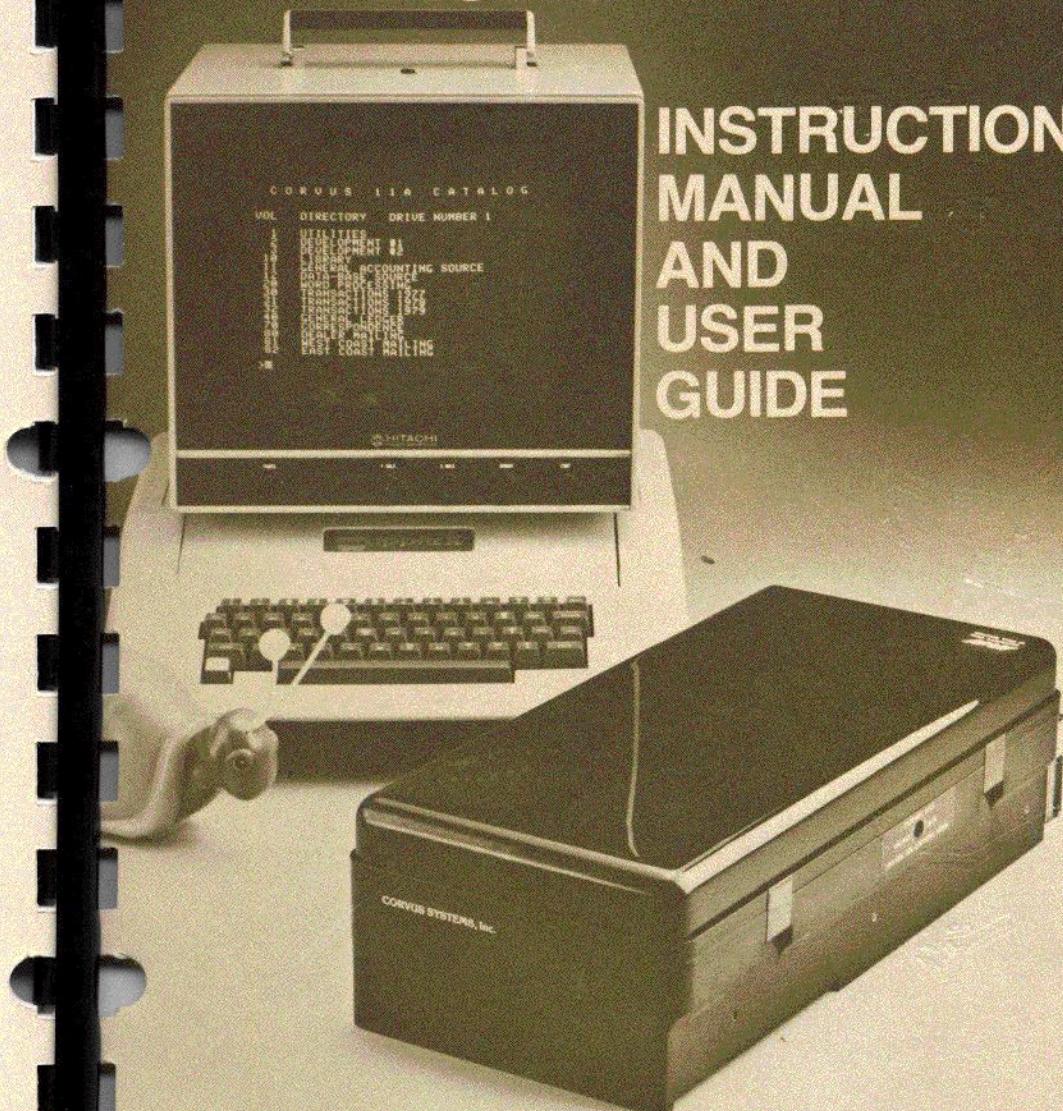


CORVUS 11AP MASS STORAGE DISK SYSTEM

INSTRUCTION
MANUAL
AND
USER
GUIDE



CORVUS SYSTEMS, Inc.

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San Jose, California 95131
408/946-7700 TWX: 910-338-0226

CORVUS 11AP MASS STORAGE DISK SYSTEM

INSTRUCTION MANUAL AND USER GUIDE

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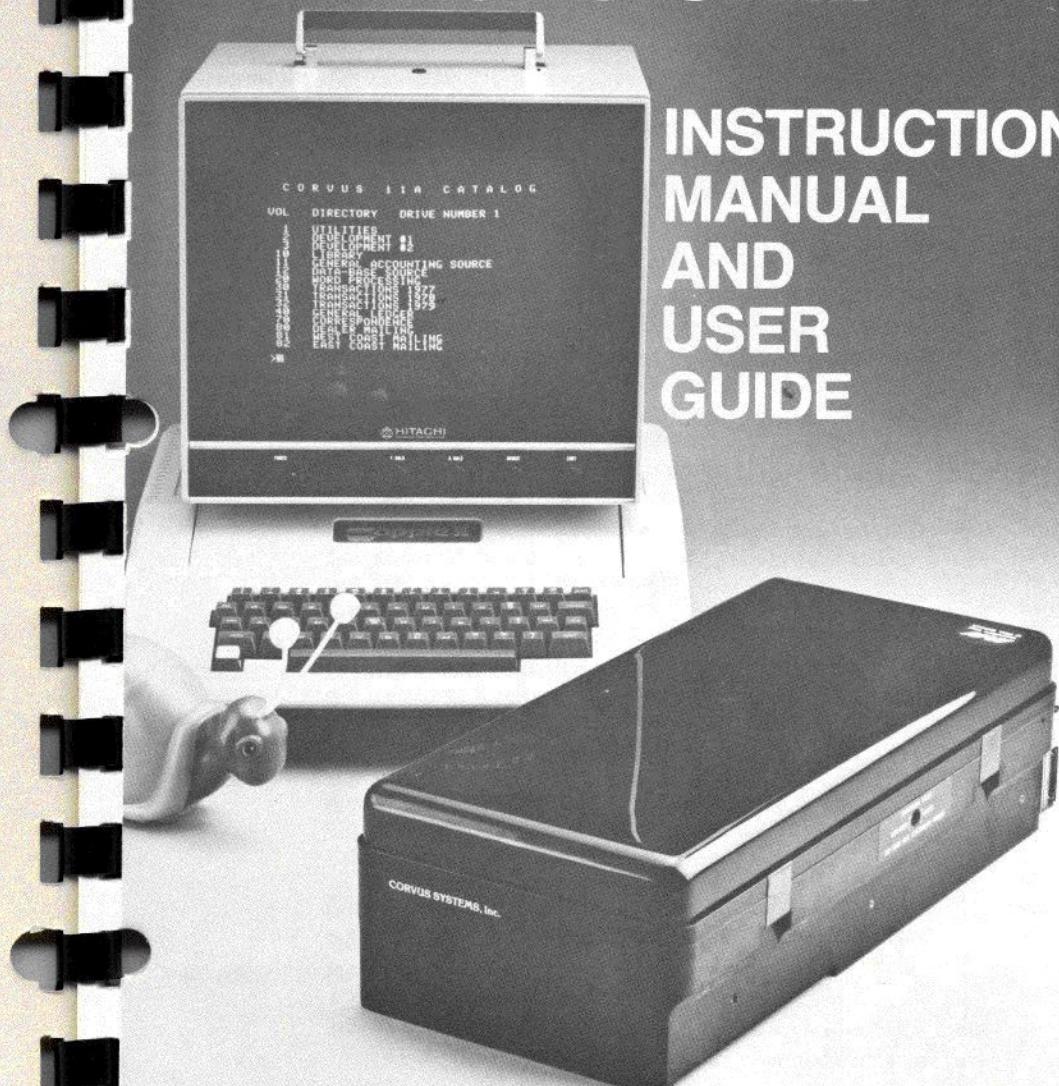
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CHAPTER 0 THE CORVUS 11AP MASS STORAGE SYSTEM

