SYSTEM
MANAGER'S GUIDE

THE CORVUS CONCEPT

★★★ CORVUS SYSTEMS

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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 net- work 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 retreive 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
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 inadverdently 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
>   seperate 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 Omninet shared disk networking hardware consists of a
Corvus Winchester disk system connected to the network by
an Omninet 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.
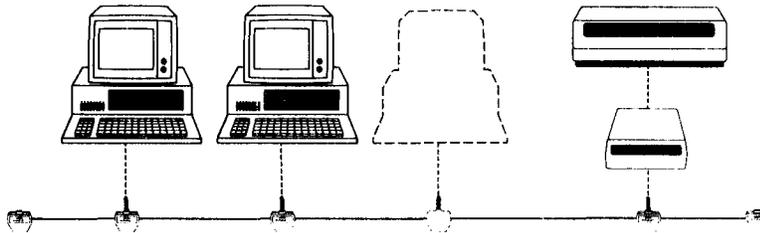
Each computer on the network must have an Omninet
interface. The Concept has a built-in Omninet interface.
The Omninet interface receives and transmits data at up to
1 million bits per second. Up to 64 devices may share an
Omninet network.

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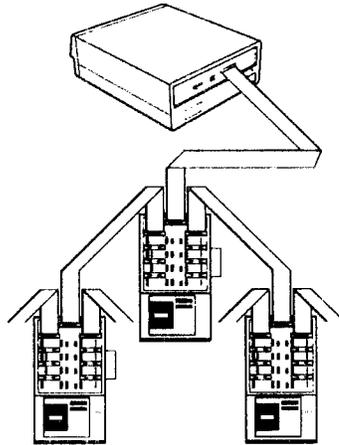
Optionally, the 8 connectors in a multiplexer may each in
turn be connected to another multiplexer, called a master
multiplexer, forming a two-level network with up to 64
computers. The two-level aspect of such a system is from a
hardware viewpoint and doesn't affect the software.

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 occuring.

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 may 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 utilitiy 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:

Main Menu   Submenus   Actual programs
==

```
                              +----------> User Manager
                              |
                              | +--------> Boot Manager
                              | |
                   +---------+-------> Volume Manager
    +------------>| Drive   |
    |             | Manager |-------> Access Manager
    |             +---------+
    |
    |
    |
+-----------+      +---------+------> Mirror
| Const II  |      | Backup  |
| Main menu |------| Utilities|------> Remote Backup
+-----------+      +---------+------> Achival Storage
    |    |
    |    |
    |    |
    |    |         +---------+------> Parameter Manager
    |    +--------| Maint.   |
    |             | Utilities|
    |             +---------+------> Disk Diagnostic
    |                  |
    |                  +--------> Omninet Test
    |
    |
    +---------------------------------> Initialize Drive
```
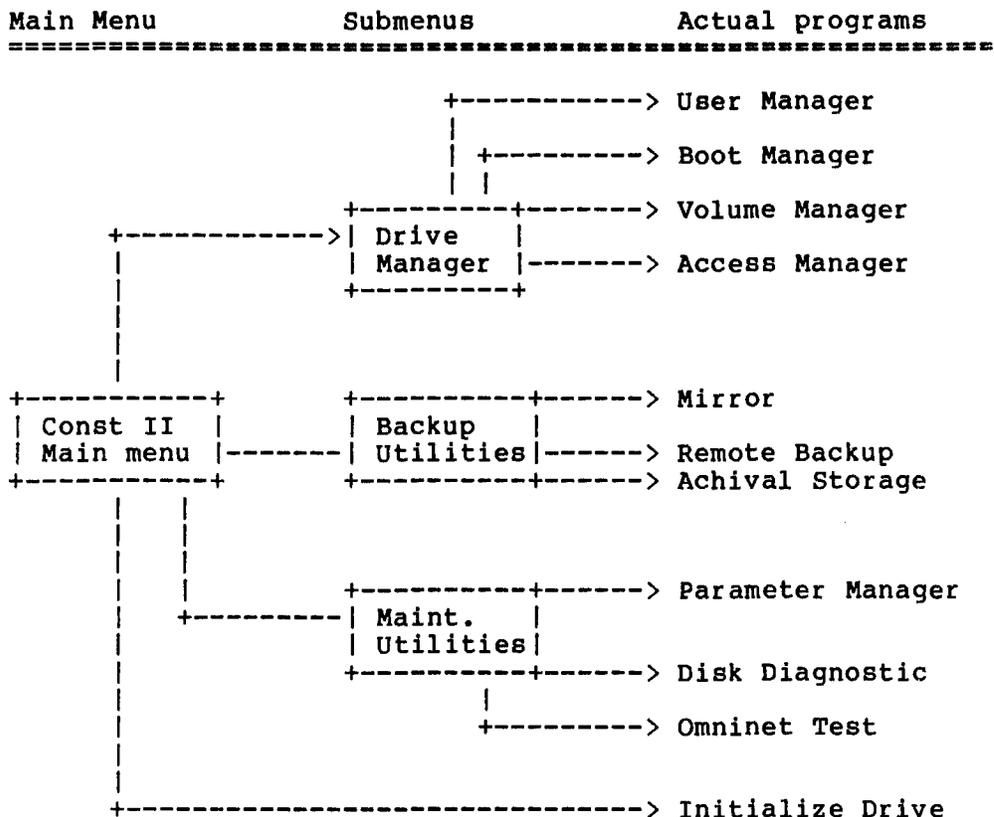
Note that the programs surrounded by boxes don't actually
do anything; they just serve as paths to the programs that
do perform the system functions.

