CORVUS DISK SYSTEM

INSTRUCTION MANUAL AND USER GUIDE

CORVUS SYSTEMS

Price $25

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Revision 1
by Michael J. A. Earley

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Special Notice

PROCEDURE FOR PREPARING A 20 MEGABYTE SINGLE-USER SYSTEM

All 20 MB users MUST follow this outline.

A 20 MB drive is configured exactly as if it were two 10 MB drives daisy chained together.
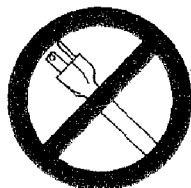
1) For Pascal systems:

   To configure the first ten megabytes (first half) of the drive, follow the procedure outlined in section 3.1 of the CORVUS DRIVE MANUAL. After you have configured the first half of the drive, configure the second half according to section 3.8 of the CORVUS DRIVE MANUAL.

2) For Pascal-BASICs systems:

   For the first ten megabytes (first half) of the drive, first follow the configuration instructions in section 3.1 then the drive instructions in section 3.5 of the CORVUS DRIVE MANUAL.

   After you have configured the first half of the drive,

 POWER OFF

   power down your drive and computer. Then turn on power to your drive and computer. Configure the second half according to section 3.8 of the CORVUS DRIVE MANUAL.

3) For BASICs systems:

   To configure the first ten megabytes (first half) of the drive, follow the configuration instructions in section 4.1 of the CORVUS DRIVE MANUAL. After you have configured the first half of the drive, configure the second half according to section 4.7 of the CORVUS DRIVE MANUAL.

WARNING

A 20 MB drive appears exactly as two 10 MB drives to your computer and operating system. However, the P(arams option in the DIAGNOSTIC program sees the drive as an undivided twenty megabytes. When using this P(arams option, the screen output reads the same regardless of the drive number entered.

NOTE: For Network Users:

To configure your 20 MB drive with CORVUS CONSTELLATION software or hardware, please refer to the CORVUS CONSTELLATION MANUAL and the 20 MB CONSTELLATION SYSTEM UPDATE SHEET, which is packaged with our CONSTELLATION products.

TABLE OF CONTENTS

ILLUSTRATIONS

INTRODUCTION TO THE CORVUS DISK SYSTEM

The CORVUS Disk System is a microprocessor controlled intelligent peripheral that adds high performance mass storage capability to microcomputers. The CORVUS Disk System uses proven Winchester technology to provide reliable high density storage. Systems can be single user or multiple user, the latter linked together in a CORVUS CONSTELLATION network. In addition, the system can be expanded by adding up to three additional disk drives if a larger data base is needed.

In a drive with Winchester technology, the read-write heads do not touch the disk surface. Instead, they are designed with a wing-like shape that allows them to fly above the surface of the rapidly spinning disk. The heads ride on a cushion of air that suspends them approximately 18 microinches (0.46 um) above the disk. That's about a hundredth of the diameter of a human hair. In a floppy drive, the heads actually touch the floppy disk's surface. To prevent dust and other contaminants from interfering with the heads on a CORVUS Drive, the disk operates in a sealed enclosure with a positive flow air filtration system. To provide high speed read-write operations of exceptional accuracy, the disk system incorporates a CORVUS intelligent controller with a Z-80 microprocessor.

A single user CORVUS System is configured with up to four high speed disk drives, a microprocessor based intelligent controller, and a personality card that links the controller to your computer.

Chapter 1

USING THIS MANUAL

CHAPTER 1   USING THIS MANUAL

1.1 Introduction

This manual presumes that you have some experience with your computer. Athough several computer procedures are described in this manual, these descriptions are designed to jog your memory. They are not a substitute for your computer's documentation.

If you have a problem, please refer to your computer manuals. If you encounter an apparent conflict between this manual and your computer's manuals, remember that a computer's manuals are the final authority on that computer's hardware and software unless we specifically mention an error in their manuals.

1.2 Background

The first step in setting up any computer system is to examine its projected uses in relation to its potential applications. Once you have an idea of what the system will be and do, you can organize the layout of the hard disk.

Before carrying out the instructions in this manual, we strongly suggest that you become familiar with the operation of both the COR-VUS Drive and your computer.

Vast quantities of hardware and software are ruined annually because people do not take the time to do the necessary reading. We urge you to make certain that you have read the applicable computer manuals and that you are familiar with the operating language of your system (see the Suggested Reading index at the end of each chapter).

WARNING

Please read this entire manual before attempting to assemble any hardware or configure any software for the CORVUS Drive.

1.2.1 Conventions

The following conventions are important aids for understanding this manual.

Brackets and Command Keys

Angle brackets <> indicate certain special keys. <ctrl>, <return>, <esc>, and <reset> are the most common. The <return> key is equivalent to the <enter> key on some systems.

In this manual, when you see a prompt followed by <return>, press the <return> key in response to the prompt.

When a command such as F(ile or R(emove is mentioned, here is what you do. Look at the menu displayed on your screen. Select the command. Type the first letter of that command—i.e. the letter that is displayed to the left of the parenthesis in the word.

Prompt

When the computer prompts you for an input, this manual will show both the prompt and the appropriate response. For example, if the computer asks

TRANSFER?

The screen cursor sits after the ?, waiting for your response. One response might be

MYDISK:EXTRA.DATA,SPARE:$

This manual will show

TRANSFER?   MYDISK:EXTRA.DATA,SPARE:$

The prompt will be on a black background and the response will be beside it on a white background.

Symbols

> **WARNING**
>
> **This symbol indicates a warning. It reminds you to be extra careful. Failure to follow the cautionary instructions that are within the box next the warning symbol could cause damage to your computer, CORVUS Disk, Mirror, or Constellation. It could cause you to lose data, start over, and gnash your teeth.**

▶ **This symbol indicates information that deserves extra attention.**
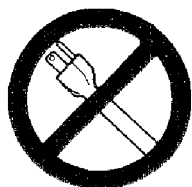
POWER OFF

This symbol acts as a reminder to you to turn off your computer, your CORVUS disk, or both. It is absolutely essential that they be

powered down any time you remove or install any circuit card or cable. A good rule of thumb is: before any additions to, or subtractions from, the system, TURN IT OFF.

When you power down, always turn the drive off before you turn your computer off. This prevents your computer—when being powered down—from accidentally scrambling information on the disk.

1.2.2 Some Terms

Floppy

When this manual refers to floppies we are using the common term for what others may call diskettes. And when we say floppy drive, we are referring to a diskette drive.

Disk

When we refer to disk, drive, disk drive, or CORVUS Drive we always mean the disk drive that is the heart of your CORVUS mass storage system.

Sector and Block

A sector is 256 bytes (4K bits) or half a block. A block equals two sectors, or 512 bytes.

Volume

When we say volume we mean a block structured Pascal device—specifically, a set of files with a directory, recorded on a floppy or on the CORVUS Disk. A volume can be any size in multiples of eight blocks.

In BASIC, a volume implies a fixed unit of disk area equivalent in size to that system's standard floppy drive. All volumes are the same size.

Unit

A logical device number used to denote accessibility.

Pascal uses units 4,5,9,10,11, and 12 for mounting floppy drives and volumes.

In CP/M, there are up to 16 logical units labeled with the letters A through P.

In BASIC, the number of the volume is the number used for gaining access.

Mount

Mount means to associate a volume with a unit. Floppies are physically mounted by placing a floppy (the volume) in a drive (the unit).

CORVUS Pascal volumes are mounted by a program (the volume manager), since there are only six logical device units and, in most cases, many more than six volumes.

The associations in CP/M and BASIC are fixed; in effect, constantly mounted.

Default

When default is mentioned in this manual, it means an option assumed automatically if no other specific parameter is explicitly stated.

The default mount table is a list of mounted volumes that are set to be automatically accessible at the time your computer is booted.

Format and Initialize

These are necessary steps in preparing the CORVUS Disk to receive information. FORMATting zeroes all directories on the disk and sets up a cold boot area at the beginning of the disk. INITIALIZing formats specific areas of the disk, which prepares those areas to receive data.
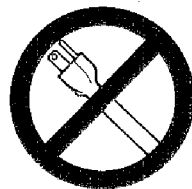
1.2.3 Cautions

These suggestions will protect your computer and your CORVUS Drive from damage.

Power Off

Allways turn off, or better still, unplug both your computer and your drive when inserting or removing any cables or circuit cards. If you forget, you may permanently damage your computer or your drive.

Remember, when you see

POWER OFF

turn off or unplug your computer.

We tell you to power off because when you remove or replace a card or a cable, one or two pins may connect before the others. The circuit was not designed to operate that way and it is possible that an illegal voltage may be applied to the circuit or that the circuit may power up in an unusual state. It is quite possible that these conditions could destroy portions of your computer, requiring extensive and expensive repair.

Power On Sequence

When powering up your system, always turn on the computer first. Then turn on the drive. If you have more than one drive, power the drives up in the reverse order from which they are connected—i.e. the last drive connected is the first to be powered up.

When you power down your system, turn off your drive(s) first.

▶ **If you have your computer and drive(s) connected to one power strip, do not use a master switch to power them up and down in unison. Follow the power on sequence above.**

Handling the CORVUS Disk Drive

Although the CORVUS Disk Drive is considerably more durable than a floppy drive, it can be damaged. Here is how to avoid damaging it.

- The drive needs cooling. Don't put it in a box, drawer, or sealed cabinet without adequate ventilation. Do not obstruct the airflow slots with loose papers or other objects (see figures 2.2 and 2.4).
- The upper housing of the drive is sealed shut to avoid dust problems. Do not attempt to open the black disk drive box and do not remove the stickers that are labeled, "Warranty Void If Seal Broken." The stickers keep the air seals intact and keep dust out. If the stickers are removed, the warranty is void.
- Keep the drive away from magnetic fields. Magnetic fields can erase the information on the drive.
- Never operate the drive with the carriage lock engaged (see section 2.2). Never ship the drive with the carriage lock disengaged.
- All switches on the drive cabinet front panel must be kept at the correct setting for your system.

Handling Floppy Disks

For the proper care of diskettes, the following are important cautions.

- Keep away from magnetic fields and temperature extremes. In particular, keep them away from the CORVUS drive and its power supply.
- Never, never touch the floppy's magnetic surface.
- If you write on a label that is already on the floppy, never use a ball point pen or a pencil. Use only a soft tipped pen and don't press hard.
- Keep the floppy disk clean.
- Do not bend, fold, spindle, or mutilate.
- Do not leave the floppy disk laying around out of its protective envelope. The various elements within a working environment (dust, coffee, etc.) can destroy the naked floppy. Store your floppies in safe places.

Handling Flat Cables and Connectors

- Flat cables and connectors are not meant to perform great feats of strength. When you run cables, avoid unnecessarily stressing the cable or the connector.

- When you place cables, avoid placing them on the floor where people are expected to walk.
- Order and use cables of the appropriate length. Do not use a 50 foot cable to connect to a computer that is next to the disk.
- If you find yourself with extra flat cable, gather it into an accordian fold. Do not roll it into a coil. Even though this would make for a neater appearance, it creates an inductor or choke coil. This will adversely affect performance. It is much better to acordian fold the cable or just leave it in a wad.
- A periodic inspection of all cables will help to keep your system running smoothly and trouble free. Cables should always have a snug connection.

INDEX (for Chapter One only)

Chapter 2

GETTING STARTED — INSTALLATION

CHAPTER 2   GETTING STARTED: INSTALLATION

Installing your CORVUS Drive is not difficult, but it is very important that you follow the directions. Please resist the temptation to just plug it all in—the result could be broken hardware and that would spoil your just-got-something-new good mood.

▶ **First, please read Chapter 1. Be sure you have the background you need. And, be sure you understand the cautions.**

Read this whole chapter before you begin installing your hardware. After you have installed the hardware, you will have an empty disk drive connected to your computer. Beginning with Chapter Three, each chapter describes the software configuration process of a different operating system.

2.1 Parts You Will Need for Normal Operation

Your CORVUS Drive installation package consists of the following items (see figure 2.1).

- Disk drive and power supply (both contained in the Disk Drive cabinet)
- Flat cable and personality card assembly
- ac cable
- CORVUS utilities floppy(ies)
- The CORVUS Drive Manual

You must supply the computer, the floppies that come with your particular computer, and the appropriate power outlets.

2.2 Drive Features

Indicator Lights

There are three red indicator lights on the upper right hand corner of the Drive Cabinet front panel. These are labeled Fault, Busy, and Ready (see figure 2.2).

To the left is the Fault light. It indicates an error in operation—such as a read error, write error, hard error, soft error, or a command that cannot be carried out.

The center light, labeled Busy, indicates the drive is active. If your Format switch is set to normal, the Active light flickers and then goes off when you power on or reset.

To your right is the Ready light. It indicates the drive is ready to be used. When you power on, all three lights come on. Then the Fault and
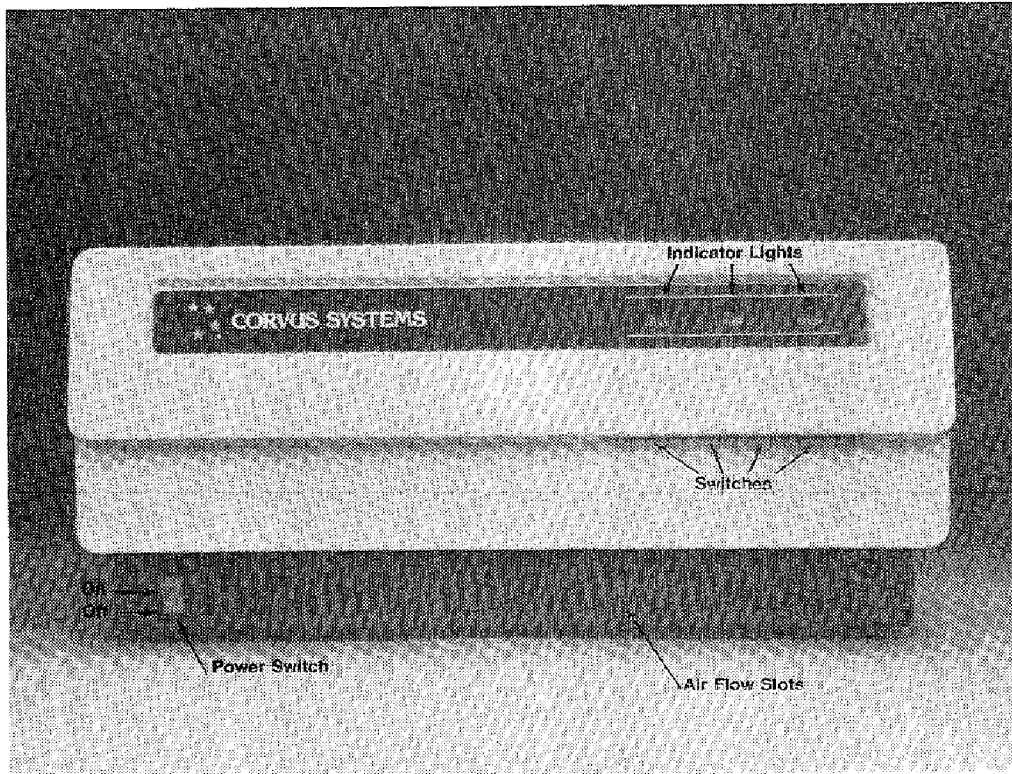
FIGURE 2.1 DRIVE AND PARTS

FIGURE 2.2 DRIVE CABINET FRONT PANEL
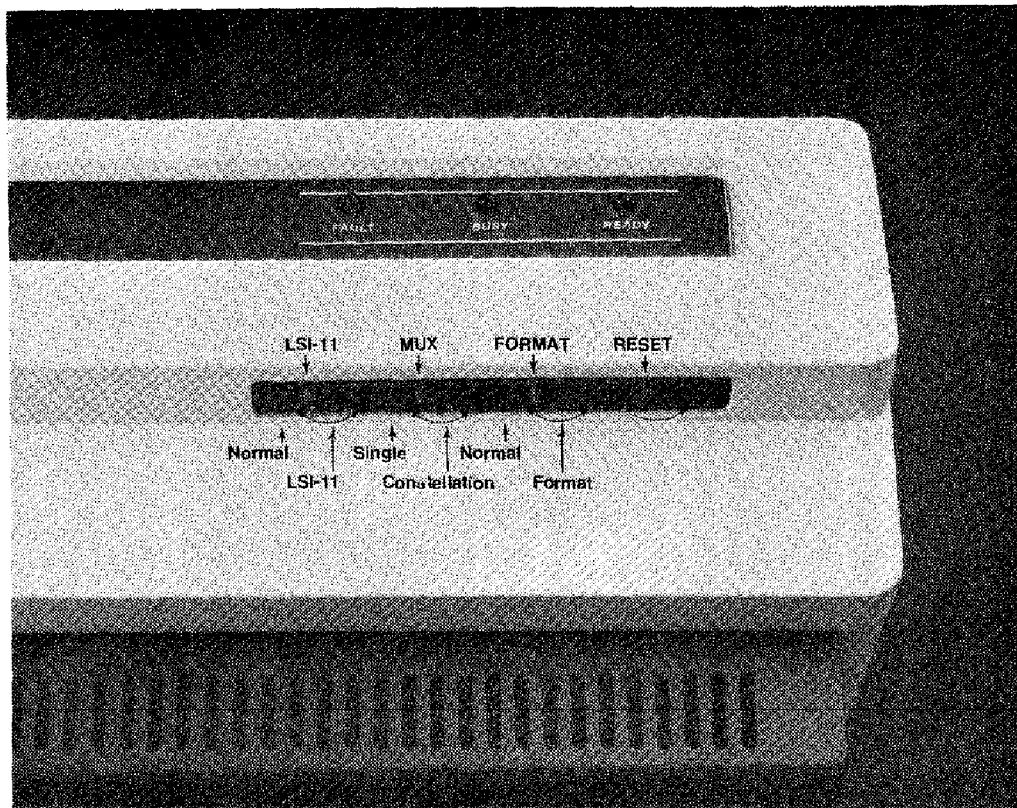
FIGURE 2.3 FRONT PANEL SWITCHES

Busy lights go off and the Ready light stays on. When your drive is ready, only the Ready light stays on. The Ready light is dimmer when the Mux switch (see below) is set to the Constellation setting.

Switches

Approximately two inches below the indicator lights, the front panel protrudes slightly. Directly beneath the lights, and up under the lip of the protrusion, are four switches labeled from left to right: LSI-11, MUX, FORMAT, and RESET. When you look straight on at the front of the drive cabinet, these switches are not visible (see figures 2.2 and 2.3).

If an LSI-11 is attached to the drive, the LSI-11 switch is put in the LSI-11 position. Otherwise, it remains in the Normal position (see figures 2.3).