0.1 What It Is and What It Does

The Corvus 11AP is a microprocessor-controlled intelligent peripheral that adds high performance mass storage to Apple Computers with DOS or Pascal operating systems.

The 11AP is totally compatible with Apple hardware and software—all programs and peripherals that work on an Apple will work on an Apple with an 11AP.

The 11AP with one disk drive adds over 9.69 million bytes (9.69 MB) of storage capacity to your Apple system. You can put as many as four drives on the 11AP with Pascal (two with the BASICS/only configuration) for over 38.7 MB storage—the equivalent of 276 floppy disks.

Summary of Features

- The 11AP provides 9.69 megabytes of storage and is totally compatible with Apple's DOS 3.2 and Pascal operating systems.
- The 11AP is faster than a floppy-based system. The 11AP transfers information many times faster than a floppy system.
- The 11AP is convenient. Corvus supplies well-engineered, friendly utilities that allow you to quickly and easily manipulate the data on the disk.
- The 11AP is accurate and more reliable than floppy disks. It features read after write operation. When you record data on the disk, the 11AP automatically reads it back to make sure it was recorded perfectly. This happens automatically. The result is flawless recording without human attention.

0.2 How It Does It

Your 11AP consists of a compact high speed disc drive, a microprocessor-based intelligent controller, and a "personality card" that links the controller to your Apple.

The disk drive can store about eleven megabytes of unformatted data on two eight-inch magnetic disks. The information is stored on three sides of the disks. The fourth side contains servo information—magnetic traces that are used by the closed-loop servo positioning mechanism to guarantee accurate positioning of the read/write heads under all operating conditions.

While a floppy disk is flexible (hence its name), the disks in your 11AP are rigid ("hard disks"). The disk drive uses proven Winchester Technology that provides reliable, dependable high density storage. In a Winchester drive, the read/write heads do not touch the disk's surface. Instead, they are designed with a wing-like shape that allows them to fly above the surface of the rapidly spinning disk, riding 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, the heads actually touch the floppy disk's surface. To prevent dust and other contaminants from interfering with the heads, the Corvus disk operates in a sealed enclosure with a positive-flow air filtration system.

The controller uses a Z-80 microprocessor and 16K Bytes of random-access-memory to provide high speed, intelligent, and accurate reading and writing.

The personality card will transfer up to fifty kilobytes per second and conforms to all Apple interface conventions. This means the 11AP works exactly like a floppy drive, but with greater capacity and speed.

CHAPTER 1 USING THIS MANUAL

1.1 Background

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

If you have a problem, please refer to your Apple Manuals. If you encounter an apparent conflict between this manual and Apple's manuals, remember that Apple's manuals are the final authority on Apple's hardware and software.

1.2 Background For Applesoft and DOS 3.2 Users

If you are just getting started with computers, please read *The Applesoft Tutorial*, an excellent way for new computer users to learn the basics (and the BASICS) of computers. Computers are complicated instruments and most computer manuals—including this one—use computer jargon that can be a barrier at first. *The Applesoft Tutorial* will get you started smoothly and make you comfortable with your Apple. The glossary in the *Apple II Reference Manual* will help you with the jargon.

If you already know computers, skim *The Applesoft Tutorial*, read the *Applesoft II Manual*, and finish with the *DOS 3.2 Manual*.

For information on the Apple's hardware and firmware (programs recorded in ROM), refer to the *Apple II Reference Manual*.

1.3 Background For Pascal Users

If computers are new to you, please read *Problem Solving With Pascal*. It is a thick book and may seem forbidding, but it's a good way to really learn computers. Computer manuals (including this one) use a lot of technical jargon. Refer to the glossaries in *Problem Solving With Pascal* and in the *Apple II Reference Manual* for help. If you already know computers, read the *Pascal User Manual and Report*.

Once you know Pascal, refer to the *Apple Pascal Reference Manual* to learn about Apple-flavored Pascal.

The Apple II Reference Manual describes the Apple's hardware and firmware.

1.4 References

Here is an annotated, partial list of the applicable Apple manuals:

1.4.1 *Disk Operating System Instructional and Reference Manual* (also known as *DOS 3.2 Manual*, *The Do's and Don'ts of DOS*, and *A Manual for Using the Apple Disk II with DOS Version 3.2*), by Phyllis Cole and Brian Howard, copyright 1979. Apple product number A2L0012. The authority on Apple's DOS.

1.4.2 *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 (such as graphics).

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

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

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

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

1.4.7 *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.

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

1.5 Conventions

- Angle brackets <> indicate certain special keys: <ctrl>, <return>, <esc>, and <reset>. The Applesoft Tutorial describes these keys in more detail.
- When the computer prompts you for an input, this manual will generally show both the prompt and the appropriate response. For instance, if the computer asks

TRANSFER ?