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
mouunted 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

list of the volumes to which a user has access.

After making a list of Joe's volumes, we are ready to
alter the account. We can accomplish this by using the
change access function of the access manager. Pressing
[Change Access] displays the following:

```
+------------------------------------------------------------+
|                                                            |
|        Please enter volume name:                           |
|                                                            |
+------------------------------------------------------------+
```

Typing CCSYS and pressing [RETURN] displays the
following:

```
+------------------------------------------------------------+
|                                                            |
|         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): RO                              |
|                                                            |
+------------------------------------------------------------+
```

When changing the access information of a user's volume, we
can change only the access type, mount status, and mount
unit. The name cannot be changed, and the program skips
over it. In this example, we want to change the access
type to RW, so we type RW and press [RETURN]. The
current status of all parameters is given as the default,
so we can just press [RETURN] twice more to quickly skip by
the mount status and mount unit parameters. However, it
is at this point that we could change them if we so
desired.

```
+------------------------------------------------------------+
|                                                            |
|        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:

```
+----------------------------------------------------------------+
|                                                                |
|      Enter volume name:                                        |
|                                                                |
+----------------------------------------------------------------+
```

Typing PASCAL1 and pressing [RETURN] displays the
following:

```
+----------------------------------------------------------------+
|                                                                |
|                 Volume name: PASCAL1                           |
|                      Access: RW                               |
|                Mount status: MOUNTED                           |
|                  Mount unit: 5                                 |
|                                                                |
|      OK to remove volume access (Y/N)?_                        |
|                                                                |
+----------------------------------------------------------------+
```

Pressing [RETURN] shows the following:

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

In this case, we will press [SPACE] to return to the main
menu of the access manager. Note that if Joe had become
bored with Pascal, but still wanted to use it occasionally,
he could have used the mount manager to unmount the volume
and mount another more often used volume in its place.

CHANGING VOLUME ATTRIBUTES

You, as the system manager, manage volumes on the hard
disk with the volume manager utility.

From the Drive Manager labels, press [Volume Manager] and
answer the prompts for server name, drive name, and drive
password. The screen displays 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                                                |
|                                                              |
+--------------------------------------------------------------+
```

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 Manager [2.2b]     DS SERVER                       |
| Free Space                Drive DRIVE1                    |
| -------------------------------------------------        |
|                                                          |
|       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,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                  home         boot          |
|          name         password 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, or                           |
|        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 despooled 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 despooled. 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]

would cause the following to display:

```
+-----------------------------------------------------------+
|                                                           |
|        Close which pipe? [pipe number]:                   |
|                                                           |
+-----------------------------------------------------------+
```