The MUX switch is set to the Constellation position only when a CONSTELLATION is attached to the system. Otherwise, it remains at the Single setting (see figure 2.3).

When making a bottom level format on the drive, the FORMAT switch is put in the Format position. Otherwise, it is left at the normal setting. When running the programs PFORMAT or BFORMAT, this switch must be at the Normal setting (see figure 2.3).

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RESET momentarily resets the drive (see figure 2.3).

On the lower left corner of the drive case front panel, you will find the power switch. It has two positions. Up is ON, down is OFF (see figure 2.2).

Video Connectors

On the bottom left side of the back panel, there are two video connectors (see figure 2.4). They are used to connect a video tape recorder if you have a MIRROR connected to your system.

The top connector is labeled IN. This means video in or the input to the disk system. It connects to the video OUT cable from the video recorder.

The lower connector is labeled OUT. This means the output from the disk system. It connects to the video IN cable from the video recorder.

A flat cable connector, labeled VCR REMOTE, is directly to the right of the video connectors. This connector is used to connect to a remote control from a video tape recorder.
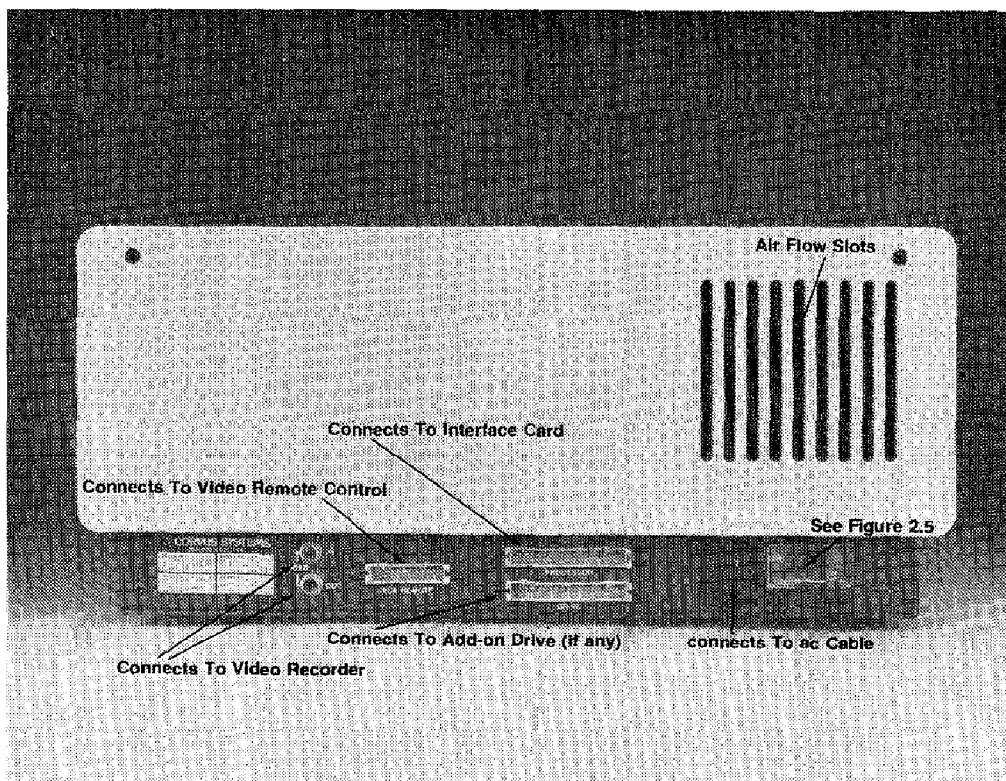

FIGURE 2.4 DRIVE CABINET BACK PANEL
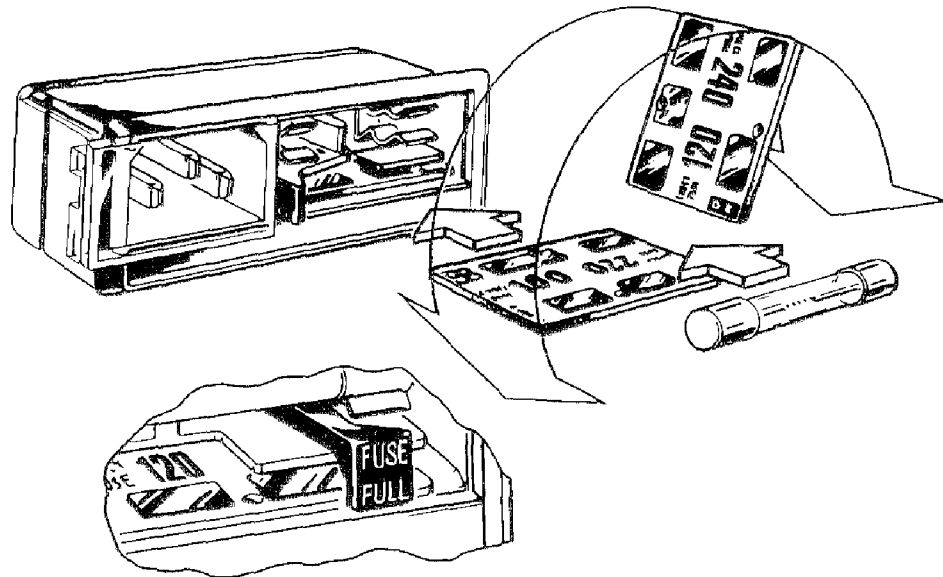
FIGURE 2.5 VOLTAGE SELECTION

All these video related connectors are explained in more detail in the CORVUS MIRROR Manual.

Computer and Drive Connectors

Near the bottom center of the drive cabinet back panel, there are two flat cable connectors (see figure 2.4). The top one, labeled Processor, connects to the flat cable leading to your interface card. The lower one, labeled Drive, connects to the flat cable leading to an add-on CORVUS drive (if you have an add-on drive).

Both of these connectors should only be connected with the cables leading down and away from the drive (see figures 2.11 and 2.12). When facing the drive cabinet back panel, the colored stripe should be to your right. To safeguard your drive's hardware, do not try to force a cable to connect in any other way.

WARNING ─────────────────

It is possible to connect the cable incorrectly. Please go slowly and take care to correctly connect the cable as depicted in figure 2.11.

---

ac Connector

To the bottom right of the back panel, there is the ac cord connector and fuse (see figure 2.4). You have a voltage option of 120v, 220v or 240v.

To change voltage, you change to the proper fuse and flip the small circuit board as follows (see figure 2.5).

Open the cover door, rotate the fuse-pull to the left, and remove the fuse.

Select the operating voltage by orienting the PC Board to position the desired voltage on the top left side. Push the board firmly into the module slot.

Rotate the fuse-pull back into the normal position and insert a fuse into the holders. If you have chosen a voltage setting different from the original setting when you received the drive, do not re-insert the fuse you removed. Please use caution to select the correct fuse value. A 3 Amp fuse is used with 110 volt systems. A 1.5 Amp fuse is used with 200 and 240 volt systems.

Carriage Lock

The carriage lock holds the heads in their fully retracted position. The carriage lock should always be engaged when the disk drive is shipped. The primary reason for this is that it prevents the destruction of data on the disk. It also prevents the heads from striking the disk's surfaces, and damaging the heads or the disk.

Some models of the CORVUS Drive have an electro-mechanical carriage lock. This lock is automatically engaged when the power switch is turned off. It is automatically disengaged when the power switch is turned on.

It is helpful to see how the carriage lock mechanism works. Remove the eight screws that hold the white cover of the drive cabinet in place, then remove the cover. Study the carriage lock by looking through the transparent top of the black disk drive case.

▶ If your carriage lock hole is covered by a sticker, you have an electro-mechanical carriage lock. You can turn to the next section entitled Service Door since the rest of this Carriage Lock section refers only to drives with manual carriage locks.

When you receive your drive, the carriage lock is engaged, clamping the heads into their fully withdrawn position. The heads do not move when the carriage lock is engaged but are able to move freely when you disengage the lock.
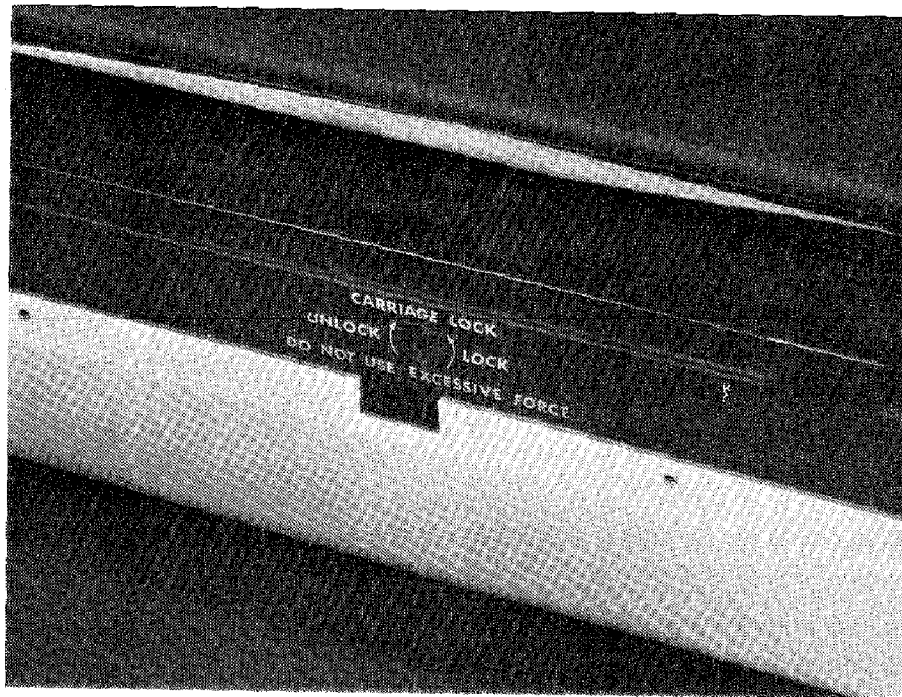
Disengaging the Carriage Lock

To disengage the carriage lock, be sure everything is unplugged and

POWER OFF

power is off. Insert a screwdriver into the carriage lock hole (see figure 2.6).

▶ We recommend the use of a ¼" nutdriver in this procedure. However, a flat head screwdriver will work just as well.

'For manual carriage locks only.   FIGURE 2.6 CARRIAGE LOCK ACCESS HOLE

Turn the carriage lock screw clockwise about 19.5 turns or until you feel some resistance. If the screw does not turn easily, STOP. It may already be disengaged.
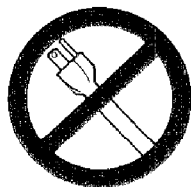
> **WARNING**
>
> **Never force the carriage lock screw. It should always turn easily.**

When the carriage lock is disengaged, you can move the heads in and out by gently lifting one end of the drive, then the other (see figure 2.7).

Engaging the Carriage Lock

To engage the carriage lock, make sure

POWER OFF

the power is off and the cables are disconnected. Retract the heads by lifting the end of the drive cabinet that has the indicator lights (see figure 2.7). Gravity will make the head assembly retract, pulling the heads toward the outside rim of the disk (see figure 2.8).

Insert a screwdriver into the carriage lock hole. Turn the carriage lock screw counter-clockwise about 19.5 turns or until you feel resistance.

Check to be sure the carriage lock is engaged. Lift one end of the drive cabinet, then the other. If the heads do not stay fully retracted (see figure 2.9), the carriage lock is not engaged. Fully disengage the carriage lock and then re-engage it, making sure the heads are retracted before you start engaging the lock.

Do not replace the drive cabinet top yet.

Service Door

Underneath the drive cabinet, there is a hinged door (see figure 2.10). This door allows access to the circuit boards underneath the drive. The drive cabinet was also designed to contain the MIRROR circuit board just inside the service door.

Power On Sequence

When powering up your system, always turn on the computer first. Then turn on the CORVUS Drive. If you have more than one drive, power the drives up in the reverse order from which they are connected—i.e. the last drive connected is the first to be powered up.

Lift This End To Retract Heads*

Lift This End to Extend Heads*
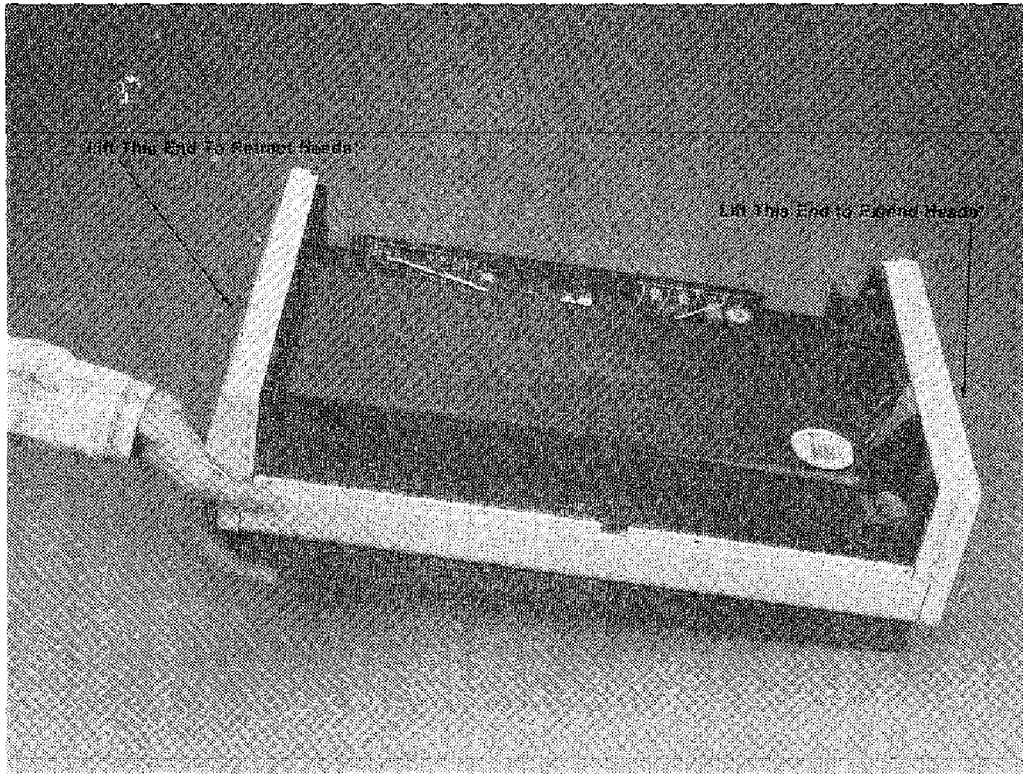
*For manual carriage locks only.

FIGURE 2.7 CHECKING FOR LOCKED HEADS

Disk

Heads

FIGURE 2.8 DRIVE HEADS RETRACTED

FIGURE 2.9 DRIVE HEADS EXTENDED

FIGURE 2.10 SERVICE DOOR

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When the system is powered down, always turn off power to the drive first.

▶ **If you have your computer and drive(s) connected to one power strip, do not use a master switch to power them up and down in unison. Follow the power on sequence above.**