(the screen cursor sits after the ?, waiting for your response) and you should respond with

MYDISK:EXTRA.DATA,SCRATCH:\$

the manual will show

TRANSFER ? MYDISK:EXTRA.DATA,SCRATCH:\$

- Watch for these symbols:

WARNING

This reminds you to be extra careful. Failure to follow these instructions could cause damage to your Apple, your Corvus 11AP, or both, or could cause you to lose data, or could cause you to have to start over.



This reminds you to turn off your Apple, your Corvus 11AP, or both. It is absolutely essential that they be powered down anytime you remove or install any circuit card or cable. (If in doubt, turn it off first!)

1.6 Some Terms

Floppy—	When this manual refers to "floppies" we are using the common term for what Apple Computer calls "diskettes." And when we say "floppy drive," we are referring to a "diskette drive" such as the Apple Disk II.
Disc—	When we refer to "disk" or "disk drive" or "Corvus drive," we always mean the disk drive that is the heart of your Corvus 11AP mass-storage system.
Block—	A block is 512 bytes (4K bits).
Sector—	A sector is 256 bytes—or half a block.
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.
Unit—	A logical device number. Apple Pascal uses units 4,5,9,10,11, and 12 for floppy drives.
Mount—	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).

CHAPTER 2 CAUTIONS

These suggestions will protect your Apple and your Corvus 11AP from damage.



2.1 Always turn off (or, better still, unplug) both your Apple and your 11AP when inserting or removing any cables or circuit cards. If you forget, you may permanently damage your Apple or your 11AP.

Here's why: 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 (though not extremely likely) 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.

So please remember—always turn off the computer and the 11AP before you start plugging in the cards and cables.

2.2 Handling Floppy Disks

You will use floppy disks to install and configure your 11AP. Please refer to the section called "Care of the Disk II and Diskettes" in Apple's DOS manual.

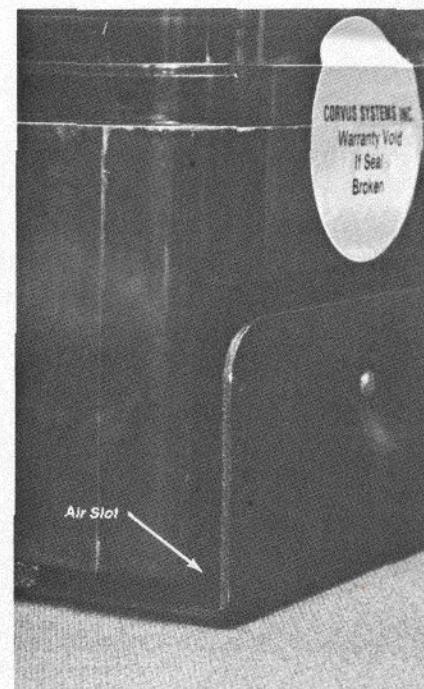
Here are the more important cautions:

- Keep away from magnetic fields and temperature extremes.
- 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.

2.3 Disk Drive

Although the disk drive in your 11AP is considerably more durable than a floppy drive and its sealed-in hard disk is much more durable than a floppy, it can be damaged. Here's how to avoid damaging it:

- The drive needs cooling. Don't put it in a box, drawer, or sealed cabinet, without adequate ventilation. Don't let the airflow slots be disturbed by loose papers, or other objects.



Air slot location

- Do not attempt to open the disk drive and do not remove the stickers that are labeled, "Warranty Void If Seal Broken". The drive is sealed shut to avoid dust problems and the stickers keep the air seals intact. If they are removed, there is a possibility that dirt will get in and a certainty that the warranty will be voided!
- Keep the drive away from magnetic fields. The drive can be erased by them.
- Never operate the drive with the head carriage lock engaged (see section 3.2). Never ship the drive with the head carriage lock disengaged.

CHAPTER 3 GETTING STARTED: INSTALLATION

Installing your Corvus 11AP 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 whole day.

First, please read Chapter 1 and be sure you have the background you need.

WARNING

Then, read Chapter 2 and be sure you understand the cautions.

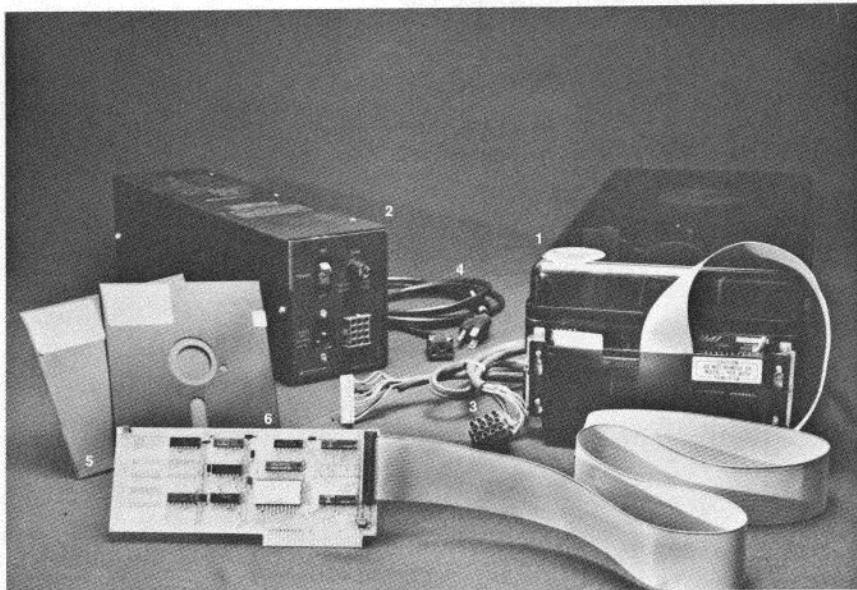
After you have installed the hardware, you will have an empty disk drive connected to your Apple. Chapter 4 will tell you how to put special files on the drive to make the 11AP really useful.

Enough background. Let's install your Corvus 11AP mass storage system.

3.1 Check Your Parts

Your Corvus 11AP consists of the following:

1. Disk drive with flat cable and personality card assembly
2. Power supply
3. Dc cable
4. Ac cable
5. Corvus BASICS UTILITIES floppy
6. Corvus PASCAL UTILITIES floppy



Components of Corvus 11AP Disk System

3.2 Carriage Lock

The carriage lock holds the heads in their fully retracted position. The carriage should always be locked when the disk is shipped to prevent the heads from striking the disk's surfaces, possibly damaging the heads or the disk.