Pressing 2 and pressing [RETURN] shows the following:

```
+-----------------------------------------------------------+
|                                                           |
|        Pipe 2 closed.                                     |
|                                                           |
+-----------------------------------------------------------+
```

A subsequent [List] operation shows the following:

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

If, on the other hand, the user wanted to purge the pipe
and throw away the data in it, we could press [Purge]:

```
+-----------------------------------------------------------+
|                                                           |
|   ·    Purge which pipe? [pipe number]:2                  |
|                                                           |
|        Pipe 2 purged.                                     |
|                                                           |
+-----------------------------------------------------------+
```

The [List] operation now shows the following:

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

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:

```
+-----------------------------------------------------------------+
|                                                                 |
| Slot 1 contains no disk interface                               |
| Slot 2 contains a Corvus disk interface                         |
| Slot 3 contains an 8 inch Corvus floppy disk                    |
| Slot 4 contains no disk interface                               |
| Slot 5 contains an OMNINET interface                            |
|                                                                 |
|                                                                 |
|                                                                 |
|                                                                 |
|                                                                 |
| Enter active slot [2,5]:     2                                  |
|                                                                 |
+-----------------------------------------------------------------+
```

If the workstation has no local disk and is attached to
only the network, the slot does not need to be changed and
the program will not allow a change.

In order to change the slot number

PRESS   A

The following is displayed on the screen:

Since the slot is presently set for 2, that is the default
value of the prompt. In order to spool a file to the pipes
area of a shared Omninet disk drive the active slot needs
to be changed to 5 which is the Omninet slot. To do this

PRESS   5
PRESS   [RETURN]

If a number is pressed that does not correspond to a
valid slot, Spool will respond with "Invalid slot
number" and will wait for a new number to be entered.
Valid slot numbers are given within brackets on the
prompt line.

The active slot number will be changed to 5 and the
following menu will display on the screen.

```
+------------------------------------------------------------------+
|                                                                  |
| Active slot for Spooling/despooling is     2                     |
|                                                                  |
| Select option [ S)pool D)espool O)ption Q)uit A)lt slot ]:       |
|                                                                  |
+------------------------------------------------------------------+
```

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 despooled 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

drive system, the presence of only one physical drive
eliminates the need for choice. Therefore, unless the
second, third or fourth physical drive in a daisy-chain
is to be backed up:

Press   [RETURN]

The screen displays the following:

```
+----------------------------------------------------------+
|                                                          |
|     Backing up 11540 blocks from drive                   |
|         starting at block 0.                             |
|     Date: 9-Mar-83                                       |
|                                                          |
+----------------------------------------------------------+
```

5. Your responses to the next four questions will be
    written on the beginning of the video tape. These
    responses will assist you in identifing 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:

```
+----------------------------------------------------------+
|                                                          |
|     Date: 1-Jan-01                                       |
|     Time: 11:39 pm                                       |
|                                                          |
+----------------------------------------------------------+
```

6. Enter the time.

    Type   5:00 P.M.
    Press [RETURN]

7. Enter a name of no more than sixteen characters which
    will be associated with the tape image created.

    Type   DRIVE BACKUP
    Press [RETURN]

8. Enter a comment of no more than 80 characters regarding
    the content of the drive backup.

    Type   BACKUP FOR DIBS' DRIVE TO LIVE

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:

```
+---------------------------------------------------------+
|                                                         |
|       Time: 11:59 pm                                    |
|                                                         |
+---------------------------------------------------------+
```

6. Enter the time if the system time is not already
   correct, followed by [RETURN].

   Type   5:00 P.M.
   Press   [RETURN]

7. Enter a name of no more than sixteen characters which
   will be associated with the tape image created.
   Normally, the name of the volume is entered.

