
| 1. JOE        MANN      SERVER    Corvus Concept
| 2. SMGR       HAI       SERVER    Corvus Concept
|
| 2 users listed.
|
+-----+

```

Press [SPACE]

```

+-----+
| User Manager [2.2b]      DS SERVER
| List users/devices      Drive DRIVE1
|-----|
|
| device        host
| name          type
|
|
| 0 devices listed.
|
+-----+

```

In this case, there are only two users on the system.

The List Users function should be used with caution, as it shows the passwords for all users on the system.

To change user attributes, you use the Change User function. This function allows you to change three of four user attributes: the user password, the name of the home disk server, and the type of boot operating system for the user being managed. If you want to change the user name, you must remove the user and then add the user again.

Press [Change User]. The screen will display the following:

```
+-----+
| User Manager [2.2b]      DS SERVER
| Change user attributes  Drive DRIVE1
|-----|
| Enter user/device name:
+-----+
```

In our example, we want to change Joe's password to MOMMA. First, we type JOE and press [RETURN]. The screen displays the following:

```
+-----+
| User Manager [2.2b]      DS SERVER
| Change user attributes  Drive DRIVE1
|-----|
|           Name: JOE
|           Password: MANN
| Home disk server name: SERVER
| Boot operating system: Corvus Concept
|
| Enter new attributes:
|
|           Name: JOE
|           Password: MANN
+-----+
```

We type MOMMA and press [RETURN]. Then we press [RETURN] twice to accept the default for the next two prompts, which leaves those prompts as they were.

```

+-----+
| User Manager [2.1 ]          DS SERVER
| Change user/device name Drive DRIVE1
|-----|
|           Name: JOE
|           Password: MANN
| Home disk server name: SERVER
| Boot operating system: Corvus Concept
|
| Enter new attributes:
|
|           Name: JOE
|           Password: MOMMA
| Home disk server name: SERVER
| Boot operating system: Corvus Concept
|
| OK to save changes (Y/N)? Y
+-----+

```

To accept the changes, press [RETURN]. Then press [SPACE] to return to the User Manager labels.

Removing Users

Joe has been caught attempting to break into other user's volumes. Subsequently, he has been fired and lawsuits are pending. Regardless of their outcome, it looks as if Joe will not be back on the system for quite a while. After saving the copy of Pac-Man Joe wrote on the company's time, we remove Joe's account from the system.

From the user manager, press [Remove User]. The system will display the following:

```

+-----+
| Enter name of user/device to remove:
+-----+

```

We type JOE and press [RETURN]. The system displays the following:

```
+-----+
|                                     |
|           User: JOE                 |
|      User password: MOMMA           |
| Home disk server name: SERVER       |
| Boot operating system: Corvus Concept|
|                                     |
|           OK to remove user (Y/N): Y|
|                                     |
+-----+
```

Y is given as the default answer to "OK to remove user," so just pressing [RETURN] brings the following:

```
+-----+
|                                     |
|           User removed.             |
|                                     |
|           Press <space> to continue, |
|           press R to remove another  |
|           user...                   |
|                                     |
+-----+
```

This example has been rather simplistic. In a real-life situation, Joe would almost certainly have one or more private volumes that would need to be eliminated or re-allocated after he was removed from the system.

One of the advantages of a computer network is that the various stations on the network can communicate with each other. The mechanism of pipes can provide this ability.

A pipe is a dynamic data structure maintained by the disk system in the pipes volume. Individual pipes have no fixed size, but can grow to accomodate data as it is sent in. When all of a pipe's data is gone, the pipe is deleted.

A spooled file is put into a pipe, and remains there until another station or device despools it. A pipe can be accessed by only one computer at a time, so if more than one computer tries to put data into a pipe with a set name, i.e. PRINTER, a second pipe with the same name is created. The disk controller handles multiple pipes with the same name, so that many people can run the SPOOL program at the same time without worrying about data becoming scrambled.

Corvus also supplies low-level pipe control procedures that may be called from Pascal or FORTRAN programs written by users.

Under ideal circumstances, pipes are created, accumulate data, dump the data, and vanish. However, sometimes things can go wrong. If a pipe is created but never read, it will remain in the pipes volume occupying space. Or, a pipe can be left in an open and indeterminate state if the computer or program accessing it crashes. The system manager has the ability to manage individual pipes should the need arise.

Normally, Constellation networks have one or more stations acting as printer servers. A printer server is a computer, with a local printer, that is running the Spool program and constantly waiting for data from other computers. Any computer on the network can send data to be printed through a special Pipes area on the disk. The printer server station takes this data from the pipes area and prints it.

Documents are not necessarily printed in the same order they are sent.

A printer server may be either a dedicated device or any network station running the spooler software supplied by Corvus.

The advantage of print spooling is that each computer on the network does not need to have its own local printer, although a local printer can still be used. Each station on the network can use the Spool utility program supplied with the Constellation II software.

SETTING UP THE PIPES VOLUME

For pipes to be used, a special volume, named PIPES, is required. This volume is created with the volume manager utility just like any other volume. The size of the pipes volume depends upon the amount of traffic you expect it to handle, but the default 1024-block volume size should handle the traffic load on even large networks. If you are running a smaller network or you do not anticipate much use of pipes, you can save disk space by making the pipes volume smaller.

Create the volume as a UCSD volume and format it. Press [Exit] once to return from the volume manager to the drive manager, and again to return from the drive manager to the Dispatcher labels. Then, press [Const II] to get to the system maintenance functions, and [Par Mgr] to get to the parameter manager.

You will now see the function key labels at the bottom of the screen display the following:

F1	F2	F3	F4	F5
CDisp		Pipes		Sema4s
F6	F7	F8	F9	F10
			Help	Exit

Parameter manager functions are invoked only by function keys.

Pressing [Pipes] changes the labels to the following:

F1	F2	F3	F4	F5
List			Clear	Init
F6	F7	F8	F9	F10
Close	Purge		Help	Exit

If the pipes volume has just been created or if it has somehow been damaged, you will need to initialize it. Pressing [Init] will display the following:

```

+-----+
|           Initialize pipes volume (Y/N)?Y           |
+-----+

```

Pressing [RETURN] displays the following:

```

+-----+
|           Pipes volume initialized.           |
+-----+

```

Pressing [List] at this point will display the following:

```

+-----+
|           Active pipes are:           |
+-----+

```


MANAGING THE PIPES AREA

As the system manager, you should check the pipes area at least once a day. If there are more than 40 pipes, check with the users on your network.

To manage the pipes area, you must press [Pipes] from the Parameter Manager labels.

Pipes labels perform the following functions:

- [List] Displays the pipe table as a list of pipes. It shows you each pipe name, state of pipe, whether the pipe contains data, and how many blocks of data are in the pipe.
- [Clear] Clears the pipe area. This purges all pipes from the system. Since, this clears all pipes from the table, you are asked for confirmation before continuing.
- [Init] Initializes the pipes area. This sets up the pipes area for use. If there are pipes in the table, they are purged. Init also asks for confirmation before continuing.
- [Close] Closes a pipe that was left in an open state. If a pipe has been left in an open state, it is not readable.
- [Purge] Purges or deletes a single pipe from the system. Pipes become invalid when the spooling or despooling process is interrupted.

Any pipe that is open and not currently in use, i.e. not being spooled to or despoiled from, is in an invalid state. These pipes cannot be accessed and must either be purged or closed. If you close the pipe, it will then be readable.

Once a pipe is purged, it is not retrievable.
- [Help] Displays a brief description of each label.
- [Exit] Returns you to parameter manager labels.

Managing the pipes area will require you, as the system manager, to periodically check the pipes table. If pipes are in an invalid state, remove them if necessary to reclaim pipe space.

Suppose a user has spooled a text file to the PRINTER pipe. A [List] of the pipes volume would show the following:

```

+-----+
| Active pipes are:
|   1. PRINTER   Closed ----   Contains data   2 blocks
+-----+

```

This is a normal condition. The pipe, PRINTER, has been spooled to by a user and contains data that will be printed when it is despoiled. Now, suppose a user wrote some data to a pipe called DEMO, but the program crashed before closing the pipe. A [List] would reveal the following:

```

+-----+
| Active pipes are:
|   1. PRINTER   Closed ----   Contains data   2 blocks
|   1. DEMO      Open   Write   Contains data   6 blocks
+-----+

```

It is impossible to tell from this display that the pipe DEMO has been left open accidentally, or if it is actually in use at the time the list was performed. You should always make sure that a pipe is not in use when you use the parameter manager to delete it. You can usually tell if it is in use by waiting about a minute then pressing [List] again. If the number of blocks has changed, the pipe is in use; if not, the pipe is in an invalid state.

The pipe DEMO has been left in an open state. Just because a pipe displays as open on a pipes list does not necessarily mean that it is damaged or left over. It could be a pipe in the process of receiving data. Generally, you will be told by a user if a pipe needs to be erased.

There are two ways to handle a pipe left in the open state: it can be closed, so that what data is in it can be read, or it can be purged. Purging the pipe destroys all data in it.

Let's look at both courses of action. Pressing [Close]

DESPOOLING

Despooling is the process of removing information from the pipes area. The method of removing information requires a computer to read the data from the pipe. The data is then printed or stored in a file for later use.

Printing text files on a shared printer is the main use of the despooler. The text is prepared on one computer through text processing, program execution, or other means. This information is spooled to the pipe area to await printing. Then the computer with the printer attached needs to use the Spool function of the File Manager, and select the D)espool option. If the pipe PRINTER remains the default and the printer is ready, the file will be printed. Several items can be spooled to the printer at once, the despooler removes each pipe, named PRINTER, one at a time until all are printed. Several computers can send to one printer without disrupting the printing process.

To to set up a Concept Workstation to despool, you must attach a printer to the Workstation, assign the printer driver, and set the proper printer parameters as discussed in "The Corvus Concept Personal Workstation User Guide."

Once a file has been sent, or spooled, to the Pipes volume it remains there until it is removed or despooled. When a file is despooled from the Pipes area the destination may be set to a printer, a file, or the console.

The Spool program on the Concept may be set up to do nothing but despool files that have been sent to the Pipes area with a pipename of PRINTER. To setup a Concept Workstation to despool, do the following:

```
PRESS [FileMgr]
PRESS [Spool]
```

The following will display in the system window:

To leave a function at any time while running the Spool program press the [ESC] key.

Press O

The screen displays the following:

```

+-----+
| Spool                                Despool                                |
| F)ormatted      : TRUE                L)inefeeds      : TRUE                |
| I)nclude        : {$I                 E)xpand Tabs   : 8                    |
| N)ew Page       : .PG                 M)ax lines/page : 55                   |
|                                                         W)here           : LinePrinter      |
| Q)uit           P)ipe name : PRINTER                                         |
| Enter options :                                                                |
+-----+

```

Options are divided into two groups. Spool options are displayed on the left side of the screen and despool options are displayed on the right side of the screen. The spool options do not need to be set when despooling a file. The P)ipe name option is associated with both spooling and despooling.

The despooling options are described below:

```

L)inefeeds      -- set to true, forces the printer to
                  advance the paper one line whenever a
                  carriage return is encountered. If
                  your printer is double spacing, set
                  this option to false. It is up to
                  you to make sure this is set
                  appropriately for your printer.

E)xpand Tabs    -- sets the tab length. EdWord does not
                  use tab characters, so this option
                  does not need to be used with Concept
                  files.

M)ax lines/page -- sets the the maximum number of lines
                  to printe per page. Many printers
                  require this to be set.

W)here         -- allows the output to be directed to a
                  printer, a file, or the console.

```

P)ipe Name -- Pipe names can be any alphanumeric name up to eight characters long and starting with a letter. The default pipe name is PRINTER. A different pipe name is normally used when a pipe is despooled to a file.

If the pipe being despooled is to be sent to a printer, it is important to have the M)ax lines/page set for that printer. Some printers ignore this command and look for form feed commands in the text file itself. For an average text file being printed on eight and one half by eleven inch paper a desirable page length is 60 lines per page.

To set the M)ax lines/page press M from the option menu.

PRESS M

The following prompt will display:

```
+-----+
| Enter option : M
| M)ax lines/page: 55
+-----+
```

TYPE 60
PRESS [RETURN]

The number will change in the option table, and the option prompt will reappear.

To despool a pipe, the pipe name must be set to pipe name that was used when the file was spooled.

To change the pipe name

PRESS P

The following will display:

```
+-----+
| Enter option : P
| Enter pipe name: PRINTER
+-----+
```

TYPE TEMP [RETURN]

The pipe name is now TEMP, and it appears in the options list. The despooler will now despool from any pipes named TEMP.

File /VOL1/NEW_FILE is on a local hard disk which is connected to a Concept. The Concept is also connected to a Corvus network. If the file /VOL1/NEW_FILE is to be made available to everyone on the network, the file could be spooled to the pipe named TEMP and then despooled to a file in one of the network's volumes.

To despool a pipe to either a file or the console, the W)here option must be set. To do this

PRESS W

The following prompt will display:

```
+-----+
| Enter option : W
| W(here: L(pr, F(ile, C(onsole
|
+-----+
```

PRESS F

The options list will change to show File next to the W)here option.

After the options have been set, the file can be despooled. Press Q to quit, and the original menu will display:

```
+-----+
| Active slot for Spooling/despooling is 5
| Select option [ S)pool D)espool O)ption Q)uit A)lt slot ]:
|
+-----+
```

To despool a pipe press D from the main Spool menu.

PRESS D

When despooling to a file the following prompt displays:


```
+-----+
| Despooling from pipe TEMP[ 2]
|
| SPOOLED FILENAME: NEW_FILE
| FILENAME TO DESPOOL TO: NEW_FILE
+-----+
```

The prompt gives a default filename of NEW_FILE, the previous name of the file. A different filename can be typed, or the default can be accepted.

PRESS [RETURN]

```
+-----+
| .....
| Pipe TEMP
| [ 2] contained          5 blocks
|
| Waiting to despool pipe "TEMP"
| Press any key to escape...
+-----+
```

Press any key on the keyboard and the original menu will reappear. Do not wait too long to press a key at this point. The file has already been despoiled and the program is waiting to despool anything else that happens to be given the same pipename. If, however, you were setting up to despool to a printer, you may not want to press a key to stop. Rather, you would let the despooler continue running.

The last command option from the main menu is Q)uit. To leave the Spool program press Q. The File Manager labels will reappear.

One of the disadvantages of mass storage devices such as hard disks is the amount of data they hold. A power failure during a write, or other catastrophe can destroy some, most, or all the data on a hard disk.

The way to insure against the effects of such an occurrence is to back up, or duplicate, the data on the disk. Previously, the only answer to backing up a hard disk system on a small computer has been one of two possibilities: use lots of floppies, and hope you do not have any files that will not fit on a single disk; or, buy two hard disks.

However, the Corvus Mirror option gives a system the ability to transcribe the contents of hard disks onto standard videotape cartridges with almost any VHS format video recorder. The information is recorded with quad redundancy to reduce errors.

MIRROR HARDWARE SETUP

Corvus disk systems can be ordered with a built-in Mirror. If the disk drive has an internal Mirror, plug the video cable into the video jacks on both the video recorder and the back of the disk drive. Video IN of the video recorder connects to video OUT of the disk drive; video OUT of the video recorder connects to video IN of the disk drive.

Users of internal Mirrors may proceed to the section "Using the Mirror" after performing this simple hardware setup.

Users of external Mirrors must connect their Mirror to the drive before the Mirror can be used to backup the drive.

The following steps describe the installation of an external Mirror.

1. Power off all equipment.
2. Remove the cover of the Mirror.
3. Connect the Mirror between the disk and computer, disk server, or multiplexer. The cable that exits from the drive must connect to the Mirror. As the Mirror is viewed from the rear, the flat cable should be plugged into the connector on the right. A properly connected cable exits toward the nearest edge of the Mirror's enclosure, with the cable's colored stripe on the right.
4. Next attach one end of the flat cable that was supplied with the Mirror to the interface card, the center port on the Multiplexer, or the flat cable port in the disk server; only one end of the cable will fit into this port. The cable exits toward the nearest edge of the Multiplexer with the cable's colored stripe on the right as the Multiplexer is viewed from the rear.
5. Attach the other end of the cable that was supplied with the Mirror to the empty port on the Mirror board. The cable exits in a manner similar to the other flat cable with the cable's colored stripe on the right as the Mirror is viewed from the rear. Be careful not to offset any pins when connecting the cable.
6. Replace the cover of the Multiplexer and the Mirror. Plug the video cable into the video jacks on both the video recorder and the back of the Mirror. Video IN of the video recorder connects to video OUT of the Mirror; video OUT of the video recorder connects to video IN of the Mirror. You may now proceed to the section "Using the Mirror."

USING THE MIRROR

This section describes the use of the Mirror program, in conjunction with the Mirror hardware, for the backup and restoration of disk information.

From the Dispatcher labels, press [Const II]. Then press

[Backup].

The Backup labels display.

[Mirror] -- This is the normal Mirror program
 supplied by Corvus to work with all
 drives with a Mirror.

[Archival Storage] -- This can be used with only the Remote
 option hardware.

[Remote Backup] -- This can be used with only the Remote
 option hardware.

[Select Drive] -- Allows you to select which drive you
 will backup.

[List Drives] -- List the drives on-line.

[Help] -- Displays a brief description of each
 Backup label.

[Exit] -- Returns you to the Const II labels.

Backing Up a Drive

1. Press [Mirror]. The Mirror labels display.
2. Press [Backup]. The Backup labels display.
3. To backup a drive, you must select the Drive option.
You are then asked which drive is to be backed up.

Press [Drive]

The screen displays the following:

```
+-----+
|       |
| Enter BACKUP parameters: |
| Drive number? 1         |
|       |
+-----+
```

4. If drives are daisy-chained together, you may select
which of the physical drives will be backed up. Only
one drive may be backed up at a time. In a single

Press [RETURN]

The screen displays the following:

```

+-----+
|                                     |
|           Date: 9-MAR-83           |
|           Time: 5:00 P.M.         |
|           Name: DRIVE BACKUP      |
|           Comment: BACKUP FOR DIBS' DRIVE TO LIVE |
|                                     |
| Position Recorder and Start Record |
| Press <return> when ready_       |
|                                     |
+-----+

```

9. Set the speed setting on the video recorder to standard play speed. Insert a video tape into the video cassette recorder and rewind the tape. It is recommended that only one drive be backed up on any one tape. A 30 minute tape is required to back up a Model 6 or Model 11 drive while a 60 minute tape is required for a Model 20 drive. When the recorder has been loaded. Press PLAY and RECORD on the video cassette recorder. Pressin [ESC] will allow you to abort this command, and will return you to the Mirror main menu.

After the video cassette recorder has been running for about five seconds, press [RETURN].

The screen displays the following:

```

+-----+
|                                     |
|           Backup in Progress ...   |
|                                     |
+-----+

```

10. The length of time required for backup varies with the size of the Corvus drive.

Drive Model	Approximate Backup Time
6	11 minutes
10	17 minutes
20	35 minutes

11. After the appropriate time for the respective disk, the screen displays the following:

```
+-----+
|                                     |
|      Backup Finished               |
|                                     |
|      Error Status:                 |
|                                     |
|          Disk Errors: 0             |
|                                     |
|      --- ALL DATA STORED ---      |
|                                     |
+-----+
```

12. The number of disk errors shown should always be zero. If the number is not zero, see the Trouble-shooting chapter of this guide to rectify possible media defects.

The number of disk errors reported indicates the number of errors made by the disk unit during transfer to video tape. The number of errors on the tape itself has yet to be determined. Bad tape media may cause the tape to be incapable of restoration. To confirm that the information on the tape can be restored to a drive

Press [Verify]

The screen displays the following:

```
+-----+
|                                     |
|      Verify selected.              |
|                                     |
|      Position Recorder and Start  |
|      PLAYBACK                      |
|      Press <return> when ready_    |
|                                     |
+-----+
```

13. Rewind the video tape to its beginning and press PLAY, then press [RETURN] on the Concept. The screen displays the following:

```
+-----+
|                                     |
|      Verify in Progress ...        |
|                                     |
+-----+
```

14. After the amount of time elapsed equals the time required for the backup of the drive, the screen displays the following:

```
+-----+
|                                     |
|      Error Status:                 |
|                                     |
|      Recovered Errors: 16          |
|      Tape Read Errors: 0          |
|                                     |
|      --- ALL DATA RECEIVED ---    |
|                                     |
+-----+
```

15. When the Mirror transfers information to video tape, the information is transferred four times. The number of recovered errors indicates the number of times the drive had to go to the second, third or fourth copy of the information in order to get a restorable block image. The number of recovered errors varies but should not exceed 250. When a large number of recovered errors are reported, the video tape is probably worn out and it should be replaced.

The number of tape read errors indicates the number of times that, despite going to the second, third and fourth copy of the information, a block could not be restored. Tape read errors usually indicate bad tape media. If tape read errors are reported, the backup should be repeated with a new tape.

16. To leave the Backup program

Press [Exit]

The Mirror labels redisplay.

Restoring a Drive

This section describes the method by which an image of a drive is restored from a video cassette tape to a Corvus disk system using the Mirror. This section describes only the normal situation where a tape image is to be restored to a drive the same size as the drive from which it was created. The possibility that the image will be restored to a different size drive than the drive from which the image was created is described in the section "Restoration to Alternate Drives."

1. From the Backup labels, press [Mirror]. The Mirror labels display.

2. To be sure that the tape contains the desired drive backup

Press [Ident]

The screen displays the following:

```
+-----+
|
| Identify selected.
|
| Position recorder and start PLAYBACK
| Press <return> when ready_
|
+-----+
```

3. Rewind the video tape. When it is rewound Press PLAY on the recorder. Then press [RETURN] on the Concept.

After a few seconds, the screen displays something similar to the following:

```
+-----+
|
| Image ID      : 1
| Size         : 11540
| Generated on: XXAP (PASCAL)
| Date        : 9-MAR-83
| Time       : 5:00 P.M.
| Name       : DRIVE BACKUP
| Comment    : BACKUP FOR DIBS' DRIVE TO LIVE
|
+-----+
```

4. If the tape contains the desired drive image

Press [Restor]

The Restor labels display.

5. Press [Drive]

The screen displays the following:

```
Enter RESTORE parameters:
```

```
Drive number: 1
```

6. If drives are daisy-chained together, you may select the drive to which the image will be restored. Remember that the size of the drive to which the image will be restored must match the size of the drive from which the image was taken. You will usually restore to drive 1. Enter the drive number to which the image will be restored followed by [RETURN].

```
Type 1  
Press [RETURN]
```

The screen displays the following:

```
Restoring 11540 blocks to drive 1  
starting at block 0.  
Position recorder and start PLAYBACK  
Press <return> when ready.
```

7. Rewind the video tape. When it is rewound press PLAY on the video cassette recorder. Then press [RETURN] on the Concept.

The screen displays the following:

```
Restore in progress...
```

8. After the amount of time elapses that was required to originally back up the drive, the screen displays the following:

```
+-----+
|
|      Error Status:
|
|      Recovered Errors: 30
|      Tape Read Errors: 0
|      Disk Write Errors: 0
|
|      --- ALL DATA RECEIVED ---
|
+-----+
```

9. The number of recovered errors varies, but should not be over 250. If the number exceeds 250, the tape is probably worn out and should be replaced. No tape read errors or disk write errors should be encountered. If tape read errors occur, the tape may have defective media; try to restore the image again. If disk write errors occur, go to the Trouble-shooting chapter to rectify possible media defects.
10. To exit the Mirror program, press [Exit].

Restoring to Alternate Drives

Occasionally users wish to restore a drive image to a different model of disk drive than the drive from which the image was recorded. This can be done as long as the drive to which the tape will be restored has a larger capacity than the drive from which the image was taken. This section describes the method by which this type of restoration is accomplished.

1. Press [Mirror] from the Backup labels.
2. To be sure that the tape contains the desired drive backup, press [Ident].

The screen displays the following:

```
+-----+
|                                     |
|           Identify selected.       |
|                                     |
|   Position recorder and start PLAYBACK |
|   Press <return> when ready_       |
|                                     |
+-----+
```

3. Rewind the video tape. When it is rewound press PLAY on the video cassette recorder. Then press [RETURN] on the Concept.

The screen displays something similar to the following:

```
+-----+
|                                     |
|   Image ID      : 1                 |
|   Size          : 11540              |
|   Generated on: XXAP (PASCAL)        |
|   Date         : 9-MAR-83           |
|   Time         : 5:00 P.M.          |
|   Name         : DRIVE BACKUP       |
|   Comment      : BACKUP FOR DIBS' DRIVE TO LIVE |
|                                     |
+-----+
```

4. If the tape contains the desired drive image, press [Restor].

The Restor labels display.

5. Press [Manual]

The screen displays the following:

```

+-----+
|               |
| Enter RESTORE parameters: |
|               |
| How many blocks: 0       |
|               |
+-----+

```

6. When the tape was Identified, the size of the image was reported. The size of the image must be smaller than the size of the drive to which it will be restored.

Drive Model	Size (in blocks)
-----	-----
6	11540
11	23700
20	35860

7. If the image is smaller than the drive to which it will be restored, enter the size of the image followed by [RETURN].

Type 11540
Press [RETURN]

The screen displays the following:

```

+-----+
|               |
| For drive: 0       |
|               |
+-----+

```

8. If drives are daisy-chained together, you may select the drive to which the image will be restored. Enter the drive number of the drive to which the image will be restored followed by [RETURN]. If no drives are daisy chained

Press 1 [RETURN]

The screen displays the following:

```
Restoring 11540 blocks to drive 1
  starting at block 0.
Position recorder and start PLAYBACK
Press <return> when ready_
```

9. Rewind the video tape. When it is rewound press PLAY on the recorder.

After about 5 seconds, press [RETURN] on the Concept.

The screen displays the following:

```
Restore in progress...
```

10. After the amount of time elapses that was required to originally back up the drive, the screen displays the following:

```
Error Status:
    Recovered Errors: 30
    Tape Read Errors: 0
    Disk Write Errors: 0
    --- ALL DATA RECEIVED ---
```

11. The number of recovered errors varies, but should not be over 250. If the number exceeds 250, the tape is probably worn out and should be replaced. No tape read errors or disk write errors should be encountered. If tape read errors occur, the tape may have defective media; try to restore the image again. If disk write errors occur, go to the Trouble-shooting chapter to rectify possible media defects.
12. To exit the Mirror program, press Q

The Backup labels display.

Backing Up a Volume

1. Press [Mirror] from the Backup labels.

2. Press [Backup]

The Backup labels display.

3. Press [Volume]

The screen displays the following:

```
+-----+
|                                     |
|      Name of volume?_             |
|                                     |
+-----+
```

4. Enter the name of a volume to be backed up, followed by [RETURN].

Type CCUTIL
Press [RETURN]

The screen displays the following:

```
+-----+
|      Backing up 3072 blocks from drive 1      |
|      starting at block 4304                  |
|                                             |
|      Enter date : 31-JAN-83                 |
|                                             |
+-----+
```

5. The responses to the next four questions will be written on the beginning of the video tape. These responses will help you to identify the contents of the video tape. The first question asks for the date. Enter the date in a form similar to the example on the screen, if the system date is not already accurate.

Type 9-MAR-83
Press [RETURN]

The screen displays the following:


```
+-----+
| Backup in Progress ... |
+-----+
```

10. The length of time required for backup varies with the size of the volume being backed up. After a period of time which may be as long as 17 minutes depending on the size of your drive and the size of your volume, the screen displays the following:

```
+-----+
| Backup Finished        |
| Error Status:         |
|           Disk Errors: 0 |
|           --- ALL DATA STORED --- |
+-----+
```

11. The number of disk errors reported should always be zero. If the number is not zero, see the Trouble-shooting chapter of this guide to rectify possible media defects.

The number of disk errors reported indicates the number of errors made by the disk unit during transfer to video tape. The number of errors on the tape itself has yet to be determined. Bad tape media may cause the tape to be incapable of restoration. To confirm that the information on the tape can be restored to a volume

Press [Verify]

The screen displays the following:

```
+-----+
| Verify selected.      |
| Position recorder and start PLAYBACK |
| Press <return> when ready |
+-----+
```

12. Rewind the video tape to its beginning.

Press PLAY on the video cassette recorder. Then press [RETURN] on the Concept.

The screen displays the following:

```
+-----+
| Verify in Progress ... |
+-----+
```

13. After the amount of time elapsed equals the time required for the backup of the volume, the screen displays the following:

```
+-----+
| Error Status:          |
|                        |
|   Recovered Errors: 16 |
|   Tape Read Errors: 0  |
|                        |
|   --- ALL DATA RECEIVED --- |
|                        |
+-----+
```

14. When the Mirror transfers information to video tape, the information is transferred four times. The number of recovered errors reported indicates the number of times the drive had to go to the second, third or fourth copy of the information to get a restorable block image. The number of recovered errors varies but should not exceed 250. When a large number of recovered errors are reported, the video tape is probably worn out and it should be replaced with a new tape.
15. To leave the Mirror program, press [Exit].

Restoring a Volume

This section describes the method by which an image of a volume is restored from a video cassette tape to a Corvus disk system using the Mirror. Note that the restoration of the volume must be to a volume that is the same size as the one backed up. Note also, that if a backup image is

restored to a volume other than the one originally backed up, the contents of the volume are overwritten. For example, you can backup the volume CCUTIL, which is 3072 blocks long, and restore it to the volume PROGS, which is also 3072 blocks long. After the volume has been restored, the name of the volume PROGS will have been changed to CCUTIL and the drive would contain two identical copies of CCUTIL.

1. Press [Mirror] from the Backup labels.
2. To be sure that the tape contains the desired volume backup, press [Ident].

The screen displays the following:

```
+-----+
|                                     |
|          Identify selected.         |
|                                     |
|      Position recorder and start PLAYBACK |
|      Press <return> when ready       |
|                                     |
+-----+
```

3. Rewind the video tape. When it is rewound, press PLAY on the video cassette recorder. Then press [RETURN] on the Concept.

The screen displays similar to the following:

```
+-----+
|                                     |
|      Image ID      : 1              |
|      Size          : 2048           |
|      Generated on: CCOS (PASCAL)    |
|      Date          : 9-MAR-83       |
|      Time          : 5:00 P.M.      |
|      Name          : CCUTIL VOLUME  |
|      Comment       : BACKUP OF CCUTIL WITH |
|                   : GARGLE-BLASTER SOFTWARE |
|                                     |
+-----+
```

4. If the tape contains the desired volume, press [Restor].

The Restor labels display.

5. Press [Volume]

The screen displays the following:

```
+-----+
|                                     |
|   Enter RESTORE parameters:       |
|                                     |
|   Name of volume?                 |
|                                     |
+-----+
```

6. Enter the name of the volume to which the data is to be restored, followed by [RETURN].

Type CCUTIL
Press [RETURN]

The screen displays the following:

```
+-----+
|                                     |
|   Restoring 3072 blocks to drive 1 |
|   starting at block 4304.         |
|   Position recorder and start PLAYBACK |
|   Press <return> when ready_     |
|                                     |
+-----+
```

7. Rewind the video tape. When it is rewound, press PLAY on the video cassette recorder recorder. Then press [RETURN] on the Concept.

The screen displays the following:

```
+-----+
|                                     |
|   Restore in progress...         |
|                                     |
+-----+
```

8. After the amount of time elapses that was required to originally back up the volume, the screen displays the following:

```
+-----+
|
|      Error Status:
|
|      Recovered Errors: 2
|      Tape Read Errors: 0
|      Disk Write Errors: 0
|
|      --- ALL DATA RECEIVED ---
|
+-----+
```

9. The number of recovered errors varies, but should not exceed 250. If the number exceeds 250, the tape is probably worn out and should be replaced. No tape read errors or disk write errors should be encountered. If tape read errors occur, the tape may have defective media; try to restore the volume again. If disk write errors occur, see the Trouble-shooting chapter of this guide to rectify possible media defects.
10. To leave the Mirror program, press [Exit].

This chapter explains how to use the Corvus disk diagnostics program to check the Corvus disk for the causes of operating failures.

A number of difficulties with the Corvus hard disk system can be rectified by the system manager. The difficulties that can be corrected include improper hardware setup, drive firmware, and drive media defects.

The indicator lights on the drive are very useful in determining the status of the drive. When only the ready light is on and glowing steadily (i.e. not flickering), the drive has become ready. For computers to communicate with the drive, the drive must be in the ready state.

When the drive is in the ready state, computers may communicate with it only if the hardware has been properly set up. The installation guides hardware setup section is useful in confirming that the hardware has been properly configured.

When the computer can communicate with the drive, operation is usually smooth. However, intermittent problems may be experienced. Such problems can be the result of media defects that can be remedied using the Corvus diagnostic utility.

The following table shows symptoms of problems that the user may experience, the possible cause of the difficulty, and the possible remedies to the difficulty.

SYMPTOM	POSSIBLE PROBLEM	REMEDY
No indicator lights on disk	power cord not properly connected	properly connect power cord
	fuse blown	replace fuse
	voltage setting incorrect	select proper voltage setting (see hardware setup)
Indicator lights function, yet drive does not become ready	improper hardware setup	check hardware especially cable attachments
	drive error	toggle reset switch
	improper firmware	replace firmware (see firmware section of this chapter)
Communication with the drive possible but intermittent problems	media defects	check for media defects (see section in this chapter)
	VDO table or interleaving spec problems	setup VDO table and interleave spec properly (see section in this chapter)

ENTERING THE DISK DIAGNOSTIC PROGRAM

To use the Corvus-supplied disk diagnostic program, press [CONST II] from the Dispatcher labels. Then press [Maint], followed by [DiskDiag]. The screen will display something similar to the following:

```
+-----+
| Slot 1: no interface
| Slot 2: a Corvus disk interface
| Slot 3: a Corvus 8" floppy interface
| Slot 4: no interface
| Slot 5: no interface
|
| Select slot number [2]: 2
+-----+
```

Press [RETURN] to accept the default slot number. The following will display on the screen:


```
DDIAG [3.1]: Disk Diagnostic
(c) Copyright 1982, 1983 Corvus Systems, Inc.
```

```
-----
V - Version check
P - Display/modify drive parameters
X - Perform servo exercise
C - Perform CRC scan for bad tracks

S - Set diag data block file name
U - Update firmware on disk
F - Perform platter format

O - Park heads of disk
M - Manual mode

H - Help
E - Exit
-----
```

```
Current slot is 2; server is 64
```

Updating the Firmware is used when a drive fails to become ready when powered on, after reformatting a drive, or when adding new types of devices to an existing system. Before updating firmware, use the Vrsion function to determine which version of firmware is on the drive.

Setting the Virtual Drive Offset (VDO) and the Interleaving Spec are also remedies for a drive that fails to become ready. The VDO table tells the computer whether the drive is a Model 6, Model 11 or Model 20. The interleaving spec sets the timing for the heads to read data from the disk while the disk rotates at 3600 RPM.

A CRC (Cylical Redundancy Check) locates media defects on the Corvus drive.

Sparing tracks allows you to skip over an area of the disk that the CRC found to be defective. In recording data on the disk, spared tracks are skipped and only the areas of the drive that have no media defects are used.

Formatting erases all data on a drive, so this procedure should be used only as a last resort when no other Diagnostics option makes the drive operate properly. After a drive is reformatted, the firmware must be replaced using the Firmware Update procedure. Also, any tracks that a

previous CRC had found defective will have to be spared out again.

Exercising the Heads checks the operation of the Heads, which are the servo mechanisms that read data from the various disk platters inside a Corvus drive. Any failures in the operation of the heads are displayed on the computer screen.

Parking the Heads locks the heads over the innermost portion of the disk, which is not used for recording data. This feature prevents damage to the data portions of the disk while the drive is being transported from one location to another.

Other functions listed in the label window are not recommended procedures. These functions are not covered in this chapter, as they should be performed only under the direction of the Corvus Service Department, which will provide the step-by-step instructions for these procedures when needed.

UPDATING THE CORVUS FIRMWARE

Firmware is the programming that converts user requests to the disk into coordinates understood by a Corvus disk drive. There are two reasons for updating or replacing the firmware file on a Corvus hard disk.

The first reason for replacing the disk drive's firmware is that certain problems with the Corvus drive are related to damaged firmware. In those instances, it becomes necessary to replace the damaged firmware file with the original firmware from the FBOOT diskette. Updating firmware is also required after reformatting a Corvus drive.

From time to time, Corvus issues a new version of the firmware that allows the drive to communicate with newer versions of equipment. The second reason for updating the firmware is to replace the existing firmware file with a newer version that allows your Corvus disk system to understand user requests from both your earlier equipment and the new equipment you have just added.

Updating or replacing the firmware does not affect any other files on your drive, but we recommend that you backup your disk with the Corvus Mirror before selecting this option.

Follow the procedures in this section to check which version of firmware is on the drive and to update or replace the Corvus firmware.

Checking the Firmware Version Number

1. To check which version of firmware currently exists on the Corvus drive

Press [Vrsion]

The screen displays the following:

Drv	P/V	Capacity	Size/Rev	SPT	TPC	CPD
1	P	35860	20MB/H	20	6	306
2	V	17940				
Drv ROM Firmware						
1	62	V18.4AP	-- CONST II - 10/82			

The firmware version is indicated by a number, in this case V18.4AP, and a short message. Also presented are the drive model and capacity, physical or virtual drive (P/V), number of sectors per track (SPT), tracks per cylinder (TPC), and cylinders per disk (CPD).

2. Press [SPACE]

The DiskDiag labels redisplay.

Updating the Firmware

1. To replace or update the firmware

Press U

The screen displays the following:

```

The option you have selected may
destroy data on the drive. Please
make sure that you are talking to
the proper drive.

Target controller is : slot 2, server 64

Continue? [Y/N]

```

2. Press Y

The screen displays the following:

```
+-----+
| Update firmware on which drive? 1 |
+-----+
```

3. Press [RETURN]

The screen displays the following:

```
+-----+
| Change drive tables? N |
+-----+
```

4. Press [RETURN]

The screen displays the following:

```
+-----+
| Enter firmware file name: CF18.4AP |
+-----+
```

5. To update the firmware with the default version number which is displayed on the screen:

Press [RETURN]

The screen displays the following:

```
+-----+
| Reading firmware from CF18.4AP.DATA |
| ..... |
| Firmware written. |
+-----+
```

6. Press [SPACE]

The DiskDiag labels redisplay at the bottom of the screen.

7. Press V to confirm that the new firmware is indeed on your drive.

9. To exit the Diagnostic program press [Exit].

VDO TABLE AND INTERLEAVING SPEC

A Concept disk system does not use the virtual drive offset (VDO) table. However, if you want to mix Concepts and other computers on a network, you may have to set the VDO table.

In order for other computers to know whether a Model 6, Model 11, or Model 20 drive is available, the VDO table must be properly setup. The VDO table normally does not need to be setup; however, if communication with the drive is not possible, the VDO table may be the problem.

An incorrect setting of the interleaving spec parameter may also cause communication to be impossible. Sectors of the disk are numbered, by taking into consideration the rotational speed and the timing of read-write operations. This is not a sequential order due to physical proximity. The wrong interleave number will cause excessive delays in disk operations.

Setting the VDO table and interleaving spec destroys data on the disk. We recommend that you backup your disk with the Corvus Mirror before selecting this option. Restore the data to the disk when you have finished.

After you have completed the first section of this chapter, "Entering the Diagnostic Program," the following procedure will cause both the VDO table and interleave values to be set.

1. From the Diagnostic menu:

Press [Param]

The screen displays the following:

```
+-----+
|       |
| Parameters of which drive? 1 |
|       |
+-----+
```

2. Press [RETURN]

The screen displays the following:

```

+-----+
| Disk Map for Drive 1
| No tracks are spared
| Interleave spec: 9
| Virtual Drive / Track Offset
|           1      0
|           2     896
+-----+

```

3. Press [SPACE]

A new set of labels display in the label window. The System window displays the following:

```

+-----+
| -----
| L - Display parameters
| S - save changes
|
| T - Set spare tracks
| I - Set interleaving
| V - Set Virtual drive offset table
|
| E - Exit
| -----
| Select PARAMETER option
+-----+

```

4. To set the interleaving specification

Press [Interl]

The screen displays the following:

```

+-----+
| Enter Interleaving: 9
+-----+

```

5. Enter the appropriate value for the particular Model of Corvus drive you have.

The proper values of the interleave specification are

the following:

```
Model 6.....12
Model 11..... 9
Model 20..... 9
```

The default value which displays on the screen should be correct for the particular drive Model. If it is

Press [RETURN]

If the Corvus service department instructs you to change the interleaving, or the displayed interleaving is incorrect, enter the correct number.

The screen displays the following:

```
+-----+
| Disk Map for Drive 1
| No tracks are spared
| Interleave spec: 12
| Virtual Drive / Track Offset
|           1      0
|           2     896
+-----+
```

6. Press [SPACE]

The Param labels redisplay.

7. To set the virtual drive offset

Press [VDO]

The screen displays the following:

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

8. Press [RETURN]

If you have a Model 6 or Model 11 drive, the screen displays the following:


```
+-----+
| Track offset for virtual drive 2: -1 |
+-----+
```

For a Model 6 or Model 11 drive, skip to Step 10.

If you have a Model 20 drive, the screen displays the following:

```
+-----+
| Track offset for virtual drive 2: 896 |
+-----+
```

The correct virtual drive offset for drive 2 of a Model 20 drive is 896. If the displayed virtual drive offset for drive 2 is correct

Press [RETURN]

If the displayed virtual drive offset for drive 2 is not correct, enter the correct value.

Type 896 [RETURN]

9. The screen displays the following:

```
+-----+
| Track offset for virtual drive 3: -1 |
+-----+
```

10. Press [RETURN]

The screen displays the following:

```
+-----+
| Disk Map for Drive 1 |
| No tracks are spared |
| Interleave spec: 12  |
| Virtual Drive / Track Offset |
|           1         0 |
|           2        896 |
+-----+
```

11. Press [SPACE]

The Param labels redisplay.

12. To save the changes to the interleaving and the virtual drive offset

Press [Save]

The screen displays the following:

```
+-----+
|
| Disk Map for Drive 1
| No tracks are spared
| Interleave spec: 12
| Virtual Drive / Track Offset
|           1      0
|           2     896
|
| You are about to destroy data
| on the disk. Continue? [Y/N]
|
+-----+
```

13. You must have your data backed-up on either diskettes or on video tape using the Corvus Mirror. If you have not backed up your data

Press N

and see Chapter Four, which has instructions on drive backup.

If you have already backed up your data

Press Y

The screen displays the following:

```
+-----+
|
| Parameters updated.
| Press <space> to continue
|
+-----+
```

14. Press [SPACE]

The DiskDiag labels redisplay.

15. Press [Exit] twice to exit the Diagnostic program.

You have now updated the interleaving spec and the VDO table.

RECTIFYING MEDIA DEFECTS**Locating Media Defects**

If you are experiencing intermittent problems with the Corvus disk drive, media defects may be the source of the problem. The defects can be of two types, hard defects and soft defects.

Hard defects are caused by blemishes in the media or aging of the Winchester drive. Thirty-one spare tracks are provided to replace defective tracks.

Soft defects are caused by format information being destroyed; this information can be corrected.

This section describes the method by which both types of media defects may be eliminated from the user area of the disk.

Sparing tracks destroys data on the disk. We recommend that you backup your disk with the Corvus Mirror before sparing any tracks. Restore the data to the disk when you have finished.

1. The Diagnostic program must be run from diskette when the hard disk drive is inoperative. After you have completed the first section of this chapter, "Entering the Diagnostic Program," you can perform a CRC scan.

2. Press [CRctst]

The screen displays the following:

```
+-----+
|
|  PERFORM CRC CHECK OF WHICH DRIVE? 1
|
+-----+
```

3. Press [RETURN]

This will execute a Cyclical redundancy check which

will determine the quality of the disk drive media.

The screen displays the following:

```

+-----+
|                                     |
|          CRC scan in progress      |
|        (takes from 1 to 3 minutes) |
|                                     |
+-----+

```

The BUSY light on the Corvus drive blinks rapidly.

4. After one to three minutes, the CRC test is finished and the screen displays the results. If no errors were found, the screen displays the following:

```

+-----+
|                                     |
|          No blocks with CRC errors |
|          found                     |
|                                     |
|          Press <space> to continue |
|                                     |
+-----+

```

If errors were found, the screen displays the following:

```

+-----+
|                                     |
|          HEAD   CYL   SECTOR   TRACK |
|          ----   ---   - - - -   - - - |
|          1     200   18         801   |
|                                     |
|          Press <space> to continue   |
|                                     |
+-----+

```

If media defects are encountered, copy the information on paper. Note the head, cylinder, sector and track of any errors.

5. Press [SPACE]

The DiskDiag labels redisplay.

6. Repeat Steps 1 to 5 five times.

If a track appears bad three or more times, the track needs to be eliminated. One of the 31 spare tracks

can be used instead. See the next section of this chapter, called "Sparing Tracks."

Sparing Tracks

Before any tracks are spared, a Mirror backup must be made of the entire drive. If a track is spared, all drive information after that track is destroyed. After all bad tracks are spared, restore the drive from the tape.

From the DiskDiag labels

Press [Param]

The screen displays the following:

```
+-----+
| Parameters of which drive? 1 |
+-----+
```

2. Press [RETURN]

The screen displays the following:

```
+-----+
| Disk Map for Drive 1        |
| No tracks are spared       |
| Interleave spec: 12        |
| Virtual Drive / Track Offset|
|           1      0        |
|           2     896        |
|                             |
| Press <space> to continue  |
+-----+
```

3. Press [SPACE]

The Param labels display.

4. To spare damaged tracks on the Corvus disk drive

Press [Sp Trk]

The Spare Track labels display. The screen displays the following:

```
+-----+
|                                     |
|      No tracks are spared          |
|                                     |
|      -----                      |
|      A - Add a track to the list  |
|      R - Remove a track from the  |
|      C - Remove all tracks from  |
|                                     |
|      H - Help                     |
|      E - Exit                     |
|      -----                      |
|                                     |
|      Select TRACK SPARING option: |
|                                     |
+-----+
```

5. Press [Add]

The screen displays the following:

```
+-----+
|                                     |
|      ENTER TRACK NUMBER TO BE     |
|      ADDED: 0                     |
|                                     |
+-----+
```

Type the number of a track that was listed as bad when you did a CRC check of the drive. For example

Type 306 [RETURN]

The screen displays the following:

```
+-----+
|                                     |
|      Spared tracks:               |
|      306                          |
|      1 tracks are currently spared.|
|      31 total tracks may be spared.|
|                                     |
+-----+
```

6. Repeat Steps 4 and 5 until all tracks that were listed as bad during the CRC check have been spared.
7. To exit the Spared Tracks menu:

Press [Exit]

The screen displays the following:

```
+-----+
|       |
| Disk Map for Drive 1       |
| Spared tracks:           |
|   306                    |
|       | 1 tracks are currently spared. |
|       | 31 total tracks may be spared. |
| Interleave spec: 12      |
| Virtual Drive / Track Offset |
|           1         0     |
|           2        896    |
|       |                    |
| Press <space> to continue |
|       |                    |
+-----+
```

8. Press [SPACE]

The Param labels redisplay.

9. To leave the Param labels

Press [Exit]

The screen displays:

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

10. You must have your data backed-up, on either diskettes or on video tape using the Corvus Mirror. You should also make a hand-written list of spared tracks and keep it with the disk drive so the list is handy if it is needed.

If you have not backed up your data

Press N

and see Chapter Four for instructions on drive backup.

If you have already backed up your data

Press Y

The screen displays:

```
+-----+
|           Parameters updated.           |
|           Press <space> to continue     |
+-----+
```

11. Press [SPACE]

The DiskDiag labels redisplay.

12. To exit the Diagnostic program

Press [Exit]

Formatting the Corvus Drive

The following procedures will destroy all data on the disk. Before you do these steps, backup all data on the drive. Use the Corvus Mirror or floppy diskettes to protect your work.

Formatting the drive should be done only as a last resort when no other Diagnostics procedure succeeds in making your Corvus drive operational. After a drive has been formatted, the firmware must be replaced, and any bad tracks that were spared will have to be spared again.

1. After you have completed the first section of this chapter, "Entering the Diagnostic Program," you may use the Format function of the DiskDiag labels.

Press [Format]

The screen displays the following:

```
+-----+
|
|       The option you have selected may
|       destroy data on the drive. Please
|       make sure that you are talking to
|       the proper drive.
|
|       Target controller is : slot 4, server 64
|
|       Continue? [Y/N]
|
+-----+
```

2. Press Y

The screen displays the following:

```
Format which drive? 1
```

3. Press [RETURN]

The screen displays the following:

```
+-----+
|
|       Reminder: You will have to rewrite
|       the firmware after the drive format.
|
|       Do you want to continue [Y/N]? N
|
+-----+
```

4. Press Y

The screen displays:

```
+-----+
|
|       Turn on the format switch
|       and press <RETURN>
|
+-----+
```

5. Under the three red lights on the front of the Corvus disk drive, there are four drive controller switches. The third switch from the left when facing the front of the Corvus drive is the Format switch. Flip this switch to the right. Leave the other three switches as they are.


```

+-----+
|
|   Disk exerciser option.
|   Press <space> to stop test.
|   .....
|   .....
|   .....
|   .....
|
+-----+

```

- 2. To stop the servo mechanism test

Press [SPACE]

The screen displays the following:

```

+-----+
|
|   Error Summary:
|
|   Number of passes      : 140
|   Number of soft errors: 1
|   Number of hard errors: 0
|
|   Press <space> to continue
|
+-----+

```

If any hard errors are reported, there may be a problem with the disk drive. Call the Corvus service department for help.

- 3. Press [SPACE]

The DiskDiag labels redisplay.

- 4. To exit the Diagnostic program

Press [Exit]

PARKING THE HEADS

Parking the Heads shuts down the disk drive. This is used to prevent damage to the disk when it is in transit, for example, when a disk drive is transported from one office

SEMAPHORES

This appendix explains a network tool called Semaphores. Semaphores may be used, by the system manager and system users in a pre-arranged fashion, to safely allow multiple users to have write access to a common area.

If two users are reading from the same volume, there is no problem. However, if one user is writing to a volume, another user simultaneously accessing that volume may read inconsistent data. A more serious problem occurs if multiple users are writing to a file or volume at the same time.

The problem arises because each computer keeps in memory its own copy of the directory for each active disk volume. The directory is usually updated on the disk only when the local operating system considers it necessary. The directory may be different in two or more computers since each user can be adding, deleting, or changing files. This leads to two users writing out their directories and the last user to write actually updating the directories on the disk.

The system manager may design an honor system where the network users are to check, lock, or unlock flags called semaphores. A semaphore may represent a file, group of files, or any item that needs protection from multiple users. Checking before locking prevents users from locking the same semaphore at the same time. The name for the semaphore can be any eight character name agreed upon by the users that share access to the disk area which the semaphore represents.

Each user may, at any time, decide to lock any of the 32

semaphores. The user checks the semaphore table and may lock the semaphore if it is not already locked. If it is locked, the user must wait until it is unlocked.

The entire semaphore table can be cleared. This should be performed only at initialization or for error recovery conditions.

Corvus also supplies low-level pipe control procedures that may be called from Pascal or FORTRAN programs written by users.

MANAGING SEMAPHORES

Managing the semaphores and their use will require you, as the system manager, to periodically check the semaphore table. If users have left semaphores locked, forgetting to unlock them, you must remove them if necessary.

Press [Const II] from the Dispatcher labels. Then, press [Maint] to get to the system maintenance functions, and [Par Mgr] to get to the parameter manager.

The function key labels at the bottom of the screen now show the following:

F1	F2	F3	F4	F5
CDisp		Pipes		Sema4s
F6	F7	F8	F9	F10
			Help	Exit

Parameter manager functions are invoked only by function keys.

Pressing [Sema4s] changes the labels to the following:

F1	F2	F3	F4	F5
List				Init
F6	F7	F8	F9	F10
Lock	Unlock		Help	Exit

Semaphore labels perform the following functions:

- [List] Displays the semaphore table as a list of names.
- [Init] Initializes the semaphore table and unlocks all semaphores.
- [Lock] Locks a semaphore. You are asked for a semaphore name.
- [Unlock] Unlocks a semaphore. You are asked for the name of a locked semaphore.
- [Help] Displays a brief description of each label.
- [Exit] Returns you to parameter manager labels.