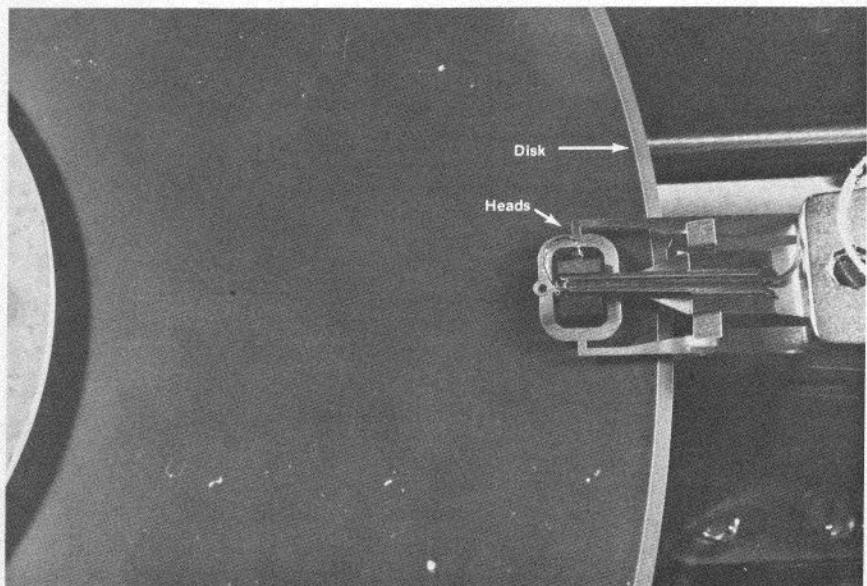
WARNING

Do not operate the drive with the carriage locked!

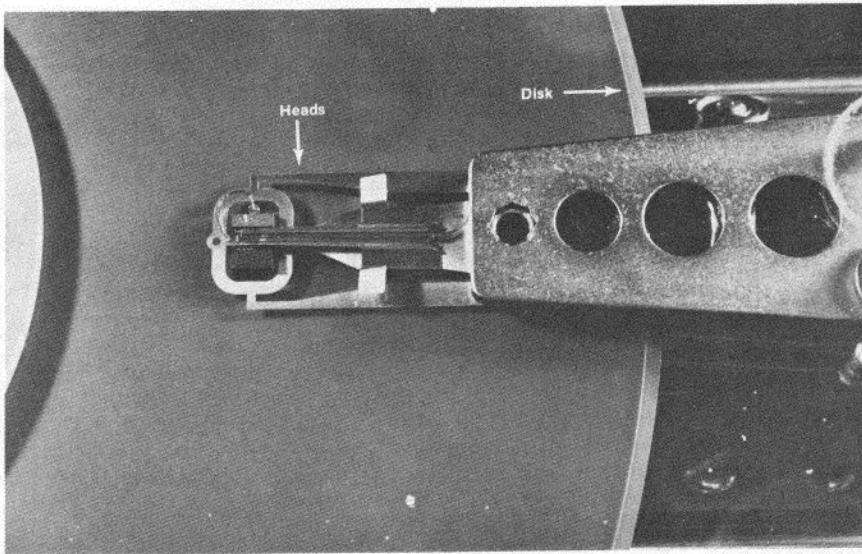
WARNING

Be sure the carriage is locked before you ship the drive.

3.2.1 Study the carriage lock. It helps to see how the mechanism works. Look through the transparent top of the disk drive.



Heads retracted, indicating carriage lock engaged



Heads extended, indicating carriage lock disengaged

When you receive your 11AP, the carriage lock is engaged, clamping the heads in into their fully withdrawn position. When you disengage the lock, the heads will be able to move freely.

When the carriage is locked, the heads will not move. When the carriage is unlocked, you can move the heads in and out by gently lifting one end of the drive or the other.

3.2.2 To unlock the carriage:

Insert a screwdriver into the carriage lock hole. Turn clockwise about 19½ turns or until you feel some resistance. If the screw does not turn easily, STOP—it may already be unlocked.



Carriage locking screw

WARNING

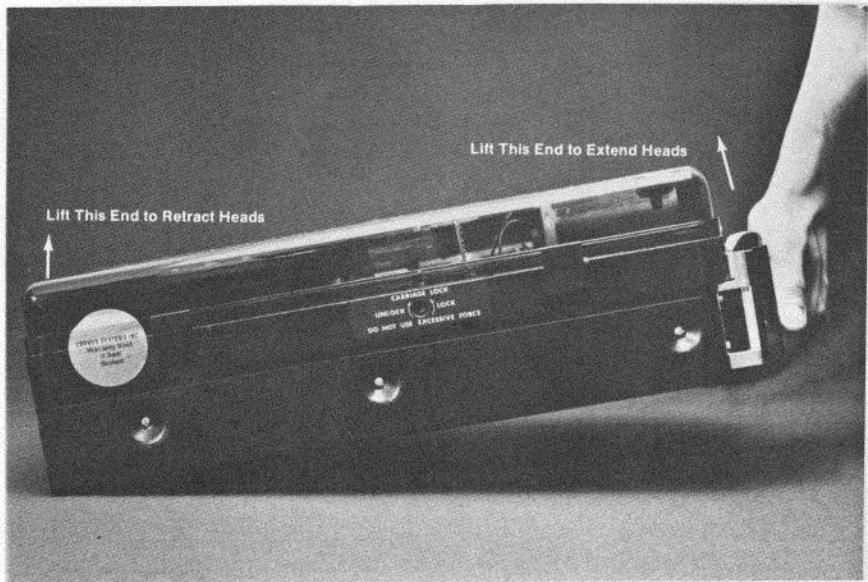
Never force the carriage lock screw. It should always turn easily.

3.2.3 To lock the carriage:

First, be sure the power is off and the cables are disconnected. Then be sure the heads are fully retracted. To retract the heads, lift the end of the drive that is furthest from the connections. Gravity will make the head assembly retract, pulling the heads toward the outside rim of the disk.

Turn the carriage lock screw counter clockwise until you feel resistance (about 19 and one-half turns).