2.3 Putting It All Together

POWER OFF

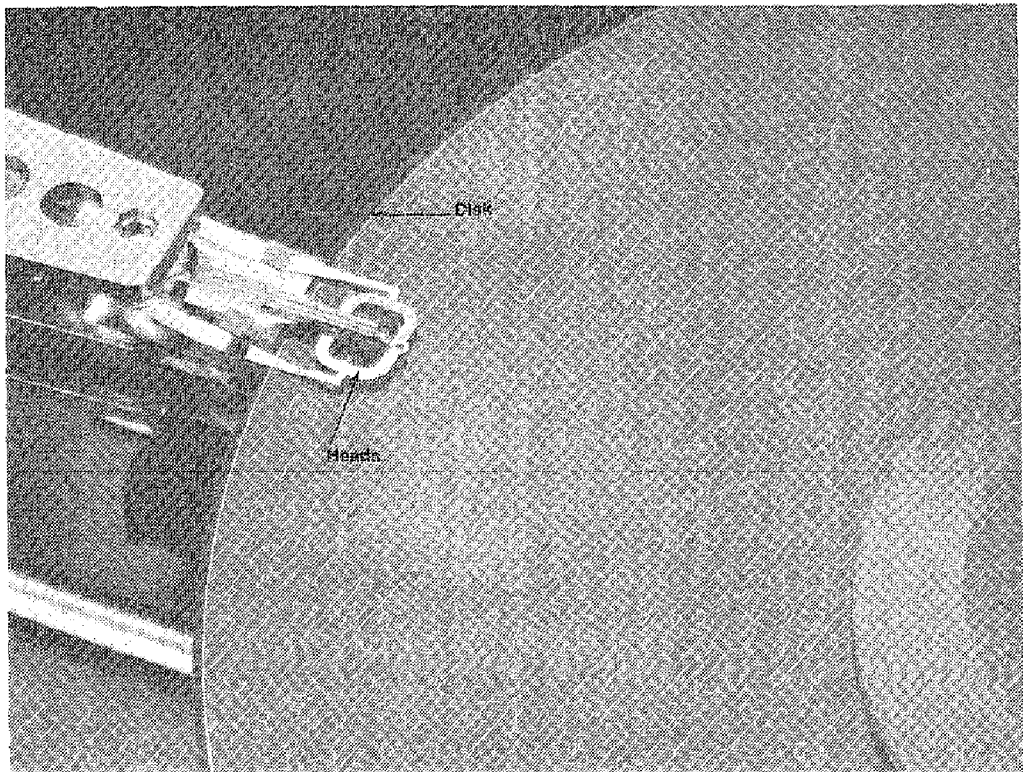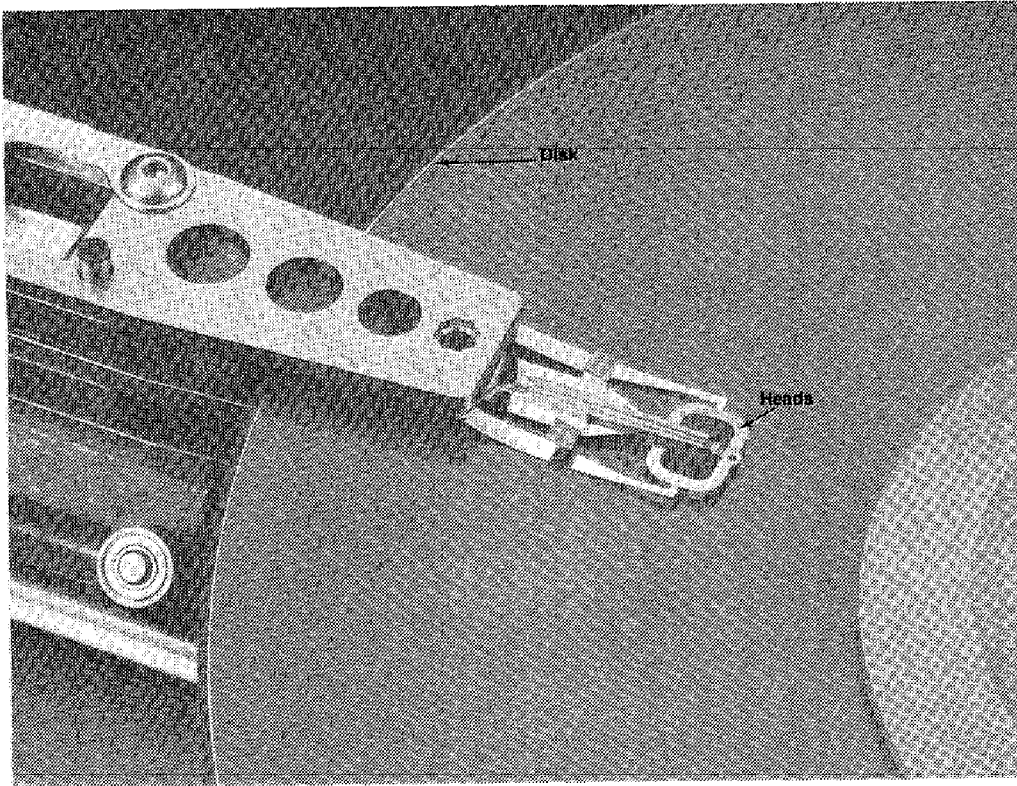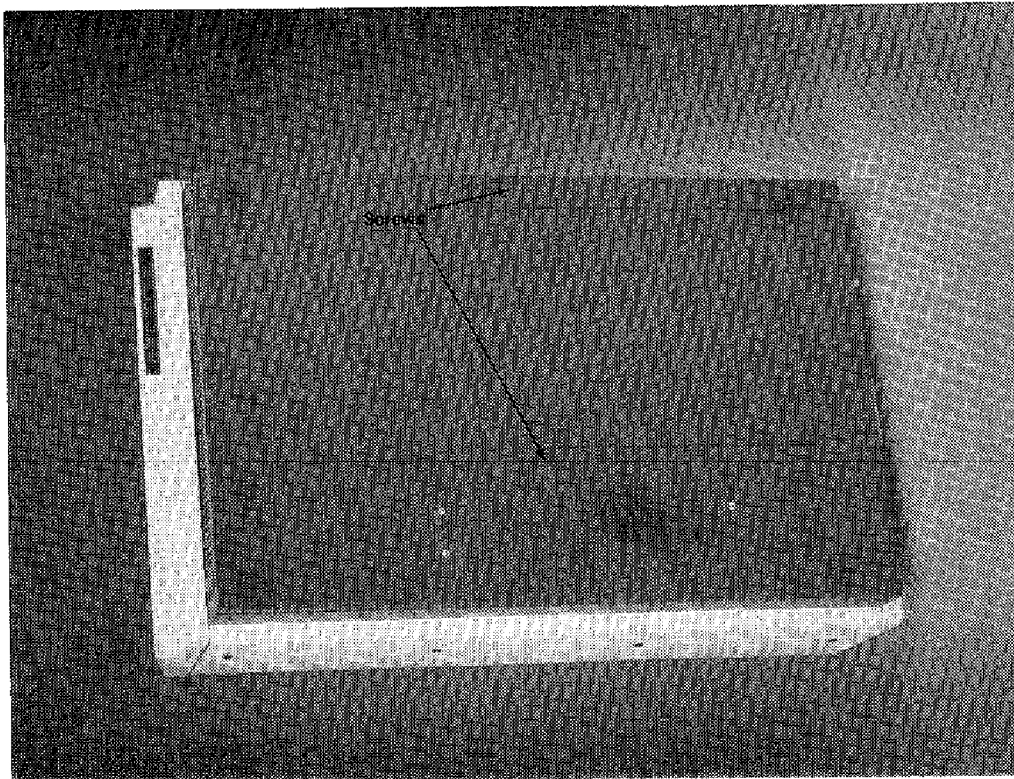Be sure the power to both the computer and to the CORVUS Drive is off anytime you install or remove any circuit cards or cables. Failure to do so may cause permanent hardware damage to both the Drive and your computer.

The drive cabinet top should still be off. By now, you probably have noticed that all connections within the cabinet have been made for you. So, you don't need to connect anything there.

1. Make sure the Carriage Lock is disengaged.
2. Replace the cabinet top and the eight screws that hold it on.
3. Make the desired voltage selection.
4. Connect the personality card flat cable to the connector labeled Processor on the drive cabinet back panel.

┌─── **WARNING** ────────────────────────────────┐
│ **It is possible to connect the cable incorrectly. Please go** │
│ **slowly and take care to correctly connect the cable.** │
└──┘

When facing the drive cabinet back panel, the colored stripe on the cable must be to your right. The cable must lead down and away from the connector (see figures 2.11 and 2.12).

5. Connect the personality card to your computer.
6. Check to see that the switches on the front panel are set to the appropriate settings, according to your system.
7. Connect the ac cord to the drive case back panel.
8. Make sure the power switches on the drive cabinet and computer are set to the Off position. Then plug both the computer and drive into appropriate wall sockets.
9. Your hardware is connected. Recheck ALL your connections.
10. Turn to the appropriate Chapter to configure your system.

Colored Stripe

¹Interface card varies according to your system.
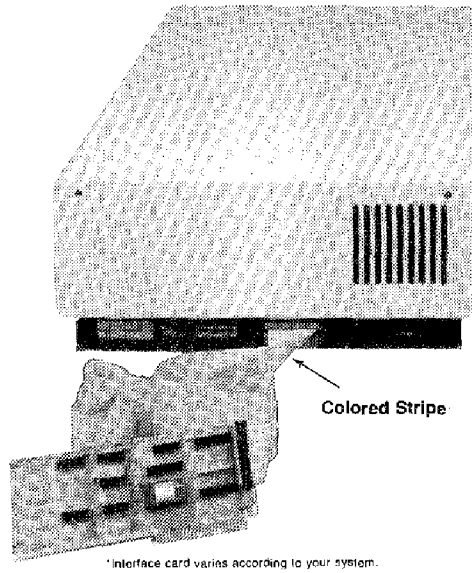
FIGURE 2.11 PROPERLY CONNECTED DRIVE

Colored Stripe

¹Interface card varies according to your system.
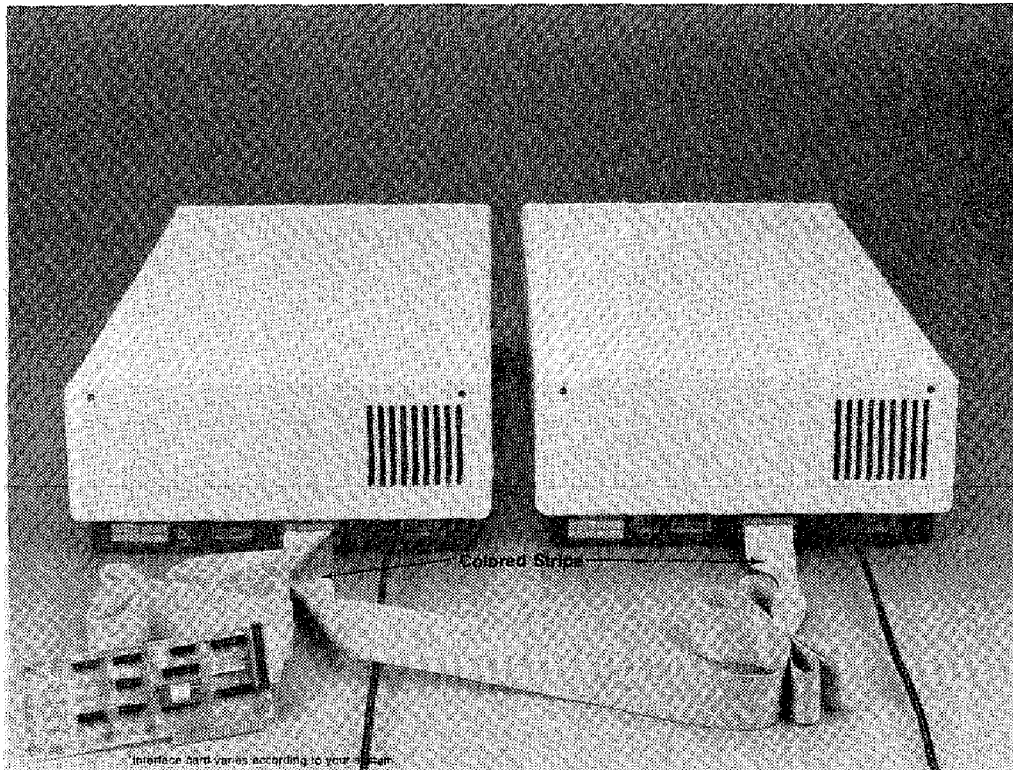
FIGURE 2.12 PROPERLY CONNECTED ADD-ON DRIVE

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2.4 Hardware Specifications

General Description

The CORVUS Disk Drive is a Winchester technology drive. It is a fixed disk in a sealed environment. One drive can provide many megabytes of unformatted storage.

The low load, low mass Winchester type Read-Write heads are positioned with a linear voice coil actuator utilizing a closed loop, track following, servo system. The recirculating filtered air flow system within a sealed enclosure prevents contamination. The brushless dc drive motor with built-in disk spindle, motor electronics and speed control provides for a universal 50/60 Hz operation.

Three printed circuit boards, Read-Write, Servo Control and Drive Logic are installed within the base. These boards are interconnected with a back panel where all interface connections are made.

Primary features of the CORVUS Disk Drive are:

- Fixed Media (magnetically oriented and lubricated)
- Winchester type recording features
- Sealed environment, clean air filter system
- Brushless dc Drive Motor
- Small size
- No scheduled maintenance
- Daisy chain up to 4 drives (original drive and three add-on drives)

Reliability

The Mean Time Between Failures is calculated to exceed 10,000 hours.

The Mean Time To Repair will not exceed 0.5 hours.

There is no preventive maintenance required on the CORVUS Disk Drive.

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10 Megabyte Drive

Operational Specifications

Number of platters	2
Number of data surfaces	3
Number of tracks per surface	418
	(354 data, 4 diagnostic, 60 guardband)
Number of data tracks per surface	350 + 4 Alternatives
Bytes per track (unformatted)	10,240
Bytes per cylinder (unformatted)	30,720
Number of data cylinders	350
Bytes per surface (unformatted)	3.58 Mb
Bytes per drive (unformatted)	10.7 Mb
Track density	300 TPI
Bit density	5,868 BPI
Rotational Speed	3,600 RPM + 1%
Average Latency	8.33 ms
Single track access time	10 ms
Average access time	50 ms
Maximum access time	100 ms
Data transfer rate (to internal controller RAM)	648 KB/S–(5.1 Mega Hz Clock Rate)
Recording code	MFM
Heads per surface	1
Data Heads	3
Servo head	1
Start time	15 seconds (max.)
Stop time	15 seconds (max.)

Physical Dimensions

Height (inches/centimeters)	6.375/16.9
Width (inches/centimeters)	14.50/36.83
Length (inches/centimeters)	23.00/58.42
Vertical Rack Space (inches/centimeters)	7.25/18.42
Rack Depth (inches/centimeters)	21.50/54.61
Weight (pounds/kilograms)	48/22

Environmental Specifications

Operating Temperature	+50 F to 120 F
	(10 C to 50 C)
Operating Relative Humidity	
(no condensation)	20% to 80% R.H.
Operating Altitude	−1,000 to +10,000 ft.
Non Operating Temperature	−40 F to 140 F
	(−40 C to 60 C)
Non Operative Relative	
Humidity (no condensation)	10% to 90% R.H.
Temperature Variation	18 F (10 C) per hour
	(no condensation)
Operating Vibration	0.1 G (5 cps linear
	increase to 100 cps)
Non Operating Vibration	1.0 G (2 cps linear
	increase to 100 cps)
Non Operating Shock	5.0 G for 5 ms duration

20 Megabyte Drive

Operational Specifications

Number of platters	3
Number of data surfaces	5
Number of tracks per surface	448
	(384 data, 4 diagnostic, 60 guardband)
Number of data tracks per surface	380 + 4 Alternatives
Bytes per track (unformatted)	10,240
Bytes per cylinder (unformatted)	51,400
Number of data cylinders	380
Bytes per surface (unformatted)	3.89 Mb
Bytes per drive (unformatted)	19.6 Mb
Track density	300 TPI
Bit density	5,868 BPI
Rotational Speed	3,600 RPM + 1%
Average Latency	8.33 ms
Single track access time	10 ms
Average access time	50 ms
Maximum access time	100 ms
Data transfer rate (to internal controller RAM)	648 KP/S–(5.1 Mega Hz Clock Rate)
Recording code	MFM
Heads per surface	1
Data heads	5
Servo head	1
Start time	15 seconds (max.)
Stop time	15 seconds (max.)

Physical Dimensions

Height (inches/centimeters)	6.375/16.9
Width (inches/centimeters)	14.50/36.83
Length (inches/centimeters)	23.00/58.42
Vertical Rack Space (inches/centimeters)	7.25/18.42
Rack Depth (inches/centimeters)	21.50/54.61
Weight (pounds/kilograms)	48/22

Environmental Specifications

Operating Temperature	+50 F to 120 F (10 C to 50 C)
Operating Relative Humidity (no condensation)	20% to 80% R.H.
Operating Altitude	−1,000 to +10,000 ft.
Non Operating Temperature	−40 F to 140 F (−40 C to 60 C)
Non Operating Relative Humidity (no condensation)	10% to 90% R.H.
Temperature Variation	18 F (10 C) per hour (no condensation)
Operating Vibration	0.1 G (5 cps linear increase to 100 cps)
Non Operating Vibration	1.0 G (2 cps linear increase to 100 cps)
Non Operating Shock	5.0 G for 5 ms duration

INDEX (for Chapter Two only)

Chapter 3

CORVUS DISK WITH PASCAL
OR APPLE PASCAL-BASICS

Chapter 3   Corvus Disk With Apple Pascal
or Apple Pascal-Basics

At this point we presume that you are familiar with how Apple Pascal works.

▶ **Please refer to the suggested reading index at the end of this chapter if you are not familiar with Apple Pascal.**

This chapter describes the Pascal-only and the Pascal-BASICs system, including how files and volumes are created, manipulated, backed up, and restored; how BASICs files are handled; and how booting works.

Read this entire chapter before you begin the following process. Before beginning, it will help to read section 4.2.

3.1 Bringing up Pascal

> **WARNING**
>
> **Configuring the system effectively removes all data from the disk drive. If you ever decide to reconfigure the system and there is data already on the drive, you must be sure to backup your data.**

Since the CORVUS Drive is empty right now, the Apple cannot boot from it. In the next steps, you will boot Apple Pascal normally, using the floppy. Then you will run a Pascal program that puts the Apple Pascal system programs plus some CORVUS utilities on the CORVUS Drive. Finally, you will plug the CORVUS Drive into slot six. From then on, your Pascal system will automatically boot from the CORVUS drive.

> **WARNING**
>
> **Please take care to follow these instructions in the exact order listed.**

1.
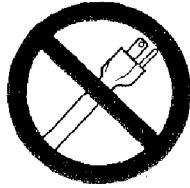
POWER OFF

Turn both your Apple and CORVUS Drive off.

WARNING ————————————————————————

Never insert or remove cables or cards with the power on.
Serious damage to the Apple and the CORVUS Drive may
result.

---

2. Plug the CORVUS Drive personality card (see figure 3.1) into slot
   two and the floppy controller into slot six. This temporary setup will
   allow you to boot the Pascal system from the floppy drive.

3. Place the APPLE1 diskette, supplied with Apple Pascal, in the
   floppy drive and turn on your Apple. The system will load Pascal.
   With a single drive system, you use the APPLE3 diskette to boot
   Pascal. APPLE1 is for multiple disk systems.
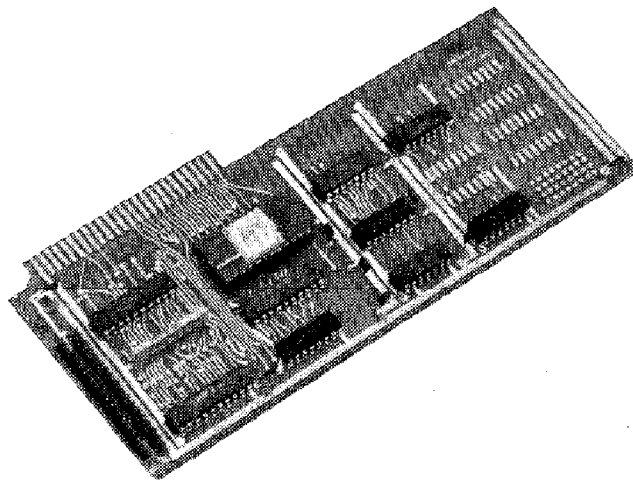
FIGURE 3.1 INTERFACE CARD

For more information, read sections 6.2 and 6.3 of the Apple Pascal Reference Manual, Apple number A2L0019.

4. If you have never made a backup copy of a diskette, please read section 6.2.3 in the Apple Pascal Reference Manual.

Use the Pascal Filer to copy all the files from APPLE1 to a formatted blank diskette.

▶ **We presume that you have a formatted backup floppy named blank.**

The command level menu is displayed across your screen.

COMMAND: E(DIT, R(UN, F(ILE, C(OMP, L(IN

Press F for the F(ile command. The Filer menu displays across your screen.

FILER: G, S, N, L, R, C, T, D, Q

WARNING

When using the Pascal filer, you must type a colon after the volume name. If you do not type a colon after the volume name, your computer displays an error message.

Press T for the T(ransfer command. Type APPLE1:,BLANK: <return>.

TRANSFER?   APPLE1:,BLANK: <return>

When the computer asks to transfer 280 blocks, press Y for Yes.

TRANSFER 280 BLOCKS ? (Y/N)   Y

If you have one floppy drive, the computer will direct you to insert BLANK, then remove BLANK and insert APPLE1, then insert BLANK, then APPLE1.

PUT IN BLANK :
TYPE <SPACE> TO CONTINUE :   <space>

When the computer asks to destroy BLANK, press Y for Yes.

```
DESTROY BLANK: ?                              Y

PUT IN APPLE1 :
TYPE <SPACE> TO CONTINUE :                    <space>

PUT IN BLANK :
TYPE <SPACE> TO CONTINUE :                    <space>
```

You do this until the floppy is copied and the computer tells you so with the following message.

```
APPLE1:            -->           BLANK:
```

If you have more than one floppy disk drive, you will be spared the trouble of swapping floppies and in about two minutes, you will have backup copy of APPLE1.