   Type   CCUTIL VOLUME
   Press   [RETURN]

8. Enter a comment of no more than 80 characters regarding
   the content of the volume backup.

   Type   BACKUP OF CCUTIL WITH GARGLE-BLASTER SOFTWARE
   Press   [RETURN]

   The screen displays the following:

```
+-----------------------------------------------------------+
|                                                           |
|     Date: 9-MAR-83                                        |
|     Time: 5:00 P.M.                                       |
|     Name: CCUTIL VOLUME                                   |
|  Comment: BACKUP OF CCUTIL WITH GARGLE-BLASTER SOFTWARE   |
|                                                           |
|  Position recorder and start RECORD                       |
|  Press <return> when ready_                               |
|                                                           |
+-----------------------------------------------------------+
```

9. Place the speed setting on the video recorder on
   standard play speed. Insert a video tape into the
   video cassette recorder and rewind the tape. It is
   recommended that only one volume be backed up on any
   one tape. When the recorder has been loaded:

   Press PLAY and RECORD on the video cassette recorder.

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

   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 difficulities
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 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 firware, 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 timimg 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 list                     |
|          C - Remove all tracks from the list                  |
|                                                               |
|          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.

6. Press   [RETURN]

    The screen displays the following:

```
+------------------------------------------------------------+
|                                                            |
|                    Format in progress                      |
|                 (takes from 1 to 2 minutes)                |
|                                                            |
+------------------------------------------------------------+
```

7. The Busy light on the drive will blink rapidly during
    the format operation. When the drive is formatted,
    the screen displays the following:

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

8. Press   [RETURN]

    The screen displays the following:

```
+------------------------------------------------------------+
|                                                            |
|       Reading firmware from CF18.4AP.DATA                  |
|                                                            |
|       ...................................                  |
|                                                            |
|       Firmware written..                                   |
|                                                            |
|       Turn off the format switch.                          |
|                                                            |
|       Press <space> to continue                            |
|                                                            |
+------------------------------------------------------------+
```

9. Flip the Format switch (the third switch from the left
    on the front of the drive) back to the left.

10. Press [SPACE]

11. Toggle the RESET switch (the rightmost switch on the
     front of the drive).

12. When only the Ready light on the drive stays lit,
     press [RETURN].

The screen displays the following:

```
+--------------------------------------------------------+
|                                                        |
|        Press <space> to continue                       |
|                                                        |
+--------------------------------------------------------+
```

13. Press [SPACE]

     The DiskDiag labels redisplay.

14. See the section on Rectifying Media Defects to respare
     any bad tracks on the disk.

15. To exit the Diagnostic program

     Press [Exit]

     See Chapter Four for instructions to restore all data
     to the disk using the Corvus Mirror.

EXERCISING THE HEADS

The Heads are the servo devices that read data from, and
write data to, the recording surfaces of the disk platters
inside a Corvus drive. Use the procedures in this section
to test whether these heads are functioning properly.

1. After you have completed the first section of this chapter,
    "Entering the Diagnostic Program," you may use the
    head exerciser.

    Press [Exrcis]

    The screen displays the following:

```
+----------------------------------------------------------+
|                                                          |
|        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

or building to another.

1.   After you have completed the first section of this
     chapter, "Entering the Diagnostic Program," you may
     park the heads.

     Press [Park]

     The screen displays the following:

```
+-----------------------------------------------------------+
|                                                           |
|      PARK HEADS OF WHICH DRIVE 1                           |
|                                                           |
+-----------------------------------------------------------+
```

2.   Press [RETURN]

     All three of the drive's red indicator lights turn
     off.

     Now the heads (the device which writes data onto the
     disk and reads data from the disk) of the disk are
     parked over the innermost portion of their respective
     disk platters. After you power-off and unplug the
     drive, you may safely transport the disk drive from
     one place to another without fear of a disk-damaging
     head crash, because even if the heads touched the
     disk, they would touch an area that is not used for
     the recording of data.

     When you power on the drive again, the heads will no
     longer be parked, and you may freely use the drive
     just as you had before parking the heads.

     If you parked the heads and did not power off the
     drive, flipping the reset switch (the rightmost
     switch on the front of the drive) will unpark the
     heads.

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
inconsistant 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 is 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.