Check to be sure the carriage is really locked. Lift one end of the drive, then the other. If the heads do not stay fully retracted, the carriage is not really locked. Fully unlock the carriage and then re-lock it, making sure the heads are retracted before you start engaging the lock.



Checking head position

3.3 Cabling

Be sure the power to both the Apple and to the Corvus power supply are off anytime you install or remove any circuit cards or cables. Failure to do so may cause permanent hardware damage to both the 11AP and your Apple.

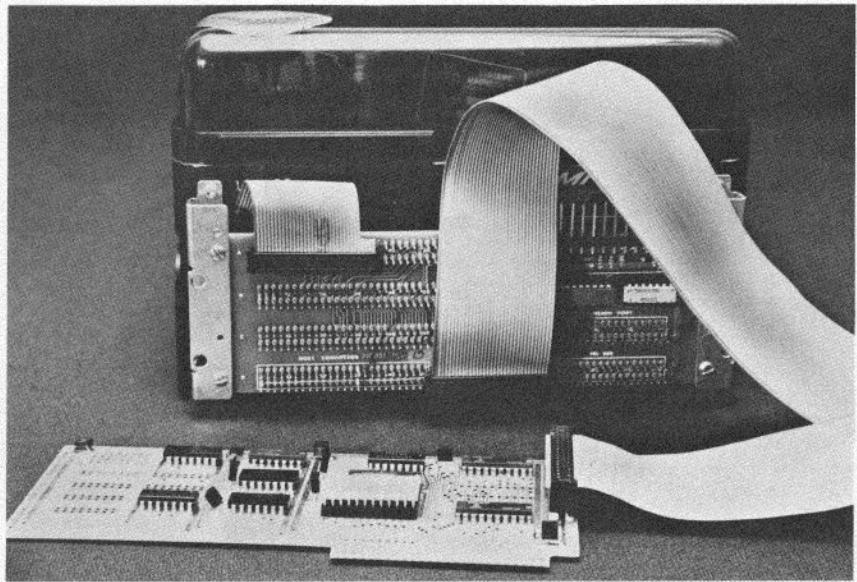
This symbol reminds you when the power must be off:



3.3.1 Disk Drive, Flat Cable, Personality Card Assembly

When you receive your 11AP, these three will be connected together already and you may go straight to section 3.3.2. If they have been disconnected or if you would enjoy confirming the assembly, here's how:

The disk drive end of the flat cable is attached to the pins that extend from one end of the drive.



Flat cable connections

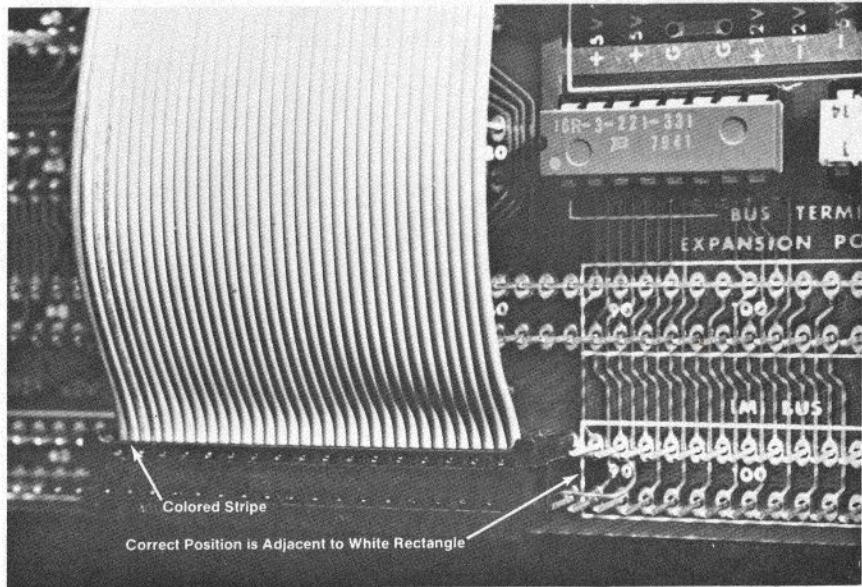
WARNING

It is possible to connect the flat cable to the wrong pins. Be careful—the wrong connection could permanently damage the hardware!

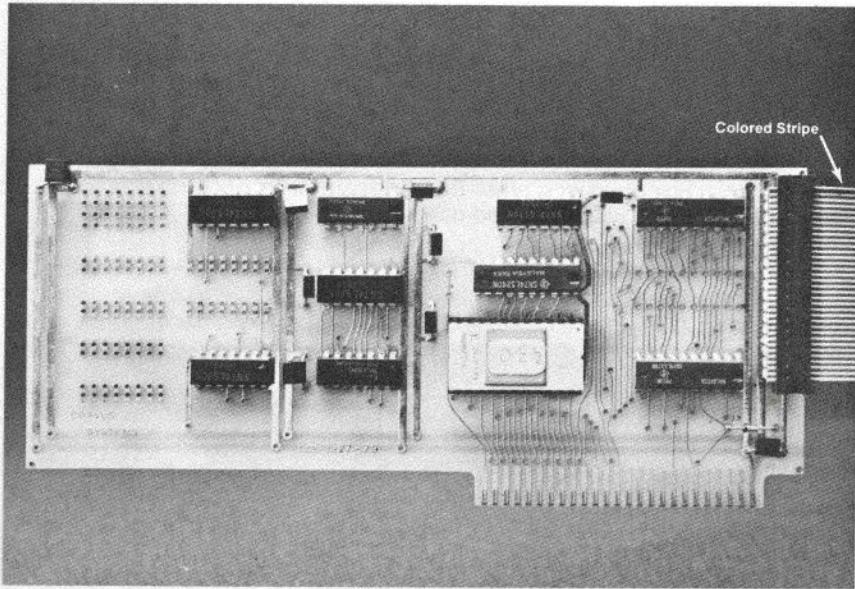
Remove the plastic cover that protects the pins. Connect the disk drive end EXACTLY as shown. The colored stripe on the cable should be closest to pin 50.

The end of the connector away from the colored stripe should be adjacent to, but not overlap, the white rectangle marked "IMI BUS" on the disk drive circuit board.

Replace the plastic cover after the flat cable has been installed.