If you have trouble, please refer to the Apple Pascal Reference Manual, Sections 6.2 and 6.3.

5. When the Filer copies APPLE1 onto BLANK, it renamed BLANK. You have two identical floppies, both named APPLE1. Remove the original APPLE1 from the floppy drive. Place new APPLE1 in the floppy drive.

   If you have two floppy drives, you must remove the original APPLE1 from the floppy drive. This keeps the computer from becoming confused.

   Change the name of the new floppy to BRINGUP. From the Filer, press C for C(hange. Type APPLE1:,BRINGUP: <return>.

```
CHANGE ?        APPLE 1:,BRINGUP: <return>
```
```
APPLE1            -->           BRINGUP:
```

Now you have two copies of APPLE1 and the new one is named BRINGUP. If you have trouble, refer to the Apple Pascal Reference Manual.

6. Copy two files from the CORVUS Pascal Utilities floppy, supplied with your drive, to the newly made copy called BRINGUP.

   Place the CORVUS Pascal Utilities floppy into your floppy drive. Transfer the files CORVUS:BOOT.DATA and CORVUS:PFORMAT.CODE from the CORVUS Pascal Utilities floppy to BRINGUP.

   If you have two floppy drives, the dialogue will be slightly different. From the Filer, press T for T(ransfer. Type CORVUS:BOOT.DATA,BRINGUP:$ <return>.

```
TRANSFER ?      CORVUS:BOOT.DATA,BRINGUP:$
                <return>
```

The $ just means "Give it the same name"—i.e. BOOT.DATA.
f020

```
PUT IN BRINGUP:

TYPE <SPACE> TO CONTINUE
```

. . . and so on until the transfer is complete, as signalled by the message

```
CORVUS:BOOT.DATA

     -->BRINGUP:BOOT.DATA
```

Repeat the process for the file CORVUS:PFORMAT.CODE. Press T for T(ransfer. Type CORVUS:PFORMAT.CODE, BRING-UP:$ <return>.

```
TRANSFER ?
```
CORVUS:PFORMAT.CODE,
BRINGUP:$ <return>

7. To be sure BRINGUP is complete, list its directory. From the Filer, press E for E(xt dir (extended directory). Type BRINGUP: <return>.

```
DIR LISTING OF ?
```
BRINGUP: <return>

The system should respond with something similar to the following:

```
BRINGUP:
SYSTEM.APPLE
SYSTEM.PASCAL
SYSTEM.MISCINFO
SYSTEM.EDITOR          (The information presented
SYSTEM.FILER           here may vary slightly.)
SYSTEM.LIBRARY
SYSTEM.CHARSET
SYSTEM.SYNTAX
BOOT.DATA
PFORMAT.CODE
<UNUSED>
10/10 FILES, 73 UNUSED, 73 IN LARGEST
```

Your BRINGUP floppy may not look exactly like this but it should be close. It should contain all the files on APPLE1, plus BOOT.DATA and PFORMAT.CODE.

If BOOT.DATA or PFORMAT.CODE is missing, repeat step six.

If the system files are not correct, check your APPLE1 floppy. All the files on APPLE1 should be on BRINGUP. If not, use the Filer to fix the problem or repeat steps three through five.

8. Turn on the CORVUS Disk Drive. The drive will make a chirping noise, which will dissolve to a whirring purr in about 15 seconds. These are the normal sounds of a healthy drive.

9. Place the BRINGUP floppy that you have made into the floppy drive. From the Filer, press Q for Q(uit. You should return to the command level.

   Execute PFORMAT.CODE. Press X for X(ecute. Type PFOR-MAT <return>. When the computer asks if it is o.k. to erase the disk, press Y for Yes.

```
EXECUTE WHAT FILE ?              PFORMAT
                                 <return>

PASCAL/BASICS FORMATTER

DESTROY ALL DATA ON DISK (Y/N) ?   Y
```

If the disk is not ready, the program will say:

```
WAITING FOR CORVUS DRIVE TO BECOME READY.
```

Be sure the drive is on. The drive takes 15 seconds to come up to speed. When the disk is ready, the program will continue, taking about a minute.

```
OPENING FILE BOOT.DATA
WRITING BOOT TRACKS
..........
COPYING FLOPPY TO DISK
..........
```

Your Apple is running a Pascal program called PFORMAT.CODE that prepares the CORVUS Drive for operation. It creates a boot area on the disk and fills the area with the information in BOOT.DATA, which is used to boot your Apple when it is turned on. Then, PFORMAT copies the entire contents of BRINGUP onto the drive as volume one.

▶ The disk structure is described in Section 3.7.

10. If, after PFORMAT finishes running, the computer returns to the command level and waits for a response, you have successfully configured your CORVUS Drive with Pascal. Go to step twelve.

If, after 70 seconds, the command level menu has not appeared, something went wrong. Go to step eleven.

11. If, when you try to execute PFORMAT, the system answers

NO FILE PFORMAT.CODE

check the contents of the BRINGUP floppy (refer to step seven) to be sure PFORMAT.CODE and BOOT.DATA are present. If not, repeat the instructions beginning with step six. If they are present, go to step nine and try again.

If these two files are present and PFORMAT simply doesn't work, double check your cabling. Check to see that the files BOOT.DATA and PFORMAT.CODE are on the BRINGUP floppy (see step seven). Then, carefully repeat the instructions beginning with step nine.

12. After you have successfully configured your CORVUS Drive, you must rearrange the cards in their final configuration.

POWER OFF

Turn off the power to both your Apple and your Drive.

Place the CORVUS personality card into slot six, making sure the flat cable exits smoothly (with no kinks) through one of the slots in the back wall of your Apple.

Plug in your floppy controller cards. If you have one floppy controller, plug it into slot four. If you have two controllers (i.e. more than two floppy drives) plug the second controller card into slot five. Arrange all the cables neatly.

13. Power on the Apple and the CORVUS Drive.

After the CORVUS Drive comes up to speed (about 15 seconds), the computer will respond with something like this:

WELCOME BRINGUP, TO
U.C.S.D. PASCAL SYSTEM II,1
CURRENT DATE IS 26-JUL-79

The computer boots itself from the CORVUS Drive, not from the floppy. Don't worry if the system revision number and the date are different.

14. Try it out. This step is a quick exercise to prove that the configuration went well and to give you a chance to play.

The command level menu should display across the top of your screen.

COMMAND: E(DIT, F(ILE, C(OMP, L(IN

Press F to get into the Filer.

FILER: G, S, N, L, R, C, T, D, Q

Then, press V for V(ols (volumes on line) to see a volume directory.

```
WARNING UNITS 4 & 9 HAVE THE SAME NAME

VOLS ON LINE:
1  CONSOLE
2  SYSTERM:
4# BRINGUP:
9# BRINGUP:
ROOT VOL IS – BRINGUP:
PREFIX IS – BRINGUP:
```

The warning is there to remind you that unit #4 (the CORVUS Drive) and unit #9 (the floppy) both are named BRINGUP. This is potentially dangerous.

To prevent a calamity, remove the BRINGUP floppy from the floppy drive. You won't need it now that your CORVUS Drive is up. Nevertheless, save the BRINGUP floppy in case you ever have a need to reformat the drive.

Change the name of BRINGUP (on the CORVUS Drive) to CORVUS1. Remove any floppies you have in floppy drives. From the Filer, press C for the C(HANGE command. Type BRINGUP:,CORVUS1: <return>.

CHANGE?   BRINGUP:,CORVUS1: <return>

BRINGUP: --->   CORVUS1:

Press V for the V(ols command to verify that the change worked.

```
VOLS ON LINE:

1  CONSOLE:
2  SYSTERM:
4# CORVUS1:
ROOT VOL IS – CORVUS1:
PREFIX IS – CORVUS1:
```

Now place any Pascal floppy in the floppy drive.

Press V for V(ols. You will get the same volume directory, but now unit #9 will bear the name of whatever floppy you inserted into the foppy drive.

Press E for E(xt dir to get a file directory. Then, type CORVUS1: <return>.

DIR LISTING OF ?   CORVUS1: <return>

You will recognize the resulting directory as the same one you saw when you listed the directory of the BRINGUP floppy. Now these files are on CORVUS1, the first volume on the CORVUS Drive.

You can also list the contents of the floppy. Press E. Type #9 or the name of the floppy.

15. Your Pascal system is almost ready. The next step is to transfer some useful files onto CORVUS1.

    When you transfer between floppies, you may choose to use this sort of dialogue:

TRANSFER ?   VOL1:,VOL2: <return>

That works, but VOL1 and VOL2 must be the same length and VOL2's name is changed to VOL1. Here's why.

When you transfer by typing VOL1:,VOL2:, you are saying, "transfer the whole volume." Sometimes that is most conven- ient—in fact, you did that sort of transfer at the beginning of these configuration instructions. However, it is often better to transfer by typing VOL1: = ,VOL2:$, which means, "transfer all the files on VOL1 to VOL2." The difference is that the directories are updated without changing the volume name and different volume lengths are handled properly. For more information, consult the Apple Pascal Reference Manual.

Place the CORVUS Pascal Utilities floppy in the floppy drive. Transfer all the files on the CORVUS Pascal Utilities diskette to CORVUS1 on the disk.

From the Filer, press T for the T(ransfer command. Type COR- VUS: = ,CORVUS1:$ <return>.

TRANSFER ?   CORVUS: = ,CORVUS1:$ <return>

$ means give the copied file the same name it had on the original volume. When the Filer encounters the files PFORMAT.CODE and BOOT.DATA, it will notice that those files are already on CORVUS1 and ask whether you want to remove the old versions. Since both copies are identical, answer N for NO.

16. Place the APPLE2 diskette, supplied with the Apple Pascal, in the floppy drive. Transfer all the files on APPLE2 to CORVUS1. From the Filer, press T for T(ransfer. Type APPLE2:=,CORVUS1:$ <return>.

TRANSFER ? APPLE2:=,CORVUS1:$ <return>

17. Transfer the following files from APPLE3 to CORVUS1.

```
FORMATTER.CODE
FORMATTER.DATA
LIBRARY.CODE
LIBMAP.CODE
SETUP.CODE
BINDER.CODE
CALC.CODE
```

Not all the files on APPLE3 should be transferred. The easiest way to do this transfer is to use the ? wild card which asks for configuration before it transfers.

From the Filer press T for T(ransfer. Type APPLE3:?,CORVUS1:$ <return>.

TRANSFER ? APPLE3:?,CORVUS1:$ <return>

Reply Y to the files you want transferred and N to the others. You will reply N to SYSTEM.APPLE, then Y to all requests up to and including CALC.CODE. None of the files after CALC.CODE should be transferred at this time. After CALC.CODE has transferred, press <esc> to terminate the transfer.

```
TRANSFER SYSTEM.APPLE ?                    N
TRANSFER FORMATTER.CODE ?                  Y
APPLE3: FORMATTER.CODE ?
-->CORVUS1:FORMATTER.CODE
TRANSFER FORMATTER.DATA ?                  Y
APPLE3:FORMATTER.DATA
-->CORVUS1:FORMATTER.DATA
```

18. From the Filer, press E for E(xt dir. Type CORVUS1: <return>.

DIR LISTING OF ? CORVUS1: <return>

If you followed the procedures in this section exactly, CORVUS1 will contain the following files, though not necessarily in this order. The rest of this manual presumes these files are in CORVUS1. We suggest that you keep them there.

```
CORVUS1:
SYSTEM.APPLE          32    26-JUL-79    6  512  DATAFILE
SYSTEM.PASCAL         36     4-MAY-79   38  512  DATAFILE
SYSTEM.MISCINFO        1     4-MAY-79   74  512  DATAFILE
SYSTEM.EDITOR         45    29-JAN-79   75  512  CODEFILE
SYSTEM.FILER          28    24-MAY-79  120  512  CODEFILE
SYSTEM.LIBRARY        36    22-JUN-79  148  512  DATAFILE
SYSTEM.CHARSET         2    14-JUN-79  184  512  DATAFILE
SYSTEM.SYNTAX         14    18-APR-79  186  512  TEXTFILE
BOOT.DATA              4    27-SEP-79  200  512  DATAFILE
PFORMAT.CODE           3     5-OCT-79  204  512  CODEFILE
BACKUP.CODE            4    13-SEP-79  207  512  CODEFILE
BASICS.CODE            2    27-SEP-79  211  512  CODEFILE
BASICS.DATA           96    30-SEP-79  213  512  DATAFILE
RESTORE.CODE           4     5-OCT-79  309  512  CODEFILE
SETBOOT.CODE           3     5-OCT-79  313  512  CODEFILE
VMGR.CODE             27     1-DEC-79  316  512  CODEFILE
SYSTEM.COMPILER       71    30-MAY-79  343  512  CODEFILE
SYSTEM.LINKER         24     3-MAY-79  414  512  CODEFILE
SYSTEM.ASSEMBLER      48    31-MAY-79  438  512  CODEFILE
6500.OPCODES           2    20-DEC-79  486  208  DATAFILE
6500.ERRORS            7    28-MAR-79  488  498  DATAFILE
FORMATTER.CODE         4     4-MAY-79  495  512  CODEFILE
FORMATTER.DATA         6    22-JUN-79  499  512  DATAFILE
LIBRARY.CODE           9    21-JUN-79  505  512  CODEFILE
LIBMAP.CODE            9    19-APR-79  514  512  CODEFILE
SETUP.CODE            33     7-FEB-79  523  512  CODEFILE
BINDER.CODE            5     4-MAY-79  556  512  CODEFILE
CALC.CODE              8    28-DEC-78  561  512  CODEFILE
(UNUSED)             455              469
     28/28 files (listed/in-dir), 569 blocks used, 455 unused, 455 in
     largest
```

19. That completes the installation and configuration procedure for the Pascal system.

Feel free to play for awhile. When you feel comfortable with the system, relax and congratulate yourself.

If you wish to have a Pascal-BASICs system, you must add BASICs to your Pascal system. Turn to section 3-5.

3.2 CORVUS Volume Manager

Your CORVUS Drive consists of 18,928 blocks of user accessible data storage area. There are eight blocks on the disk that are not accessible. These eight blocks are used for booting the system and for storing the volume directory and related information (see section 3.7). The data can be divided into as many as 63 volumes.

A volume is like an imaginary floppy disk. Like a floppy, it has a name (such as CORVUS1 or APPLE1). Up to six volumes can be mounted at once on Pascal I/O units #4, #5, #9, #10, #11 or #12.

Pascal format floppies are 280 blocks long, but CORVUS volumes can be any length in multiples of eight blocks. You can divide the disk space in many ways. You might create one huge volume,

18,928 blocks long, or up to 63 volumes of the same or different lengths. You can make the last volume on the disk a special DOS volume that contains DOS format volumes (see section 3.6).

Volumes are manipulated by the CORVUS Volume Manager (Vmgr). The files in each volume are handled by the standard Pascal Filer, described in the Apple Pascal Reference Manual.

Getting Acquainted With the CORVUS Volume Manager (Vmgr)

Turn on your Apple. It should boot from the CORVUS disk.

If you have just installed your system according to the procedure in section 3.1, you will have one volume called CORVUS1 on the hard disk. You may also have volumes mounted in your floppy drives.

Press F for F(ile, and press V for V(ols. This will tell you what volumes are mounted. CORVUS1 should appear on unit #4.

Run through the following exercise to quickly become familiar with the Vmgr.

▶ **In Vmgr, you do not need to type a colon after the volume names.**

1. Press Q for Q(uit to exit the Filer.

    To start the CORVUS Volume Manager, press X for X(ecute. Type VMGR <return>.

    Hint: Make a copy of VMGR and call it V. Then you can use the volume manager by typing XV <return>.

    The Volume Manager command menu displays across your screen. These commands are : quit, mount, unmount, list, new, remove, and write-protect.

    VMGR: Q M(OUNT L(IST N(EW R(EMOVE W(PROT

    If you have a 40 character screen, press <ctrl> A and you will see the rest of the line.

    U(NMOUNT:

    Press <crtl> A to get back to the left side of the screen.

2. List the volumes.
    Press L for L(ist.

```
CORVUS VOLUME DIRECTORY

WP  NAME        LENGTH   ADDR   DRV#   UNIT

    CORVUS1       1024       8      1     #4
    <UNUSED>     17896    1032      1
    <OFFLINE>    18928       8      2
    <OFFLINE>    18928       8      3
    <OFFLINE>    18928       8      4
```

This list tells you that you have a volume named CORVUS1 on
drive one. CORVUS1 is 1024 blocks long, has its origin at block
eight on the drive, and is mounted on unit #4. Drives two, three,
and four are offline (not connected). An asterisk appears in the
WP column next to any volumes that are write-protected.

► **Checking your work is a good habit to develop. If you use the
L(ist command after each Vmgr transaction, any little mis-
takes you make can be spotted and corrected immediately.**

3. Write-protect CORVUS1.
   Press W for W(Prot. Type CORVUS1 <return>.

   ENTER VOLUME NAME: CORVUS1 <return>

   CORVUS1: NOW WRITE PROTECTED "*"

4. List the volumes again and you will see an asterisk in the WP
   column, adjacent to CORVUS1.

5. Remove the Write-Protect from CORVUS1.
   Press W for W(Prot. Type CORVUS1 <return>.

   ENTER VOLUME NAME: CORVUS1 <return>

   CORVUS1: NOW UNPROTECTED

   Press L for L(ist to confirm the transaction.
   Before going on to the next step, make a note of the starting block
   address of the unused portion of the disk.

6. Create a new volume called SPREAD.
   When you create a new volume, the Vmgr program usually
   prompts you intelligently for the volume length, volume address,
   and the drive number. All you need to do is press <return>.
   Press N for the N(ew command. Type SPREAD <return>.

3-13

```
NEW VOLUME: ENTER
VOLUME NAME:             SPREAD <return>.

ENTER LENGTH
(BLOCKS): 1024           <return>

ENTER CORVUS DRIVE
# (1 . . . 4) : 1        <return>

ENTER ADDRESS
(BLOCKS): 1032           <return>
```

Notice that you did not have to type 1024, 1, or 1032. Vmgr typed those suggested responses for you and positioned the cursor at the beginning of the response. When this happens, you can simply press <return> and Vmgr will use the suggested response. Or you can type another response and Vmgr will use it.

Press L for L(ist to see your new volume listed.

```
CORVUS VOLUME DIRECTORY

WP      NAME       LENGTH   ADDR   DRV#   UNIT

        CORVUS1     1024       8      1     #4
        SPREAD      1024    1032      1
        <UNUSED>   16872    2056      1
        <OFFLINE>  18928       8      2
        <OFFLINE>  18928       8      3
        <OFFLINE>  18928       8      4
```

SPREAD has no unit number assigned to it because it has not been mounted.

7. Mount SPREAD on the next available unit.
   Press M for M(ount. Type SPREAD <return>.

```
MOUNT WHICH VOLUME:      SPREAD <return>
MOUNT SPREAD:
  ON UNIT #12            <return>
SPREAD: MOUNTED
```

You did not have to supply the unit number because Vmgr suggested the response. When you mount a volume, the Vmgr usually prompts you intelligently.

Press L for L(ist to see the result. SPREAD is now mounted on unit #12.

8. Remove SPREAD.
   Press R for R(emove. Type SPREAD <return>.

```
ENTER VOLUME NAME:        SPREAD <return>

OK TO DESTROY SPREAD:?    Y
```

You must press Y to confirm the destruction of SPREAD. If you press N for No, the Vmgr aborts the remove attempt. This acts as a safety that may spare you the agony of delete.

Press L for L(ist to see that SPREAD disappeared. R(emove is smart enough to unmount SPREAD, then destroy it.

9. Create and mount SPREAD again.
   Repeat steps five and six.

10. Unmount SPREAD.
    Press U for U(nmount. Type SPREAD <return>.

```
UNMOUNT: VOLUME
"NAME" OR UNIT #:         SPREAD <return>

SPREAD: UNMOUNTED . . .
```

11. Mount a floppy by placing one in the floppy drive.
    If you mount a CORVUS volume on a unit that is occupied by a floppy, the floppy will no longer be accessible. To access the floppy again, simply unmount the CORVUS volume.

12. List the volumes.
    The listing should look similar to the following list. Press L for L(ist.

```
CORVUS VOLUME DIRECTORY

WP  NAME          LENGTH   ADDR   DRV#  UNIT

    CORVUS1       1024        8     1    #4
    SPREAD        1024     1032     1
    <UNUSED>     16872     2056     1
    <OFFLINE>    18982        8     2
    <OFFLINE>    18982        8     3
    <OFFLINE>    18982        8     4
```

When you use the Vmgr's L(ist command, the floppy does not appear because Vmgr lists only the volumes on the hard disk drive. The Pascal Filer's V(ols command, however, will show that the floppy is mounted on unit #9.

13. Leave Vmgr and use the Filer's V command to see the results. Press Q for Q(uit to leave Vmgr, press F to start the Filer, and press V for the V(OLS command.

```
VOLS ON-LINE

  1   CONSOLE:
  2   SYSTERM:
  4#  CORVUS1:
  9#  (name of floppy in floppy drive)

  ROOT VOL IS -- CORVUS1:
  PREFIX IS -- CORVUS1:
```

The floppy is mounted on unit #9. SPREAD does not appear because it is not mounted.

This completes the Vmgr exercise. The next section describes the commands in detail.

3.3 Volume Manager (Vmgr) Commands

CORVUS Volume Manager commands are quit, mount, unmount, list, new, remove, and write-protect.

Q(uit

If you have made no changes in your volume table, quit aborts the Vmgr program and returns you to the command level menu. If you have made changes, Quit asks

CHANGE DEFAULT MOUNT TABLE (Y/N) ?

before it returns you to the command level.

If you press N for No, any changes you just made in the volume table will temporarily stay the way you set them. When the system is rebooted, the changes you have made will revert to their original setting.

If you Press Y for Yes, the changes you have made will become permanent until you change them again. Rebooting will not affect these changes.

M(ount

The mount command assigns a volume to a specific unit (volume number). It is analogous to placing a floppy in the appropriate drive. Apple Pascal restricts volumes to units #4, #5, #9, #10, #11 and #12; therefore, only six volumes can be mounted at any time.

A CORVUS volume may be mounted on top of a floppy volume. If a floppy is placed in a floppy drive plugged into slot four, drive one, it would be mounted on unit #9. If a CORVUS volume was subsequently mounted on unit #9, then the floppy would not be accessible and any references to unit #9 would refer to the CORVUS volume.

To access the floppy again, unmount the CORVUS volume that is using the floppy's unit or move the CORVUS volume to a different unit.

This command usually intelligently prompts you for the unit number. If the number prompted is the one desired, you press <return>. If you desire a different number, type in the desired number.

EXAMPLE:

```
MOUNT WHICH VOLUME :          EVEREST <return>
MOUNT EVEREST :
    ON UNIT #12               <return>
EVEREST : MOUNTED
```

U(nmount

Unmount disassociates a volume from the unit on which it is mounted. It is comparable to removing a floppy from a floppy drive.

EXAMPLE:

```
UNMOUNT: VOLUME
    "NAME"OR UNIT # :         EVEREST <return>
EVEREST : UNMOUNTED
```

L(ist

Lists the volumes that are on each disk in the system. A typical listing of a single drive system might look like the following list.

EXAMPLE:

WP	NAME	LENGTH	ADDR	DRV#	UNIT
	CORVUS1	1024	8	1	#4
	NEW	1024	1032	1	#9
*	TUNA	72	2056	1	
*	ACCTS3	1024	2128	1	#12
	<UNUSED>	11150	3152	1	
	DOS1	4680	14256	1	
	<OFFLINE>	18982	8	2	
	<OFFLINE>	18982	8	3	
	<OFFLINE>	18982	8	4	

CORVUS VOLUME DIRECTORY

The above listing tells us that drive one contains five volumes COR-VUS1, NEW, TUNA, ACCTS3, and DOS1. TUNA is 72 blocks long, DOS1 is 4680 blocks long, and each of the others is 1024 blocks long. There are 11,104 empty blocks between ACTS3 and DOS1.

TUNA and ACCTS3 are write-protected, as indicated by the asterisk in the WP column.

The ADDR column gives the block.address of the volume—i.e. tells where each volume physically begins on the disk.

The first 8 blocks on each drive are reserved for system use and are unavailable.

CORVUS1 is mounted on unit #4, NEW is on unit #9, and ACCTS3 is on unit #12. DOS1 and TUNA were not mounted when the listing was made.

Drives two, three, and four (CORVUS add-on drives, see Chapter Two) are not connected, as indicated by an <OFFLINE> label in the NAME column. If they were connected, their volumes or an <UNUSED> lable would be listed in the NAME column.

N(ew

The New command creates new volumes. It asks for the name you want to give the new volume, for its length, drive number, and address. Default values for the length, drive, and address are provided. If you press <return> when a default value is displayed, the displayed default is used. If the default value displayed is not the one desired, you can type in the desired value.

▶ **The name of the new volume must meet Apple Pascal volume name requirements.**

EXAMPLE:

```
NEW VOLUME : ENTER          COMMENT <return>
    VOLUME NAME :
ENTER LENGTH
    (BLOCKS) : 1024          320 <return>
ENTER CORVUS DRIVE
    # 1 (. . . 4) : 1        <return>
ENTER ADDRESS
    (BLOCKS) : 1032          <return>
```

R(emove

The Remove command removes, unmounts, and destroys a specified volume. This command also gives you a chance to change your mind before it destroys the volume. Remove asks you if it's o.k. to destroy the specified volume. If you respond with a Y for Yes, the remove is carried out. An N for No aborts the attempt.

EXAMPLE:

```
ENTER VOLUME NAME :         COMMENT <return>
OK TO DESTROY
    COMMENT : ?             Y
```

--- WARNING ---

If you remove the volume mounted on unit #4, you will not be able to boot. See U(nmount.

W(prot

Write-protects a volume. When a volume is write-protected, it cannot be edited. However, it can be read and programs in it can be used.

This command is a flip-flop (or toggle) type command—repeat it once to unprotect a volume. If a volume is not protected, W(prot protects it. If it is protected, W(prot removes the protection.

EXAMPLE:

```
ENTER VOLUME NAME:          PUNS <return>
PUNS : NOW WRITE
    PROTECTED "*"
```

3.4 Backup and Restore Facilities

Backup

Backup is a CORVUS utility that allows you to make backup copies of any CORVUS Disk volume. The backup copy can be made

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on a floppy or on the Disk. The volume to be backed up is called the source volume and the copy is called the destination.

To use BACKUP, you must create one or more destination volumes depending on how much space is needed. Name the first volume BACKUP1, the second BACKUP2, the third BACKUP3, and so on.

BACKUP asks for the source volume number and the destination volume number, then proceeds to make a backup copy. If the destination volume is not called BACKUP1, you are asked if you want to continue. If you do continue, the volume will be named BACKUP1.

BACKUP copies one file at a time from the source volume to BACKUP1. If a file is too large the space remaining on BACKUP1, the program will stop and ask you to mount BACKUP2. When BACKUP2 is full, the program will ask for BACKUP3 and so on.

Press X for X(ecute. Type BACKUP <return>.

EXAMPLE:

CORVUS BACKUP UTILITY

ENTER SOURCE UNIT # (4,5,9 . . . 12) : 4 <return>

At this point you must insert a blank formatted floppy into the floppy drive. We have suggested that you name this floppy BACKUP1. If it isn't named BACKUP1, the BACKUP program will give it that name.

BACKING UP CORVUS 1: . . .

MOUNT BACKUP1

If the floppy isn't named BACKUP1, the following message will appear.

WARNING : FOUND BLANK :

<SPACE> TO CONTINUE
<ESC> TERMINATE
R TO REMOUNT

Pressing R gives you a chance to mount a different floppy. Pressing <esc> terminates the BACKUP program. Pressing <space> changes the name BLANK to BACKUP1, then continues with the program.

ENTER DEST UNIT # (4,5,9 . . . 12) : 9

If a file from the source volume is so large that it will not fit on a new (empty) destination volume, the file must be broken into pieces. This

can happen if you are backing up to floppies and a file of over 280 blocks is encountered. BACKUP will fragment the file automatically, recording it on as many volumes as necessary. It will append a period (.) to the file name of each fragment so that you can tell it's been broken up.

The standard Pascal Filer can be used to read the backup copies created by BACKUP unless large files were fragmented.

Restore

Restore is a CORVUS utility that reads fragmented backup files and recreates the originals by merging the fragments created by BACKUP.

▶ **Restore can only be used with individual files. If you use the Filer to restore a backup volume, be careful how you specify the transfer. If you want to transfer from unit #9 to unit #5, don't transfer #9: to #5:. Instead, transfer #9: = to #5:$. This will preserve the name assigned to the volume on unit #5.**

To use, press X for X(ecute. Type RESTORE <return>.

EXAMPLE:

CORVUS FILE RESTORE UTILITY	
ENTER DESTINATION	
UNIT # (4,5,9 . . . 12) :	5
ENTER FILE NAME :	TEMP
COPYING TEMP	
MOUNT BACKUP VOLUME	
AND ENTER UNIT # (4,5,9 . . . 12)	
OR ZERO AFTER LAST VOLUME :	9

3.5 Creating Pascal-Basics

One of the major features of the CORVUS system is that DOS format files can be stored on the disk along with Pascal. This section describes how to create and use DOS format volumes on a disk with Pascal.

DOS 3.2 and 3.3 operate the same, except for minor differences displayed in the prompt messages. You are allowed 59 volumes in DOS 3.3 and 78 volumes in DOS 3.2. If you are using DOS 3.2, insert 78 wherever 59 volumes is mentioned in this chapter.

```
┌─── WARNING ──────────────────────────┐
│  From Basics, you can alter any memory location, any byte │
│  on the disk, or any Pascal files on the disk including the │
│  operating system. You can lose the ability to boot. Then you │
│  will have to reformat the disk, losing all the data on the disk. │
│  Your best insurance is to backup your disk. │
└───────────────────────────────────────┘
```

VINIT's D(osvol command creates a Pascal volume that contains a 48K byte Warm Boot Area. This is followed by a zeroed area that can hold DOS format volumes followed by a space for the file SYS-TEM.BASIC.

It is important to have an understanding of what the Warm Boot Area and SYSTEM.BASIC are.

The Warm Boot Area contains an image of the Apple's entire main memory—all 48K bytes of RAM. If your Apple has less than 48K of RAM, the Area stores whatever you have.

The DOS format volumes are followed by space for a Pascal format file called SYSTEM.BASIC. If the file SYSTEM.BASIC is present when you boot BASICs, SYSTEM.BASIC is loaded into the Apple Language card and the card is enabled. When the card is enabled, your Apple will execute the language in it. There is no way to load the Language Card with one language and then boot with some other language running.

The D(osvol command fills the Warm Boot Area with a copy of the file BASICS.DATA from CORVUS1. D(osvol does not creat SYS-TEM.BASIC. The following steps tell you how to rewrite the Warm Boot Area and create SYSTEM.BASIC to make your BASICs system come up the way you want.

You must decide how you want your BASICs system to boot. This depends on how your Apple is equipped and which BASIC you want running when you power on.

FOR EXAMPLE :

Helen, has an Apple II with Integer BASIC in ROM on the mother-board, wants Applesoft loaded into the Language card, and wants to come up with Applesoft running. Helen must creat a SYS-TEM.BASIC file.

Ronald has an Apple II Plus with Applesoft in ROM, doesn't use Integer BASIC and doesn't care whether the Language card is loaded. He wants to come up in Applesoft but with his own BASIC program running. Ronald doesn't need to create a SYS-TEM.BASIC. file. However, it can come in handy if he decides to alter his system at a later date.

To create DOS volumes, execute the following steps. Make sure you still have a floppy drive hooked up to your computer. Read section 4.2 before attempting the following instructions.

1. The DOS volumes are stored in a single Pascal file called DOS1 at the end of the disk.

To create DOS1, use the D(osvol command in the VINIT program. Press Q to Q(uit the Vmgr. Press X for X(ecute. Type VINIT <return>.

EXECUTE WHAT FILE?   VINIT <return>

VINIT : Q I(NIT D(OSVOL C(ONST K(EYSINIT

Press D for D(osvol. D(osvol prompts you for the drive number and the number of DOS volumes. For purposes of this manual, we will create 20 DOS volumes. You may create more if you wish.

CREATE DOS VOLUMES ON DRIVE : 1 <return>
ENTER # OF DOS VOLUMES
(MAX = 59) :   20 <return>

VINIT then creates DOS1 automatically allocating space for SYSTEM.BASIC. The process takes about one minute for 20 DOS volumes. VINIT tells you what it's doing.

MOUNTING DOS1: ON #9:
OPENING BASICS.DATA
WRITING DOS1: DOSVOLUMES

....

ZEROING DOS1: DOSVOLUMES

....

UNMOUNTING DOS1

VINIT created and mounted the volume DOS1 on unit #9. It copied the file BASICS.DATA to DOS1 and created a file called DOSVOLUMES on DOS1. Then it zeroed DOSVOLUMES and unmounted DOS1.

2. Mount DOS1 on unit #10.

   Press Q for Quit to leave VINIT.

   Press X for X(ecute. Type VMGR <return>. Press M for M(ount. Type DOS1 <return>. Type 10 <return>.

EXECUTE WHAT FILE?	VMGR <return>
MOUNT WHICH VOLUME :	DOS1 <return>
MOUNT DOS1 : ON	
UNIT #11	10 <return>
DOS1 : MOUNTED	

DOS1 does not need to be mounted to be accessible for a user. Under normal use, DOS1 remains unmounted. However, the next step calls for a Pascal Transfer which requires the two volumes involved in the transfer be mounted. With a No response to the prompt asking to change the mount table, DOS1 will remain mounted until the next time you boot the system. DOS1 will then be unmounted.

Press Q to Quit the Vmgr. Press <return> when you are asked if you want to change the default mount table. You are prompted with an N, so by pressing <return> you are answering No.

CHANGE DEFAULT MOUNT TABLE (Y/N) ? N	<return>

If you want changes in the mount table to be permanent, press Y for Yes. This writes to the disk any changes you have made in the mount table. See Q(uit in section 3.3 for more explanation.

3. Create SYSTEM.BASIC

   When you bought your Apple, you received a floppy called the BASICS INTEGER AND APPLESOFT II DISKETTE. Place this diskette in your floppy drive. If you list the volumes on line, this floppy is listed as BASICS. Use this name when making transfers from this floppy.

   If you want Applesoft in the Language card, use the Pascal Filer to transfer the file FPBAS.DATA from BASICS to DOS1:SYSTEM.BASIC.

   From the Filer, Press T for T(ransfer. Type BASICS:FPBAS.DATA, DOS1:SYSTEM.BASIC <return>.

TRANSFER ?　BASICS:FPBAS.DATA,DOS1:
SYSTEM.BASIC <return>

If you want to put Integer BASIC in the language card, from the Filer's transfer command, type BASICS: INTBAS.DATA, DOS1:SYSTEM.BASIC <return>.

TRANSFER ?　BASICS:INTAS.DATA,DOS1:
SYSTEM.BASIC <return>

4. Switch from Pascal to BASICs.
Press Q to leave the Filer. Press X for X(ecute and type BASICS <return>.

```
EXECUTE WHAT FILE ?          BASICS <return>

><  ------------ ><
><               ><
><               ><
><  CORVUS DRIVE ><
><               ><
><  ------------ ><

]
```
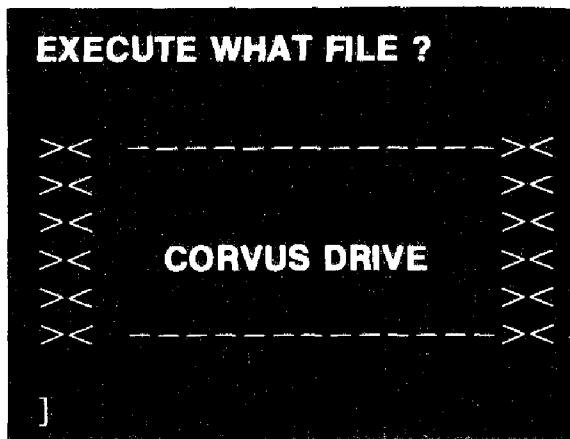
You are now in RAM based Applesoft.

When you finish this set of steps, everytime you boot up you will come up with Pascal running. If you want to come up with BASICS running, sections 3.5 and 4.4 explain how can make your system boot up in BASICs.

5. Copy all the files from the CORVUS BASICs Utilities diskette onto volume one of the BASICs area of the disk.

Remove the Apple BASICs diskette from your floppy drive.

Place the CORVUS BASICs Utilities diskette in the floppy drive and copy it to volume one on the disk. For DOS 3.2 or 3.3, use COPY3. You do not have to INIT the volume—COPY3 copies the whole floppy, complete with directory.

Type LOAD COPY3,S4 <return>. Type RUN <return>. Answer the TO and FROM prompts as follows. When the program asks if it is o.k. to copy, press Y for Yes.