Proper position of flat cable connector



Personality card connection

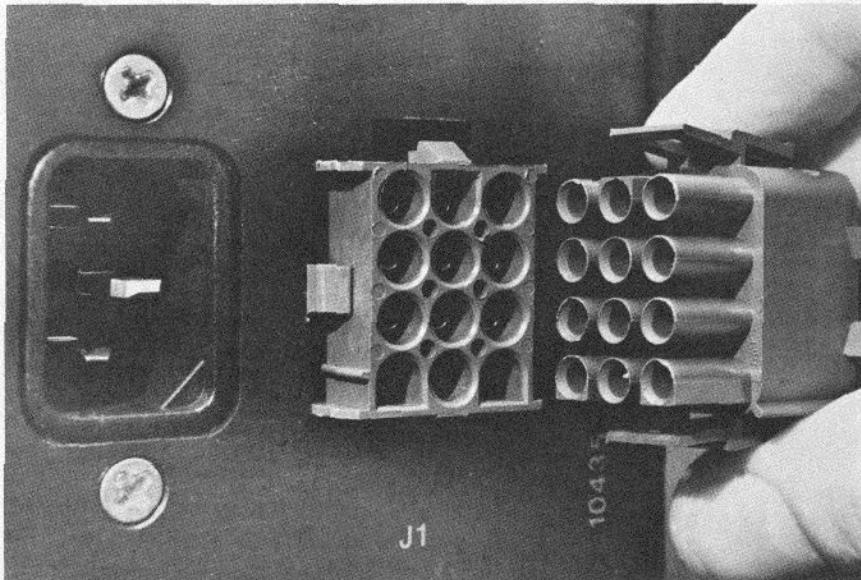
The personality card goes on the other end of the flat cable. The colored stripe should be at the end farthest from the "edge connector" that plugs into the Apple. Be sure all the pins on the personality card are engaged.

Do not install the personality card in your Apple just yet—you will do that when you configure the system (Chapter 4).



3.3.2 Dc Cable

Connect the square connector at one end of the power supply. Note that three of the pins are squared off so the connector will only go in one way. It will snap in easily when it's positioned correctly.



Dc cable connection at power supply

The other end of the Dc cable connects to the ten large pins on the rear of the disk drive exactly as shown.

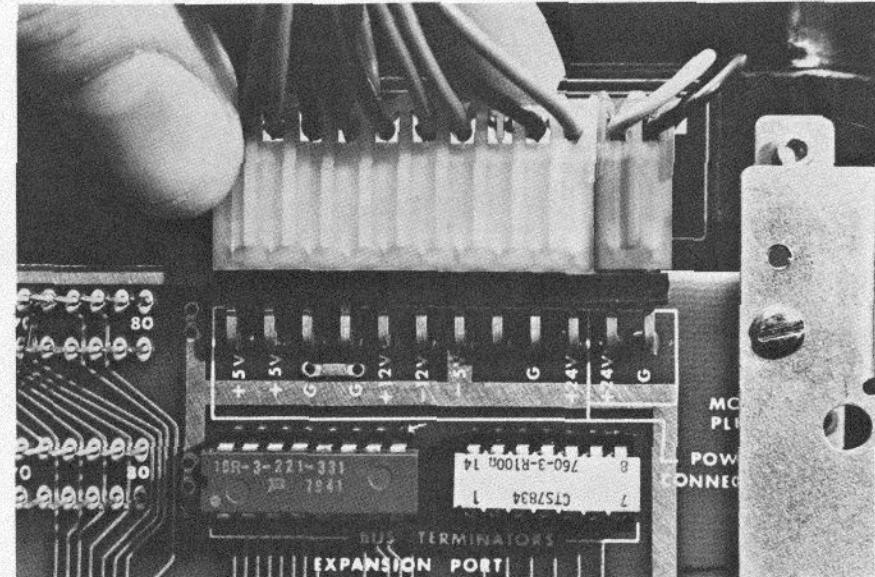
3.3.3 Ac Cord

Be sure the switch on the power supply is OFF!

Then connect the Ac cord to the supply and plug it in a 110 volt Ac socket.

WARNING

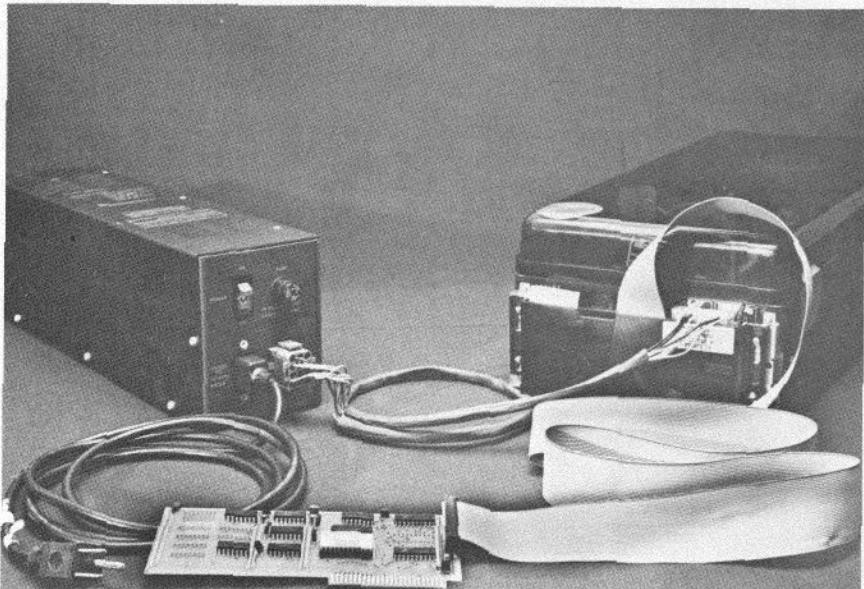
Your 11AP has been wired for the type of power used in the country it was shipped to. If you move your 11AP to a country with different power specifications, contact Corvus for instructions.



Dc cable connection at drive

3.4 Final Check

Your system should look like this:



Properly connected system

CHAPTER 4 GETTING STARTED: CONFIGURING THE SYSTEM

When you received your 11AP, it was empty—there was no information on the disk. To make the system useful, you must put some special programs on the drive. This is called “configuring” the system.

This section tells you how to configure your new Corvus 11AP. (It also tells you how to re-configure a previously configured system, something you may want to do someday, for instance, if you add Pascal to a non-Pascal system.)

You use your Apple to configure the new disk. Here's how: First you bring up your system normally. Then you run the special Corvus programs (supplied on one of the floppies that came with your 11AP) that put all the correct information on the Corvus disk.