]　LOAD COPY3,S4 <return>
]　RUN <return>

```
C O P Y 3 — CORVUS SYSTEMS 1979

USE VOLUME 0 FOR FLOPPY DISKS

TO ENTER DEFAULT JUST PRESS RETURN ...


FROM SLOT (6): ?                          4
FROM DRIVE (1): ?                         1
FROM VOLUME (1): ?                        0


TO SLOT (4): ?                            6
TO DRIVE (1): ?                           1
TO VOLUME (0): ?                          1


                                          Y
OK TO COPY ?
```

When the computer asks "copy again ?", press N for No and press <return>.

COPY AGAIN ?   N <return>

After you are done, list the directory of BASICs volume one on the CORVUS Drive.

Type CATALOG,V1,S6 <return>. You should see all the files you just copied from the floppy to volume one.

]   CATALOG,V1,V6 <return>

6. COPY3 initialized volume one when you copied the Utilities diskette onto it. But, the remaining volumes on the disk were zeroed by D(osvol and must be initialized. You can initialize each volume when you want to use it, but it is easier to use the CORVUS program VOLUME INIT to initialize all the volumes at once. The program takes four or five seconds per volume.

Type LOAD VOLUME INIT,S6,V1 <return>. Type RUN <return>.

]   LOAD VOLUME INIT,S6,V1 <return>
]   RUN <return>

Type 2 for the first volume number, and 20 for the second volume number. If you specified more or less than 20 DOS volumes when you ran VINIT, type in the desired number instead of 20.

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```
VERSION 3.3

BULK VOLUME INIT PROGRAM

9 / 15 / 80

WHICH DRIVE ? :                    1 <return>

ENTER FIRST VOLUME NUMBER :        2 <return>

ENTER LAST VOLUME NUMBER :         20 <return>
```

After the program is done, all the DOS volumes will be initialized and ready for storing data. You will never have to run this program again (unless you zero the disk for some reason). For more information on initializing, see Chapter Two of the DOS 3.2 Manual or Chapter Two of The DOS Manual.

7. Chapter Four of this manual tells how BASICs boots and how to make it boot the way you want. It also explains how to use the DOS commands to manipulate the BASICs volumes in your hard disk system.

▶ **An Apple II that has an Applesoft card with an auto boot ROM and has Integer ROM on the motherboard will not properly boot using the Applesoft boot prep. The system must be booted in Integer even though the switch on the Applesoft card is set for Applesoft.**

3.6 Pascal Cold Boot Facility and Turnkey Operation

When you turn on your Apple or press <reset>, a cold boot occurs. The Apple executes the cold boot program from the disk in slot six (the CORVUS Drive). The cold boot program will boot Pascal, using the files located in the first volume on the disk: SYSTEM.APPLE and SYSTEM.PASCAL.

If you want your Apple to boot BASICs instead of Pascal at power on or reset, then you should run the program SETBOOT and indicate a BASICs boot. You can make your Apple power on running a BASIC program by following the procedure described in section 4.4.

From the command level, press X for X(ecute. Type SETBOOT <return>. Press B for a BASICs boot.

```
EXECUTE WHAT FILE ?        SETBOOT <return>


P(ASCAL B(ASICS <ESC>         B
```

SETBOOT will change a portion of the file BOOT.DATA and from then on, when you power on or press <reset>, the computer will boot BASICs. See section 4.3 for a description of BASICs booting.

┌─── **WARNING** ────────────────────────────┐
│ **Do not set up the system to boot BASICs until you have** │
│ **created and tested the DOS volumes area using the D(osvol** │
│ **command in the VINIT program (see section 3.5). If you do** │
│ **not test the DOS area, your system may be unable to boot. In** │
│ **which case, you will have to reformat the disk, losing all** │
│ **your smiles, files, and data.** │
└──┘

If you wish to return to Pascal booting, type RUN PASCAL <return>.

█ RUN PASCAL <return>

Then press X for X(ecute and type SETBOOT <return>. When SET-BOOT asks which system you want to boot, press P for Pascal and your Apple will boot Pascal.

By leaving SETBOOT configured for a Pascal boot and setting up Pascal to boot your program according to the procedure in Chapter Three of the Apple Language System manual, you can make your Apple come up running a Pascal program when you power on. The procedure is to change the name of a tested code file to SYS-TEM.STARTUP and include it on the boot volume (CORVUS1). When you boot, the program will execute.

┌─── **WARNING** ────────────────────────────┐
│ **It is very important that you test your boot program before** │
│ **you name it SYSTEM.STARTUP. If it bombs, your Apple will** │
│ **bomb every time you power on and you may be unable to** │
│ **recover. Then you'll have to reformat the disk and lose all** │
│ **your data. Always backup your disk.** │
└──┘

3.7 Pascal-Basics Organization

The CORVUS Disk consists of eight blocks (4K bytes) of Cold Boot data followed by 18,928 blocks of user accessible space.

The Cold Boot data blocks were created by the program PFOR-MAT.CODE that you executed when you configured the disk. These blocks comprise a machine language program that is executed when you turn on your Apple or press <reset>. It normally causes your Apple to boot Pascal, using the files SYSTEM.APPLE and SYS-TEM.PASCAL that are located in the first volume (normally COR-VUS1) on the disk.

If you use the SETBOOT utility to set the Cold Boot area to boot BASICs (see section 3.5), then the system will boot DOS and BASICs at power on.

When BASICs boots, whether at power on or when the program BASICs is executed, the Warm Boot area is loaded into Apple RAM. If the file DOS1:SYSTEM.BASIC is present, it is loaded into the language card and the card is enabled. See section 3.6 for more information.

CORVUS PASCAL OR PASCAL-BASICS DISK CONFIGURATION (11 Mb)

COLD BOOT AREA
Created by PFORMAT
when system is configured.
Executed at power on or
<reset>. SETBOOT alters
this area.

PASCAL-BASICS COLD BOOT AREA	8 BLOCKS
MOUNT INFORMATION	
VOLUME DIRECTORY	

1-63 PASCAL USER VOLUMES

First user volume (usually CORVUS1) generally must include files: SYSTEM.APPLE and SYSTEM.PASCAL.

EACH VOLUME ANY SIZE, IN MULTIPLES OF 8 BLOCKS

Other Pascal format user volumes and/or unused blocks.

18,928 BLOCKS

OPTIONAL DOS1 VOLUME

Pascal format file DOS volumes

48K Warm Boot Area — 96 BLOCKS

1-59 DOS 3.3 format volumes — 280 BLOCKS EACH

Pascal-format file SYSTEM.BASIC — 24 BLOCKS

▶ **In DOS 3.2, there can be 78 volumes that are 227.5 blocks each.**

3.8 Adding Another Drive

Carefully follow steps one through nine in this section to properly connect and configure an add-on drive.

▶ **To configure the second half of a twenty megabyte drive, begin with step seven.**

1.

POWER OFF

Make sure power to both your drive and computer is off.

2. Set the desired voltage selection on the add-on drive (see ac Connector in section 2.2).

3. You received a flat cable with your add-on drive. Connect one end of this cable to the connector labeled DRIVE on your first drive. Connect the other end of the cable to the connector labeled PROCESSOR on the add-on drive (see figure 2.12).

4. Make sure the power switches on your computer and drives are set to the OFF position. Connect the ac cord.

5. Plug everything into appropriate wall sockets.

6. Power on using the Power On Sequence described in Chapter Two. Turn on your computer, then power up your drives in the reverse order from which they are connected—i.e. the last drive connected is the first to be powered up.

7. From the command level, press X for X(ecute. Type VINIT <return>.

EXECUTE WHAT FILE ? VINIT <return>
VINIT : Q I(INIT D(OSVOL C(ONST K(ESINIT

Press I for I(nit.
When this is done press X for X(ecute and type VMGR <return>.

EXECUTE WHAT FILE ? VMGR <return>

Press L for L(ist. Notice how much user space is available on drive two. Try creating a Pascal volume on drive two to see if everything is working properly.

Your add-on drive is now configured for Pascal-only. For a Pascal-BASICs system, continue with the next step.

8. When you have a Pascal-BASICs number one drive, you may have Pascal-BASICs or Pascal-only on your second drive. But drives three and four must be Pascal-only.

If you want to have Pascal-BASICs on your second drive, it must look the same as drive one—i.e. their DOS1 volumes must be identical in length and address.

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Press Q to Q(uit the Vmgr.
Press X for X(ecute. Type VINIT <return>.

EXECUTE WHAT FILE ?   VINIT <return>

VINIT: Q I(NIT D(OSVOL C(ONST D(EYSINIT

Press D for D(osvol. The computer prompts you with the correct
drive number, you only press <return>.

CREATE DOS VOLUMES ON DRIVE : 2   <return>

**CREATED 20 DOS VOLUMES ON
   DRIVE #2
MOUNTING DOS2 on #9**

**OPENING BASICS.DATA
WRITING DOS2 : DOSVOLUMES**

....

ZEROING DOS2 : DOSVOLUMES

....

UNMOUNTING DOS2

9. Your system is now set up for Pascal-Basics with two drives. Only
the first two drives can have BASICs on them. Drives three and
four can only have Pascal.

3.9 CORVUS Pascal Utilities

These programs are found on the CORVUS Pascal Utilities dis-
kette and, if you followed the installation procedures, are also found on
CORVUS1.

All CORVUS Utility Programs are explained in greater detail in the
CORVUS Utilities Manual.

Backup

Allows you to back up an individual volume, on a CORVUS Disk,
to one or more floppies (see section 3.4). It is recommended that the
Mirror program be used to backup the entire disk (see Mirror below).

Basics

Allows you to switch to RAM-based Applesoft from Pascal.

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Diagnostic

Allows you to diagnose and alter drive parameters. Parts of this program should only be used under the supervision of the CORVUS Service Department.

Mirror

Used in conjunction with the CORVUS MIRROR, see the MIRROR Manual.

Pformat

Zeroes directories, sets up a cold boot area, and copies the contents of the BRINGUP diskette to the first volume on the disk. It is usually used only when you install a new disk.

Restore

Allows you to restore fragmented files from Backed up volumes, see section 3.4.

Setboot

Gives you a choice of a Pascal or Basics boot, see section 3.6.

Vinit

Initializes an add-on drive for Pascal-only, creates the DOS area for drives with Pascal-Basics, or initializes a drive for CONSTELLA-TION use, see section 3.8 for an example of the option display.

Vmgr

Used to create, destroy, mount, and write-protect volumes. For a complete description, see sections 3.2 and 3.3.

▶ **If you have created a DOS area, you can also use the BASICS Utilities.**

SUGGESTED READING
(for Chapter 3 only)

Here is an annotated, partial list of applicable manuals.

- **Apple Language System Installation and Operating Manual,** by Apple Computer, copyright 1979, Apple product number A2L0024.

- **Apple Pascal Reference Manual,** by Apple Computer, copyright 1979. Apple product number A2L0019. Describes Apple's version of Pascal.

- **Applesoft II,** by Apple Computer, copyright 1978. Apple product number A2L0006. The authoritative reference on Applesoft BASIC.

- **Apple II Reference Manual,** by Apple Computer, copyright 1979, Apple product number A2L0001A. Describes the Apple's hardware and firmware in considerable detail, including full information on all past and present Apples and a rather extensive glossary.

- **Disk Operating System Instructional and References Manual** (also known as DOS 3.2 Manual), by Phyllis Cole and Brian Howard, copyright 1979. Apple product number A2L0012.

- **Pascal User Manual and Report,** second edition, by Kathleen Jensen and Niklaus Wirth, copyright 1974. The authoritative reference on Pascal.

- **Problem Solving Using Pascal,** by Kenneth L. Bowles, copyright 1977. An introduction to using computers in general, and Pascal in particular.

- **Programming in Pascal,** by Peter Grogono, copyright 1978. This book is intended for people who want to write programs in Pascal. It is suitable for an introductory course in Pascal.

- **The Applesoft Tutorial,** by Caryl Richardson, copyright 1979. Apple product number A2L0018. This manual is a superb way to get started in BASIC. It provides fruitful hands-on experience right away, virtually guaranteeing a warm first experience with the computer. More experienced computer people will benefit from this manual, too, as it provides a swift introduction to the Apple's unique features (graphics for instance).

- **The DOS Manual,** by Apple Computer Inc., copy 1980. Apple product number A210036.

INDEX (for Chapter Three only)

Chapter 4

CORVUS DISK WITH APPLE BASICS

Chapter 4   CORVUS DISK WITH APPLE BASICS

This chapter presumes you are familiar with how your Apple BASIC and the DOS operating system work. DOS 3.2 and 3.3 operate the same, except for minor differences displayed in the prompt messages. You are allowed 67 volumes in DOS 3.3 and 82 volumes in DOS 3.2. If you are using DOS 3.2, insert 82 wherever 67 volumes is mentioned in this chapter.

▶ **Please refer to the suggested reading index at the end of this chapter if you are not familiar with Apple DOS.**

⌐— WARNING ——————————————————————————

From BASICS, you can alter any memory location or any byte on the disk, including the Operating System or any Pascal files on the disk. You can conceivably lose the ability to boot and may have to reformat the disk, losing all the data on the disk. Your best insurance is to back up your disk.

This chapter describes how data is stored and files are manipulated using DOS and the CORVUS extensions. These features can be used from DOS 3.2 or 3.3, whether it is part of a BASICs-only system or part of a Pascal-BASICs system. However, Pascal-BASICs users will find that they may have less than 67 DOS format volumes (less than 82 for DOS 3.2) and that their boot procedures are somewhat different. If you are using Pascal-Basics, please see Chapter Three on booting procedures.

Read this entire chapter before you begin the following process.

4.1 Bringing Up BASICs

⌐— WARNING ——————————————————————————

Configuring the system effectively removes all data from the drive. If you ever decide to reconfigure the system with data already on the drive, you must backup your data to avoid losing it.

By the time you are ready to configure your drive, you ought to have read section 4.2 in this manual. You should know how you want your BASICs system to boot.

The key point to understand is that the Apple will be booting from a disk. In the following procedure, you will first boot from the floppy,

then use your Apple to set up the hard disk drive with boot data. You need this data to boot from the Drive.

> ### WARNING
>
> **Please take care to follow these instructions in the exact order listed.**

1.

POWER OFF

Turn the Apple and the CORVUS Drive off.

> ### WARNING
>
> **Never insert or remove cables or cards with the power on. Serious damage to the Apple and the CORVUS Drive may result.**
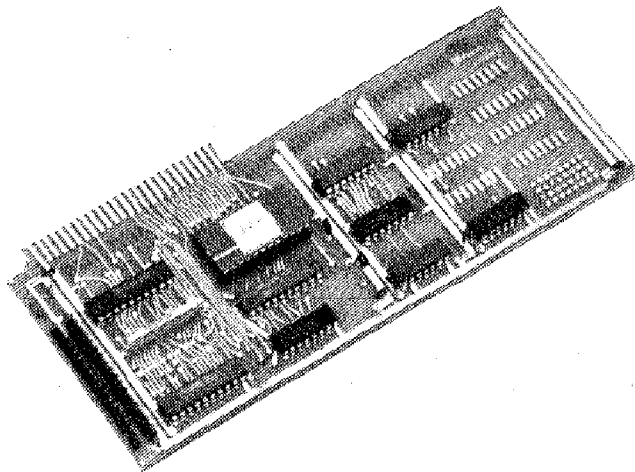

FIGURE 4.1 INTERFACE CARD

Read about slots, booting, and configuring in section 4.2 if you haven't already.

2. Insert the CORVUS personality card (see figure 4.1) in slot six and the floppy drive controller in slot four. If you have more than one floppy controller, leave the others out for now.

3. Turn on your Apple computer, but not the CORVUS Drive. Press <reset> immediately after you turn your Apple on. Depending on how your Apple is equipped, the TV monitor will display an ∗, an >, or a], followed by a flashing cursor.

4. Place the SYSTEM MASTER DOS floppy, supplied with Apple DOS 3.2 or 3.3, in the floppy drive.

   Boot the Apple from that floppy by typing 4<ctrl>P <return> when the monitor prompt appears or PR#4 <return> when the Integer or Applesoft prompt appears.

   After a few seconds, the monitor should display something like this

   DOS VERSION 3.3 04 / 15 / 80
   APPLE II STANDARD SYSTEM MASTER

   (LOADING APPLESOFT INTO LANGUAGE CARD)

   followed by the Applesoft prompt (]) and the cursor.

   ]

   If you do not have Applesoft, the Integer BASIC prompt (>) and a slightly different message will appear.

   If you have trouble, refer to the section on Booting DOS in Apple's DOS manuals.

▶ **Your floppy controller must be equipped with the appropriate control ROM for either DOS 3.2 or 3.3.**

   If you have less than 32K bytes of RAM, you cannot format the disk with the program BFORMAT. You have three options.

   ● Obtain enough RAM to give your system 32K bytes or more.

   ● Format the disk on another system. Borrow a 32K Apple, format the drive, and then move the drive back to your Apple.

   ● Ask your dealer to format the drive for you.

5. Format the disk. The Apple should be up, with DOS running. Turn on the CORVUS Drive and wait 15 seconds for the disk to come up to speed.

Remove the SYSTEM MASTER DOS floppy and place the CORVUS
BASICs Utilities floppy into the floppy drive. There is a program on the
floppy called BFORMAT. Run it.
Type LOAD BFORMAT <return>. Type RUN <return>.

```
] LOAD BFORMAT <return>
] RUN <return>
```

The computer will respond with the following. Type 1 in response
to which drive you want formatted.

```
VERSION    4.0

DISK FORMATTER-BASICS ONLY

WHICH DRIVE DO YOU WANT
FORMATTED FOR 'BASICS ONLY' ?        1 <return>
```

At this point, we presume you have only one drive. If you have a
second drive, it must be formatted according to section 4.7 for
add-on drives. When you are prompted respond with the drive
number to be formatted (1 or 2 only). Press Y for Yes when you
are asked if it's o.k. to Bformat.

```
WRITING BOOT TRACKS – – –

.................

ZEROING DIRECTORIES – – –

.................
```

In about 5 minutes, the BASIC prompt will return.

6. The program you just ran, BFORMAT, formatted the disk. Now
   you must run a program that connects Apple's standard DOS to
   the CORVUS Drive firmware.
   With the CORVUS BASICs utilities floppy still in the floppy drive,
   type LOAD BRINGUP <return>. Type RUN <return>.

```
] LOAD BRINGUP <return>
] RUN <return>
```

The system will respond with the following.

```
BRINGUP UTILITY .. DOS/ONLY


THIS PROGRAM IS FOR A DRIVE THAT IS DOS
ONLY. IF THE DRIVE HAS BEEN FORMATTED
WITH PASCAL THIS PROGRAM WON'T WORK.


CONTINUE ?                                    Y


YOU ARE CONFIGURED AS 67 VOLUMES
OF 16-SECTOR IMAGES.
```

This is followed by a volume directory—but since there are no volumes on the CORVUS Drive yet, the directory will not be very interesting.