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.

Section 4.1 describes “slots” and how they are used in booting and configuring your system.

Section 4.2 describes the differences between the “BASICs/only” configuration and the “Pascal/BASICs” configuration and will help you decide which applies to your needs.

Section 4.3 tells you how to configure a “BASICs/only” system.

Section 4.4 tells how to configure a “Pascal/BASICs” system.

4.1 Slots, Booting and Configuring

4.1.1 About Booting the System

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 “guiding intelligence” (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.

4.1.2 About 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 0 to 7. (Computer people tend to count from 0 instead of 1—that’s why this manual has a Chapter 0!) The slot numbers are printed near each connector, at the rear edge of the main keyboard. The leftmost slot (looking at the computer from the keyboard end) is slot number 0 and probably contains an Apple ROM CARD or an Apple LANGUAGE CARD. Your floppy drive is probably plugged into slot 6. (Slot 6 is special—the next section tells why.)

4.1.3 What Do Slots Have To Do With Booting?

As you learned in section 4.2.1, booting is the process of loading your computer with a “guiding intelligence”—called an operating system—and starting it. Where does the operating system come from?

Most of the world's advanced operating systems are stored on disk. Apple's DOS 3.2 and Pascal are examples, so when you boot your Apple, you boot it from disk. Right now, the boot-disk drive is the floppy drive but you will be able to boot from your Corvus drive once it has been configured.

The disks are connected to one of the slots. In general, the disk you boot from is connected to slot 6.

Although some Apples allow you to boot from a different slot, we strongly recommend that you use slot 6 as the drive you use for booting.

4.1.4 How To Boot

When you turn your Apple on and press <RESET> it will do one of these things, depending on how it is equipped:

- Early Apples will come up in the "monitor," present you with a "*" and wait for you to type.
- Some Apples will come up in Integer BASIC. You will see a ">" and the computer will wait for you to type.
- Some Apples will come up with a "|". That indicates 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 11AP, you will want to boot from disk. Depending on how your Apple comes up, you will use one of these commands:

*6<CTRL>P
>PR#6
]PR#6

(Reminder: <CTRL>P means hold down the <CTRL> key while you press P. The *, the >, and the] are supplied by the computer—you don't type them.)

All these commands do the same thing—they tell the computer to "boot from slot 6". (Note that *4<CTRL>P or]PR#4 would mean "boot from slot 4".)

Pascal always boots from slot 6—never any other slot. No command is needed—Pascal boots from slot 6 any time power is turned on or <RESET> is pressed.

For more information, refer to the section on "Booting DOS" in Apple's DOS 3.2 Manual and/or the sections on "Starting up an Apple Pascal System" in the Apple Pascal Reference Manual.

4.2 Selecting the System

Pascal/BASICS system—if your Apple has 48K of RAM and the Apple Language card, then you will probably want to use the 11AP in the Pascal/BASICS configuration. With this configuration, you can use the Apple Pascal operating system or you can use the Apple DOS 3.2 system with either of the Apple BASICS. You can switch back and forth between DOS 3.2 and Pascal and use both types of files.

BASICS/only system—the BASICS/only system allows you to use Apple DOS 3.2 with either Integer BASIC or Applesoft BASIC, but does not provide access to Pascal. This system will work with any size memory (that is, it doesn't require 48K of RAM as does the Pascal configuration.) (When you use the Corvus 11AP in this configuration, it is identical to the Corvus 11A, except that the 11AP MUST be plugged into slot 6 of the Apple.)

If you decide to configure your 11AP as a BASICS/only system, then proceed to section 4.3. If Pascal is your choice, go to section 4.4.

4.3 Bringing Up BASICS/only

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 first backup your data.

4.3.1 Turn the Apple and the Corvus 11AP off.



WARNING

Never insert or remove cables or cards with the power on. Serious damage to the Apple and the Corvus 11AP may result.

4.3.2 Read about slots, booting, and configuring in section 4.1 if you haven't already. The key point to understand is that the Apple will be booting from a disk. In this procedure, you will first boot from the floppy, then use your Apple to set up the 11AP disk drive with the data you will need to boot from it.



4.3.3 Insert the Corvus personality card into slot 6 and the floppy drive controller into slot 4. (If you have more than one floppy controller, leave the others out for now.)

4.3.4 Turn on your Apple computer, but not the Corvus 11AP. Press <RESET> immediately after you turn your Apple on. Depending on how your Apple is equipped, the TV monitor will display a "*", a ">", or a "|", followed by a flashing cursor.

4.3.5 Place the SYSTEM MASTER DOS 3.2 floppy, supplied with Apple DOS 3.2, into the floppy drive.

4.3.6 Boot the Apple from that floppy by entering

*4<CTRL>P
or >PR#4
or]PR#4

depending on which prompt you received (remember that the *, >, and the] are prompt characters, displayed by the computer—you don't type them—and remember to press <RETURN>).

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

DISK II MASTER DISKETTE VERSION 3.2
16-FEB-79
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followed by the Applesoft prompt () and the cursor. (If you do not have Applesoft, the message won't appear and the Integer BASIC prompt (>) will appear.)

If you have trouble, refer to section 4.1.4, "How To Boot," or refer to the section on "Booting DOS" in Apple's DOS Manual.

NOTE: Your floppy controller must be equipped with a DOS 3.2 control ROM.

4.3.7 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.

Here's how to format the disk. The Apple should be up, with DOS 3.2 running. Turn on the Corvus drive and wait 15 seconds for the disk to come up to speed. Remove the SYSTEM MASTER DOS 3.2 floppy and place the CORVUS BASICS UTILITIES floppy into the floppy drive. There is a program on the floppy called BFORMAT. Run it by centering:

JRUN BFORMAT

The computer will respond

DOS/ONLY FORMATTER
IS IT OK TO ERASE DISK?
(Y/N):

This is a reminder that configuring the disk will effectively remove all data. Answer Y to continue.

WRITING BOOT TRACKS ...
ZEROING DIRECTORIES ...

In about 20 seconds, the BASIC prompt will return.

4.3.8 The program you just ran, BFORMAT, formatted the disk. Now you must run a program called BRINGUP, which connects Apple's standard DOS 3.2 to the Corvus 11AP firmware.