```
VOL DIRECTORY – CORVUS 11A – DRIVE 1
```

The computer will then display the Applesoft BASIC prompt (]). BFORMAT formatted the CORVUS disk and BRINGUP connected DOS to the CORVUS firmware. BRINGUP put a 3-byte patch in DOS's RWTS to refer all disk references to the CORVUS firmware.

7. Copy all the files from the CORVUS BASICs Utilities diskette onto volume one of the disk.

With the CORVUS BASICs Utilities diskette still in the floppy drive, copy it to volume one on the disk. Use COPY3. You need not initialize volume one — COPY3 copies the floppy, complete with directory. Type LOAD COPY3,S4<return>. Type RUN <return>. Answer the TO and FROM prompts as follows. When the program asks if it is O.K. to copy, press Y for yes. Use COPY3. You need not initialize volume one—COPY3 copies the floppy, complete with directory.

Type LOAD COPY3,S4 <return>. Type RUN <return>. Answer the TO and FROM prompts as follows: When the program asks if it is o.k. to copy, press Y for Yes.

```
]    LOAD COPY3,S4 <return>
]    RUN <return>
```

```
C O P Y  3  —  CORVUS SYSTEMS 1979
USE VOLUME 0 FOR FLOPPY DISKS

TO ENTER DEFAULT JUST PRESS RETURN . . .


FROM SLOT (6):?              4
FROM DRIVE (1):?             1
FROM VOLUME (1):?            0

TO SLOT (4):?               6
TO DRIVE (1):?              1
TO VOLUME (0):?             1

OK TO COPY ?               Y
```

COPY2 and COPY3 will copy all the files on the floppy (slot 4, Drive 1, Volume 0) to the CORVUS drive (Slot 6, Drive 1, Volume 1). Volume 0 indicates a floppy. The copying will take about a minute. After it is done, the program will give you a chance to copy other files. Press N for No.

COPY AGAIN (Y/N) : ?   N

Type CATALOG,V1,S6 <return> to list the files on volume one of the CORVUS Drive.

]   CATALOG,V1,S6

You should see a list of all the files you just copied from the floppy to volume one.

8. Setup the Warm Boot Area on the CORVUS Disk so that when you boot, you will have Applesoft running.

Your Apple should be displaying the Applesoft prompt (]). With the CORVUS BASICs Utilities diskette in your floppy drive, type LOAD APPLESOFT BOOTPREP, S4 <return>. Type CATALOG,S6,V1 <return>.

]   LOAD APPLESOFT BOOT PREP, S4 <return>
]   CATALOG,S6,V1 <return>

DISK VOLUME 1

A list of all the files you just copied onto volume one should display.

Type RUN <return>.

|] | RUN <return> |

This will load and run the APPLESOFT BOOT PREP program from the floppy. The program will copy all the data in your Apple's RAM into the Warm Boot Area of the disk. Then when you boot from the disk, the data will be copied from the Warm Boot Area back into your Apple's RAM and you will be up and running with Applesoft. Section 4.2 will tell you how to rewrite the Warm Boot Area to boot other systems.

▶ **An Apple II that has an Applesoft card with an auto boot ROM and has integer ROM on the motherboard will not properly boot using the Applesoft boot prep. The system must be booted in integer even though the switch on the Applesoft card is set for applesoft.**

9. COPY3 initialized volume one when you copied the Utilities diskette to it. However, the remaining 66 volumes on the disk were zeroed by BFORMAT and must be initialized. You can initialize each volume when you want to use it, but it is easier to use the CORVUS program VOLUME INIT to initialize all 66 volumes at once. The program takes about four or five seconds per volume (approximately six minutes for 66 volumes).
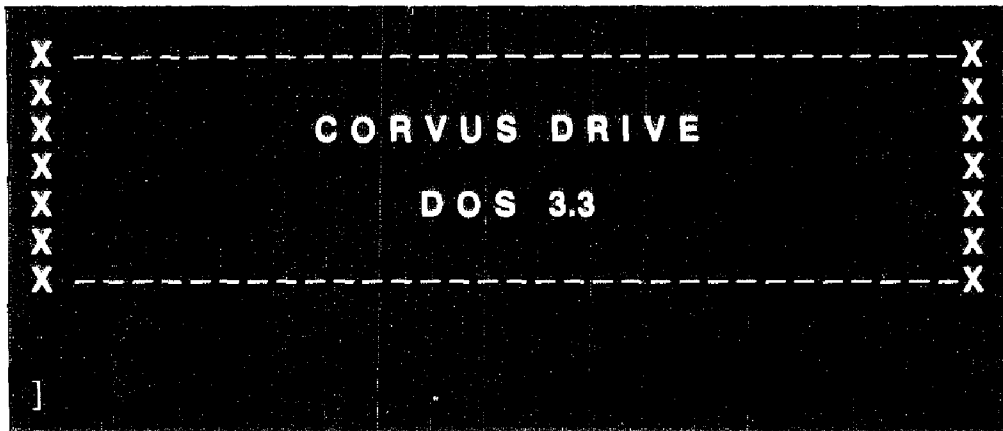Type LOAD VOLUME INIT,S6,V1 <return>. Type RUN <return>.

|] | LOAD VOLUME INIT, S6, V1 <return> |
|] | RUN <return> |

Respond to the prompts as follows.

BULK VOLUME INIT PROGRAM

WHICH DRIVE?   1 <return>

ENTER FIRST VOLUME NUMBER: 2 <return>

ENTER LAST VOLUME NUMBER: 67 <return>

After about six minutes, all 67 volumes will be initalized and ready for storing data. The following message with appear.

```
X ---------------------------------------------- X
X                                                X
X                                                X
X           C O R V U S   D R I V E              X
X                                                X
X               D O S   3.3                      X
X                                                X
X                                                X
X ---------------------------------------------- X


]
```

You will never have to run VOLUME INIT again (unless you zero the disk for some reason). For more information on initializing, see Chapter 2 of the DOS 3.2 Manual or Chapter Two of The DOS Manual.

10. Your CORVUS Drive is ready for BASICs-only operation. The rest of this chapter describes how to use your BASICs-only system, including how to manipulate all 67 volumes, how to make your Apple boot from the disk in any configuration, and a technical discussion of how the disk is organized.

4.2 Slots and Booting

When you receive your Drive, it is empty—there is no information on the disk. You must put some special programs on the drive to make the system useful. This is called configuring the system.

You use your Apple to configure the new disk. You bring up your system normally, then you run the special CORVUS programs that put all the correct information on the CORVUS disk. These programs are supplied on one of the floppies that came with your drive.

Once the system is configured, you bring it up using the programs on the CORVUS Disk instead of the programs that originally came with the Apple.

Slots

Your Apple has eight input/output connectors, called slots, that it uses to communicate with disk drives, Apple cards, and the like. Look inside your Apple. The slots are the eight long, narrow connectors on the rear of the large main circuit board.

The slots are numbered from zero to seven. Slot numbers are printed near each slot, at the rear edge of the main circuit board. Slot zero is the left most slot (looking at the computer from the keyboard end). It probably contains an Apple ROM card or an Apple Language card.

Each disk drive is connected to one of the slots. Your floppy drive is probably plugged into slot six.

You usually boot from the disk connected to slot six. Although some Apples allow you to boot from a different slot, we strongly recommend that you use the drive in slot six as the drive you use for booting.

Booting

Booting is the process of loading your computer with a guiding intelligence—called an operating system—and starting it. When you boot your Apple, you boot it from the disk. Right now, the boot disk is the floppy drive. You will be able to boot from your CORVUS Drive once it has been configured.

When a computer is first turned on, it is particularly stupid. In order to be useful, the computer must first be booted—in other words, the computer's operating system must be loaded into the machine and started.

Some computers (such as an Apple with an Auto-Start PROM) are smart enough to boot themselves automatically as soon as they're turned on. Others require human assistance.

When you turn your Apple on and press <reset> it will do one of the following things, depending on how it is equipped.

- Early Apples will come up in the monitor, present you with an * and wait for you to type.
- Some Apples will come up in Integer BASIC. You will see an > and the computer will wait for you to type.
- Some Apples will come up with an] . This indicates that Applesoft is running.
- Many Apples (notably all Pascal equipped Apples and Apples with Auto-Start PROM's) require a disk to come up. Every time you turn one of these Apples on, they go straight to the disk to look for an operating system.

To configure your Drive, you will want to boot from the disk. Depending on which prompt appears, you will use one of the following commands.

*	6<ctrl>P <return>
>	PR#6 <return>
]	PR#6 <return>

▶ **<CTRL>P means hold down the <CTRL> key while you press P.**

All these commands do the same thing. They tell the computer to boot from slot six. 4<CTRL>P or PR#4 would mean boot from slot four.

Pascal always boots from slot six. No command is needed. Pascal boots from slot six any time power is turned on or <reset> is pressed.

For more information, refer to the section on "Booting DOS" in Apple's DOS Manuals and/or the sections on "Starting up an Apple Pascal System" in the Apple Pascal Reference Manual.

Selecting the System

The first step in setting up any computer system is to examine its projected uses in relationship to its potential applications. Once, you have an idea of what the system will be and do, you can organize the layout of the hard disk.

If your Apple has 48K of RAM and the Apple Language card, then you will probably want to use the CORVUS drive in the Pascal-BASICs configuration. With this configuration, you can use the Apple Pascal operating system or you can use the Apple DOS system with either of the Apple BASICs. You can switch back and forth between DOS and Pascal and use both types of files.

The BASICs-only system allows you to use Apple DOS with either Integer BASIC or Applesoft BASIC, but does not provide access to Pascal. This system will work with any size memory. It doesn't require 48K of RAM as does the Pascal configuration.

If you have a BASICs-only system, you boot using the command 6 <ctrl>P <return> or PR#6 <return>, depending on how your Apple is equipped. If your Apple has an Auto-start ROM, simply powering on the system will boot BASICs and no boot command is necessary.

If you have a Pascal-BASICs system, you can boot BASICs from Pascal using the X(ecute command to run BASICs. Or you can use the SETBOOT utility to set the boot to BASICs (see sections 3.6).

If you decide to configure your Drive as a BASICs-only system, then proceed to section 4.1 when you finish reading this chapter. If Pascal is your choice, go to section 3.1 after reading this chapter.

How BASICs Booting Works

No matter how you boot BASICs, the first thing to happen is that your Apple executes the machine code stored in the Cold Boot Area at the beginning of the BASICs area of the CORVUS disk.

If you have a Pascal-BASICs system, the Cold Boot looks for a Pascal format file called SYSTEM.BASIC on DOS1. If it finds the file, it loads it into your Apple Language Card and enables the card.

Whether you have Pascal-BASICs or BASICs-only, the Cold Boot loads your Apple's main memory (RAM) with the data it finds in the Warm Boot Area, a 48K byte area on the disk and passes control to that data.

It is very important that you understand the Warm Boot. The Warm Boot Area is a 48K byte image of the Apple's main memory. The image is created by a program called BOOT PREP, a program called APPLESOFT BOOT PREP, or a user program constructed as de-

scribed in section 4.4. The Warm Boot is copied back into RAM when BASICs is booted, whether from a BASICs-only system or a Pascal-BASICs system.

▶ **When you run Boot Prep, Applesoft Boot Prep, or a specially constructed user program, all of your Apple's RAM is copied into the Warm Boot Area on the disk. When you boot BASICs, the Warm Boot Area is copied back into RAM and resumes execution.**

The reason the Warm Boot is so important is that it contains the entire state of your Apple. When it is loaded back into RAM, the machine will be in exactly the same state as it was when Warm Boot was loaded. If your Apple was in Applesoft and the slot default was six when you ran APPLESOFT BOOT PREP, then it will be in Applesoft with slot six as the default when the Warm Boot Area is copied back into RAM.

Changing the Boot

When you first configured your BASICs system, the Warm Boot Area was automatically set up with RAM based Applesoft. If you want to boot in some other configuration, all you need to do is set up the computer the way you want it to boot and run BOOT PREP, APPLESOFT BOOT PREP, or your own turn-key program (described in section 4.4).

EXAMPLE:

If you are running Applesoft, but you want your Apple to boot Integer BASIC. Switch to Integer BASIC. Type INT <return>.

```
]
>
```
 INT <return>

Then type RUN BOOT PREP <return>.

```
>
```
 RUN BOOT PREP,S6 <return>

▶ **This will first switch the default slot number to S6, then load and run Boot Prep. Since Boot Prep saves all of RAM, including the location that stores the default slot number, when you boot, the default slot number will be S6.**

Suppose you want to make your system boot in Applesoft again, with the default slot set to slot four (the floppy).
Type FP <return>. Type LOAD APPLESOFT BOOT PREP,S6 <return>. Type CATALOG,S4 <return>. And, type RUN <return>.

```
>     FP <return>
]     LOAD APPLESOFT BOOT PREP,S6
        <return>
]     CATALOG,S4
]     RUN
```

┌─ **WARNING** ─────────────────────────────┐
│ **You must run Applesoft Boot Prep if you want the system to** │
│ **boot Applesoft and you must use Boot Prep to get the** │
│ **system to boot Integer BASIC.** │
└──┘

What To Do If The Boot Doesn't Work

The boot method used by the CORVUS Drive is simple and powerful. When you boot, it gives your Apple the same system memory it had when you ran BOOT PREP, APPLESOFT BOOT PREP, or your own boot preparing program. However, you can confuse it if you change your hardware configuration—i.e. if you remove the Applesoft ROM card or you change memory size.

▶ **When you boot, the system hardware must match the hardware it had when you ran Boot Prep.**

If the system boots with a blank screen and won't respond to the keyboard, it may be because the wrong language is enabled, the switch on the ROM card is in the wrong position, or the wrong language is loaded into the Apple Language Card. You can usually recover by pressing <reset>.

To connect the CORVUS Drive when the boot doesn't work in a BASICs-only system, you can boot from the diskette and run BRINGUP from the CORVUS BASICs Utilities diskette. Then set up the system the way you want it and run BOOT PREP, APPLESOFT BOOT PREP, or your own boot preparing program to rewrite the Warm Boot Area.

4.3 BASICs Volumes

Your CORVUS Drive has space for 67 DOS volumes, called V1 through V67. They are very similar to floppies. Each is the same size as a floppy and has a directory and a number of files.

Most DOS commands allow you to specify a volume number. For example,

]   LOAD FISH,V8,S4

would load the file FISH if the floppy in slot four happens to have been initialized as volume eight. DOS uses the volume number simply to

check that the correct volume is in the floppy drive. See the DOS (3.2 or 3.3) manual's section on Drive, Slot, and Volume Options for more information.

Your CORVUS Drive uses the volume number to specify which of the 67 volumes of the disk you want. If the CORVUS Drive were plugged into slot six,

] LOAD FISH,V8,S6

would get the file FISH from V8, the eighth volume on the disk.

If the Volume is not specified, then the command will refer to the volume that was referenced by the last command.

] LOAD CHEEKS,V8
] SAVE JOWLS

would load the program CHEEKS from volume eight and save it as JOWLS on volume eight.

4.4 Creating a Turnkey BASICs System

You can easily make your Apple come up running any BASIC program. If you have a Pascal-BASICs system, you can boot using a Pascal program (see section 3.5).

To boot from a BASIC program, you must understand how the Warm Boot works. Read section 4.2, then try the following.

Type:

```
] NEW
] 10 REM SAM'S BOOT PROGRAM
] 20 REM
] 30 REM COPY MEMORY TO WARM BOOT
       AREA:
] 40 CALL −14707
] 50 REM
] 60 PRINT
] 70 PRINT "THIS IS SAM'S BOOT PROGRAM"
] 80 PRINT
] 90 END
]
] SAVE SAM'S BOOT PROGRAM,S6,V1
] RUN
```

THIS IS SAM'S BOOT PROGRAM

```
] NEW
]
```

Turn off your Apple.
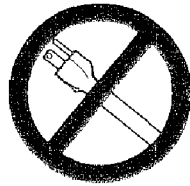
 POWER OFF

Turn it on again and boot it from slot six. The screen should display the following.

THIS IS SAM'S BOOT PROGRAM
]

When you ran the program, statement 40 called a CORVUS machine language routine. This routine, located in a ROM on the CORVUS Personality Card plugged into slot six, copies all the data in RAM into the Warm Boot Area on disk. When you booted the system, it copied all that data back into RAM and continued where the program had left off. Now, every time you boot, your system will execute lines 50 through 90 of SAM'S BOOT PROGRAM. The system will come up with SAM'S BOOT PROGRAM in RAM and all the defaults (slot, volume, etc.) will be exactly as they were when the program first ran.

If all this reminds you of what APPLESOFT BOOT PREP does, that's not coincidence at all—look at the program.

Type LOAD APPLESOFT BOOT PREP,S6 <return>. Type LIST <return>.

```
]    LOAD APPLESOFT BOOT PREP, S6 <return>
]    LIST <return>
```

Notice that line 5 is

5 CALL –936: CALL –14707

call –936 clears the screen.

When you understand how APPLESOFT BOOT PREP and SAM'S BOOT PROGRAM work, you will be able to write your own booting routine.

4.5 Using DOS and BASICs

Most of the Catalog command works exactly as they do for floppy based systems except that the V option specifies which volume on the drive the command should operate on.

Catalog

The Catalog command is special. Normally, it does what you'd expect. Typing

] CATALOG,V10,S6 <return>

would list the names, lengths, and types of the files on volume 10.

With the CORVUS Drive, there is also a special form of Catalog in addition to the normal Catalog. Type CATALOG,V99,S6 <return>.

] CATALOG,V99,S6 <return>

Volume 99 does not exist. This command lists the name of the first file on each volume.

▶ **It is good practice to begin each volume with an explanatory title file so that CATALOG,V99 will tell you what is in each volume.**

If the first file on a volume is not type A (Applesoft) or I (Integer BASIC), then the volume will not be listed by the CATALOG V99 command.

You can hide a volume by making the first file on it type B or T. Hidden volumes are useful for storing large amounts of data that span several volumes.

Hidden volumes may be locked and unlocked (see the next section).

Write-Protect

When the write-protect notch on a floppy is covered, no one can write on that floppy. Each volume on the CORVUS Drive can be write-protected by locking the first file on the volume.

Example:

Type CATALOG,V7 <return>.

] CATALOG,V7 <return>

**DISK VOLUME 007
A 028 EMPLOYEES
A 052 ADDRESSES
A 003 SALARIES**

Type LOCK EMPLOYEES,V7 <return>

] LOCK EMPLOYEES,V7 <return>

WRITE PROTECTED

Now, no one may write on volume seven.
Type UNLOCK EMPLOYEES,V7 <return>.

⬛1 UNLOCK EMPLOYEES,V7 <return>

This will not work because the volume is protected. You cannot alter the EMPLOYEES file, even to unlock it. To unlock a volume, use the following commands.

⬛1 POKE 1278,1 <return>
⬛1 UNLOCK EMPLOYEES, V7 <return>

Using Files In Two Volumes

The READ and WRITE commands in DOS do not allow you to specify volume numbers, but the OPEN command does. If your program references files in separate volumes, it can open the file every time it accesses a different volume.

Another method is to POKE the desired volume number into location 1150 before performing the READ and WRITE. Location 1150 stores the default volume number.

```
┌──── WARNING ──────────────────────────────────────┐
│ Even though they are in different volumes, the files must │
│ have different names.                               │
└───────────────────────────────────────────────────┘
```

The FILE MOVER program on the CORVUS BASICs Utilities diskette is an example of a program that reads and writes to and from different volumes.

4.6 How The CORVUS BASICs-only Disk Is Organized

The CORVUS Disk consists of eight blocks (4K Bytes) of Cold Boot data followed by a 96 block (48K Bytes) Warm Boot Area and 67 DOS format volumes, each 280 blocks long.

The Cold Boot data blocks were created by BFORMAT, the program you ran to format the disk for BASICs-only operation when you installed the system. These blocks comprise a machine language program that is executed at power on or reset. The Cold Boot loads the Warm Boot Area into your Apple's RAM and causes it to start executing.

The BASICs-only Cold Boot Area is identical to the Cold Boot Area that you'd have if you configured a Pascal-BASICs system and used SETBOOT to set up for a BASICs boot (see section 3.5).

If you set up a Pascal system using SETBOOT to set up for BASICs boot, and Vmgr's D(osvol command to set up a 67 volume DOSVOLUMES file, your disk would look exactly like the disk you have with a BASICs-only system.

For more information, see section 3.7.

COLD BOOT AREA. Created when system is configured. Executed at power on, reset, or with *6, <ctrl>P, or PR#6.	BASICS-ONLY COLD BOOT AREA	8 BLOCKS
	VOLUME DIRECTORY	
WARM BOOT AREA. Loaded into memory by the cold boot program.	WARM BOOT AREA	48K = 96 BLOCKS
	67 DOS 3.3 FORMAT USER VOLUMES	67 VOLUMES : 280 BLOCKS EACH

▶ **In DOS 3.2, there can be 82 volumes that are 227.5 blocks each.**

4.7 Adding Another Drive.

Carefully follow directions one through nine in this section in order to properly connect and configure an add-on drive.

▶ **To configure the second half of a twenty megabyte drive, begin with step seven.**

1.

POWER OFF

Make sure power to both your drive and computer is off.

2. Set the desired voltage selection on the add-on drive (see ac Connector in section 2.2).

3. You received a flat cable with your add-on drive. Connect one end of this cable to the connector labeled DRIVE on your first drive. Connect the other end of the cable to the connector labeled PROCESSOR on the add-on drive.

4. Make sure the power switches on your computer and drives are set to the OFF position. Connect the ac cord to the add-on drive.

5. Plug everything into appropriate wall sockets.

6. Power on using the Power On Sequence described in Chapter Two. Turn on your computer, then power up your drives in the opposite order that they are connected—i.e. the last drive connected is the first to be powered up.

7. Run BFORMAT for the add-on drive.
   Type LOAD BFORMAT,V1,D1,S6 <return>. Then type RUN <return>.

```
] LOAD BFORMAT,V1,D1,S6 <return>
] RUN <return>
```

Type 2 in response to which drive you want formatted.

DISK FORMATTER — BASICS ONLY

**WHICH DRIVE DO YOU WANT
FORMATTED FOR 'BASICS ONLY' ?**   2 <return>

8. Run VOLUME INIT.

   Type LOAD VOLUME INIT,V1,D1,S6 <return>. Then type RUN <return>.

```
] LOAD VOLUME INIT,V1,D1,S6 <return>
] RUN <return>
```

Respond to the prompts as follows.

VERSION 3.3.

BULK VOLUME INIT PROGRAM

9 / 15 / 80

WHICH DRIVE ? :   2 <return>

ENTER FIRST VOLUME NUMBER :   1 <return>

ENTER LAST VOLUME NUMBER :   67 <return>

9. Your system is now set up for BASICs-only with two drives. You are limited to two drives in a BASICs-only system.

4.8 CORVUS BASICs Utilities

These programs are found on the CORVUS BASICs Utilities diskette and, if you followed the installation instructions, are also on volume one of the disk.

All CORVUS Utility Programs are explained in greater detail in the CORVUS UTILITIES MANUAL.

Applesoft Boot Prep

Contains the boot program for Applesoft. See Boot Prep.

Bformat

Zeroes directories and prepares a cold boot area. It is used only when you install a new disk.

Boot Prep

An image of the Integer BASIC boot program.

Bringup

Modifies Apple DOS so that the CORVUS disk may be used.

CatalogV99 Updater

Used to update the disk to DOS 3.3.

COPY2 and COPY3

COPY2 can copy a DOS 3.2 format volume between any two disk drives, whether they are CORVUS or floppy drives.

COPY2 can only be used with DOS 3.2.

— WARNING —

COPY2 ignores the write-protect on disk volumes and will write over a protected volume.

COPY3 is an improved version of COPY2. It's faster because it only copies sectors that have been recorded. It's safer because it will not record over write-protected volumes. When COPY3 encounters an error, it continues to copy and reports the error when it is finished.

COPY3 requires 48K Bytes of RAM and will not run under RAM-based Applesoft. Use COPY2 if one of these limitations becomes a barrier.

COPY3 can copy DOS 3.2 and 3.3 format diskettes.

Both COPY programs ask you for the slot, drive, and volume numbers for the FROM volume and the TO volume. Use 0 for the volume number for floppies. Press <return> if you wish to enter the default number given.

Diagnostic

Allows you to test your CORVUS Disk parameters. Some of the options in this program must only be used under the supervision of the CORVUS Service Department.

File Finder

Finds a file, regardless of which volume it is in.

If you forget which volume you used to store a new program. FILE FINDER will search all 82 volumes. It reports the first instance of the file name and asks if you want to continue the search. If so, simply press <return>. If not, press N.

```
┌─ WARNING ─────────────────────────────────┐
│  When FILE FINDER finds a file, it unlocks it. │
└──────────────────────────────────────────┘
```

Mirror

Used in conjunction with the CORVUS MIRROR, it allows you to make a backup of the entire disk.

Pascal

Allows you to switch to the Pascal environment.

Setboot

Gives you the option to boot Pascal or BASICs, see section 3.5.

Volume Init

VOLUME INIT initializes volumes on the disk. Initialization of a volume removes all files and places a binary file called EMPTY at the start of the volume. Volumes initialized by VOLUME INIT are not listed by the CATALOG,V99 command because the first file is binary.

VOLUME INIT asks for the numbers of the first and last volumes to be initalized. It initializes all volumes between the first and last, inclusive. It cannot modify a write-protected volume.

Volume Updater

Copies a bootable DOS image to a BASICs volume.

4.9 Updating DOS 3.2 to DOS 3.3

To install DOS 3.3 on a CORVUS system currently running with DOS 3.2, you must copy each BASICs volume to a floppy. After you rebuild the BASICs area of the hard disk, you must restore all the data.To restore the data, you must use the Apple supplied utility program called MUFFIN.

▶ **We urge you to read the detailed description of MUFFIN that can be found in Apendix K of the DOS Manual (see the suggested reading index).**

Take care to follow the instructions in the order presented.

1.
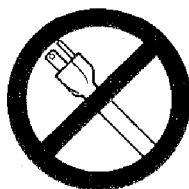
 POWER OFF

Power off both your drive and computer.

2. Connect a floppy drive to slot four of your computer.

3. Power on using the Power On Sequence. First, power up the computer. Then, turn on the disk drive. If you have more than one drive, power up the drives in the reverse order from which they are connected—i.e. the last drive connected is the first to be powered up.

4. Use the 3.2 version of COPY3 to copy each BASICs volume on the CORVUS Disk(s) to a floppy (one volume per floppy).

   Place a formatted blank diskette in the floppy drive. Type LOAD COPY3,V1,D1,S6 <return>. Type RUN <return>.

   ```
   ]    LOAD COPY3,V1,D1,S6 <return>
   ]    RUN <return>
   ```

Answer the prompts as follows.

C O P Y 3 — CORVUS SYSTEMS

USE VOLUME O FOR FLOPPY DISKS

TO ENTER DEFAULT JUST PRESS RETURN. . .

FROM SLOT	(6): ? 6 <return>
FROM DRIVE	(1): ? 1 <return>
FROM VOLUME	(0): ? 1 <return>
TO SLOT	(6): ? 4 <return>
TO DRIVE	(1): ? 1 <return>
TO VOLUME	(1): ? 0 <return>
OK TO COPY ?	Y

You have just copied volume one of the CORVUS Drive to the floppy in the floppy drive. When the computer asks if you want to copy again, press Y for Yes.

COPY AGAIN   (Y/N): ?   Y

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Remove the floppy from the floppy drive and label it volume ONE. (If you have brought up your drive acording to the CORVUS Drive manual, you have the CORVUS 3.2 utilities on volume ONE. You probably won't need them again).

Place a new formatted blank diskette in the floppy drive and repeat the copy process for the next volume on the CORVUS Drive. Make sure to type the appropriate responses to the COPY3 prompts.

Continue until all of your BASICs volumes have been transferred to separate floppies.

5. If you have a Pascal-BASICs disk, to step nine and continue until you have finished these instructions.

6. If you have a BASICs-only disk, you must update your hardware.
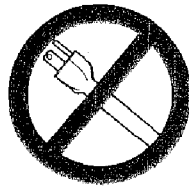
 POWER OFF

Power down your drive and computer. Put the 16-sector Apple PROMs in your floppy drive interface card as described in The DOS Manual.

Power on using the Power Sequence.

Let your computer boot from the CORVUS Drive. Place the Apple DOS 3.3 SYSTEM MASTER floppy in the floppy drive. Type PR#4 <return>.

Complete steps seven and eight then go to step thirteen and continue until you finish these instructions.

7. Place the new (3.3) CORVUS UTILITIES FOR BASICS floppy in the floppy drive. Run the program BFORMAT from the floppy. This will destroy all data on the CORVUS Disk(s).

Type LOAD BFORMAT,S4 <return>. Type RUN <return>.

```
] LOAD BFORMAT,S4 <return>
] RUN <return>
```

Type 1 in response to which drive you want formatted. When the computer asks 'o.k. to format', press Y for Yes.

```
VERSION 4.0

DISK FORMATTER — BASICS ONLY

WHICH DRIVE DO YOU WANT FORMATTED
FOR 'BASICS ONLY' ? (1 or 2)                    1

THIS PROGRAM WILL DESTROY ANY
DATA ON DRIVE 1

O.K. TO BFORMAT ? (Y/N)                         Y

LOADING BFORMAT.OBJ

WRITING BOOT TRACKS - - -
. . . . . . . . .
ZEROING DIRECTORIES - - -
. . . . . . . . .
```

If you have a second CORVUS Drive, you must run BFORMAT again for the second drive. Type 2 in response to which drive you want formatted.

8. Run the program BRINGUP. Type LOAD BRINGUP,S4 <return>. Type RUN <return>.

```
]   LOAD BRINGUP,S4 <return>
]   RUN <return>
```

When you are prompted press Y for Yes.

```
BRINGUP UTILITY . . . DOS/ONLY

THIS PROGRAM IS FOR A DRIVE THAT
IS DOS ONLY. IF THE DRIVE HAS BEEN
FORMATTED WITH PASCAL THIS
PROGRAM WON'T WORK.

CONTINUE ?                                      Y

YOU ARE CONFIGURED AS 67 VOLUMES
OF 16-SECTOR IMAGES.
```

There are now 67 (16-sector) volumes instead of 82 (13-sector) volumes. Go to step thirteen.

9. Boot up in Pascal, then place the (3.3) CORVUS UTILITIES FOR PASCAL floppy in the floppy drive. From the command level, press F for F(ile. Press T for T(ransfer. Type #9:=,#4:$ <return>. Replace all the old files with the new ones.

10. Press Q for Q(uit. Press X for X(ecute. Type VMGR <return>. Press R to R(emove the volume DOS1 (and DOS2 if you have two drives). Type DOS1 <return> in response to the prompt.

11. Press Q for Q(uit to leave the VMGR. Press X for X(ecute. Type VINIT <return>. The version number should be 1.4.

    Press D for D(osvols. Decide how many DOS volumes you want. Because each volume is now bigger (16 versus 13 sectors), you may have to specify fewer DOS volumes than you had previously.

12. You must run the program SETBOOT. Press B for a B(asics boot. Then reboot your computer.

    Place the Apple DOS 3.3 SYSTEM MASTER floppy in the floppy drive. Type PR#4 <return>.

    Place the new (3.3) CORVUS UTILITIES FOR BASICS floppy in the floppy drive.

13. Use COPY3 to copy the new (3.3) CORVUS UTILITIES FOR BASICS floppy to volume one of the CORVUS Disk.

▶ **See step four for an example of COPY3 prompts.**

14. With COPY3 copy the Apple DOS 3.3 SYSTEM MASTER floppy to volume two of the CORVUS Disk.

15. Volumes one and two were initialized by COPY3. Initialize all volumes—except volumes one and two—on the CORVUS Disk.

    Type LOAD VOLUME INIT,S6,V1,D1 <return>. Type RUN <return>.

    > LOAD VOLUME INIT,S6,V1,D1 <return>
    > RUN <return>

    Respond with 3 for your first volume number. Make the last volume number the total of DOS volumes that you have. This number will be 67 if you have a BASICs-only system.

BULK VOLUME INIT PROGRAM	
WHICH DRIVE ?	1 <return>
ENTER FIRST VOLUME NUMBER :	3 <return>
ENTER LAST VOLUME NUMBER :	67 <return>

    VOLUME INIT creates a file called EMPTY in each of these volumes.

16. To copy each volume back to the CORVUS Disk, you use the utility program MUFFIN which was part of the data you transferred to volume two in step fourteen.

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MUFFIN is on volume two of the CORVUS Disk. Begin by deleting the EMPTY files in each volume to be restored. Type CATALOG,S6 <return>.

>]   CATALOG,S6 <return>

Type DELETE EMPTY,V3,D1 <return>. Then type DELETE EMPTY,V4,D1 <return> and so on until you have deleted EMPTY from every volume you wish to restore.

>]   DELETE EMPTY,V3,D1
>]   DELETE EMPTY,V4,D1
>]   DELETE EMPTY,V5,D1

17. After you delete the EMPTY files, load MUFFIN.

Set the default volume and drive, then run the MUFFIN program. Type BLOAD MUFFIN,V2,D1 <return>. Type CATALOG,V3,D1 <return>. Type CALL 2051 <return>.

>]   BLOAD MUFFIN,V2,D1 <return>
>]   CATALOG,V3,D1 <return>
>]   CALL 2051 <return>

```
*************************************************************
*                                                           *
*          APPLE II DOS 3.2 TO 3.3 CONVERTER                *
*                                                           *
*               MUFFIN VERSION D                            *
*                                                           *
*       COPYRIGHT 1979 APPLE COMPUTER INC.                  *
*************************************************************


          CHOOSE ONE OF THE FOLLOWING OPTIONS

             <1> CONVERT FILES
             <2> QUIT

    WHICH WOULD YOU LIKE ?                                  1
```

Place the floppy you want to update in the floppy drive. Press 1 to indicate that you wish to convert files.

Respond with 6 as the source slot and 1 as the source drive. Then respond with 6 as the destination slot and 1 as the destination drive.

```
SOURCE SLOT ?                    6
        DRIVE ?                  1

DESTINATION SLOT ?               6
        DRIVE ?                  1
```

The computer asks for the name of the file to be converted. Respond with an = which means you want to convert the entire contents of the source floppy. Respond N for No when the computer asks if you want prompting.

```
FILENAME ?                       =
DO YOU WANT PROMPTING ?          N
```

When the computer prompts you to begin, press <return>.

```
INSERT DISKS THEN PRESS <ESC>
TO RETURN TO MAIN MENU OR
ANY OTHER KEY TO BEGIN           <return>
```

When the conversion is finished, the computer returns you to the main menu. Press 2 for Quit.

```
CHOOSE ONE OF THE FOLLOWING OPTIONS

    <1> CONVERT FILES
    <2> QUIT

WHICH WOULD YOU LIKE ?           2
```

Go the next step.

18. Repeat step seventeen (the whole step) for each volume to be restored. Do not forget to set the correct default volume and drive with the CATALOG command (CATALOG,V4,D1 for volume four, etc.).

19. If you are not running CONSTELLATION software, run the program SETBOOT and select the proper boot. You are finished updating your system.

    If you are running CONSTELLATION software, go to the next steps.

20. You must rebuild the access and user tables for BASICs.

▶ **See chapter four of the CONSTELLATION Manual for examples of ACCESS MANAGER, USER MANAGER, SETBOOT, and VOLUME UPDATER.**

Run CONSTCREATE and indicate ALL your DOS volumes. Run USER MANAGER, then run ACCESS MANAGER to rebuild the user and access tables.

You must run VOLUME UPDATER to put a master image from volume two or from the Apple DOS 3.3 SYSTEM MASTER floppy in each volume that will serve as a home volume.

21. You must run SETBOOT and select the proper boot: BASICs, Pascal, or CONSTELLATION.

Your system is now updated to DOS 3.3

SUGGESTED READING
(for Chapter 4 only)

Here is an annotated, partial list of applicable manuals.

- **Apple Language System Installation and Operating Manual**, by Apple Computer, copyright 1979, Apple product number A2L0024.

- **Applesoft II**, by Apple Computer, copyright 1978. Apple product number A2L0006. The authoritative reference on Applesoft BASIC.

- **Apple II Reference Manual**, by Apple Computer, copyright 1979, Apple product number A2L0001A. Describes the Apple's hardware and firmware in considerable detail, including full information on all past and present Apples and a rather extensive glossary.

- **Disk Operating System Instructional and References Manual** (also known as DOS 3.2 Manual), by Phyllis Cole and Brian Howard, copyright 1979. Apple product number A2L0012.

- **The DOS Manual**, by Apple Computer Inc., copyright 1980. Apple product number A210036.

- **The Applesoft Tutorial**, by Caryl Richardson, copyright 1979. Apple product number A2L0018. This manual is a superb way to get started in BASIC. It provides fruitful hands-on experience right away, virtually guaranteeing a warm first experience with the computer. More experienced computer people will benefit from this manual, too, as it provides a swift introduction to the Apple's unique features (graphics for instance).

INDEX (for Chapter Four only)