With the CORVUS BASICS UTILITIES floppy still in the floppy drive, enter:

JRUN BRINGUP

The system will respond with

BRINGUP UTILITY .. DOS/ONLY

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 end up displaying the Applesoft BASIC prompt ()).

4.3.9 BFORMAT formatted the Corvus disk and BRINGUP connected DOS 3.2 to the Corvus firmware (it put a 3-byte patch in DOS 3.2's RWTS to refer all disk references to the Corvus firmware).

The next step is to load the "Warm Boot Area" on the Corvus disk. The

Warm Boot Area is a 48K Byte area on the disk that is loaded into your Apple's RAM when you boot from the Corvus drive. This procedure sets up the Warm Boot Area so that when you boot, you will have Applesoft running. Chapter 5 tells you how to make other boot arrangements, but for now, follow this procedure so that if something goes wrong, you will be able to boot from the Corvus drive.

4.3.10 Your Apple should be displaying the Applesoft prompt ()). Place the CORVUS BASICS UTILITIES DISKETTE into your floppy drive and enter:

J LOAD APPLESOFT BOOT PREP, S4
J CATALOG, S6
J RUN

This will load the APPLESOFT BOOT PREP program from the floppy and run it. 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. Chapter 5 will tell you how to rewrite the Warm Boot Area to boot other systems.

4.3.11 Next, copy all the files from the CORVUS BASICS UTILITIES DISKETTE onto volume 1 of the disk. That way, you will have all these handy programs available on the disk and you will get some practice putting programs on your disk.

Place the CORVUS BASICS UTILITIES DISKETTE into the floppy drive and copy it to volume 1 on the disk (You need not initialize volume 1—COPY2 copies the floppy, complete with directory):

J LOAD COPY2,S4
J RUN
COPY 2 — CORVUS SYSTEMS 1979
USE VOLUME 0 FOR FLOPPY DISKS
TO ENTER DEFAULT JUST PRESS RETURN ...
FROM SLOT (6) :?6
FROM DRIVE (1) :?
FROM VOLUME (1) :?0
TO SLOT (4) :?6
TO DRIVE (1) :?
TO VOLUME (0) :?1
OK TO COPY ? Y

COPY2 will copy all the files on the floppy (Slot 4, Drive 1, Volume 0 indicates a floppy) to the Corvus drive (Slot 6, Drive 1, Volume 1). It will take about a minute. After it is done, it will give you a chance to copy other files:

AGAIN (Y/N) :?

Reply N if you are done copying, reply Y if you want to copy more floppies to disk.

After you are done, try this:

| CATALOG, V1, S6

to list the files on volume 1 of the Corvus drive. You should see all the files you just copied from floppy to volume 1.

4.3.12 COPY2 initialized volume 1 when you copied the UTILITIES DISKETTE to it. But the remaining 81 volumes on the disk were zeroed by BFORMAT and must be initialized. You can initialize each one when you want to use it, but it is easier to use the Corvus program VOLUME INIT to initialize all 81 volumes at once: The program takes about four or five seconds per volume.

| LOAD VOLUME INIT, S6

| RUN

BULK VOLUME INIT PROGRAM

CORVUS SYSTEMS — 1979

ENTER FIRST VOLUME NUMBER: 2

ENTER LAST VOLUME NUMBER: 82

Take a coffee break—the program will take six minutes, but then all 82 volumes will be initialized and ready for storing data and you will never have to run it again (unless you zero the disk for some reason). (For more information on initializing, see Chapter 2 of the DOS 3.2 Manual.)

4.3.13 Your Corvus 11AP is ready for BASICS/only operation. Chapter 5 describes in detail how to use your BASICS/only system, including how to manipulate all 82 volumes, how to make your Apple boot from disk in any configuration, and a technical discussion of how the disk is organized.

4.4 Bringing Up Pascal/BASICS

WARNING

Configuring the system effectively removes all data from the disk drive. If you ever decide to reconfigure the system with data already on the drive, you must first be sure to backup your data.

4.4.1 Turn both your Apple and your Corvus 11AP off.



WARNING

Never insert or remove cables or cards with the power on. Serious damage to the Apple and the Corvus 11AP may result.

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 11AP into slot 6. From then on, your Pascal system will automatically boot from the Corvus drive.

4.4.2 Plug the Corvus 11AP personality card into slot 2 and the floppy controller into slot 6. This temporary setup will allow you to boot the Pascal system from the floppy drive.

4.4.3 Place the APPLE1: diskette, supplied with Apple Pascal, in the floppy drive and turn on your Apple. The system will load Pascal. (Normally, with a single drive system, you use the APPLE3: diskette to boot Pascal. APPLE1: is for multiple-disk systems, which is what you are about to configure!)

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

4.4.4 Use the Pascal Filer to copy all the files on APPLE1: onto a formatted blank diskette.

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

If you have, these commands will refresh your memory. They assume the back-up floppy is formatted and is named BLANK:.

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

(You type F)

FILER: G, S, N, L, R, C, T, D, Q [C.2]

(You type T)

TRANSFER ? APPLE1:

TO WHERE ? BLANK:

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:, again and again (actually about 20 times) until the floppy is copied and the computer tells you so with the message:

APPLE1: --> BLANK:

You now have a floppy copy. (Say it three times fast. Now you know why Apple likes to call them diskettes.)

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 a backup copy of APPLE1:.

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

4.4.5 Now you have two identical floppies, both named APPLE1: (when the Filer copied APPLE1: onto BLANK:, it renamed BLANK:).

Change the name of the new floppy to BRINGUP:. Use the FILER's C(HANGE command. From the FILER, type C. The FILER will respond:

CHANGE ? APPLE1:

CHANGE TO WHAT ? BRINGUP:

APPLE1 --> BRINGUP:

If you have trouble, refer to the Apple Pascal Reference Manual.

4.4.6 Now you have two copies of APPLE1: and the new one is named BRINGUP:. The next step is to copy two files from the CORVUS PASCAL UTILITIES floppy, supplied with your 11AP, to BRINGUP:, the newly-made copy of APPLE1:.

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:.

Refer to the Apple Pascal Reference Manual if you get stuck. These commands will jog your memory. (If you have two floppy drives, the dialogue will be slightly different).

FILER: G, S, N, L, R, C, T, D, Q [C.2]
TRANSFER ? CORVUS:BOOT.DATA
TO WHERE ? BRINGUP:\$

(You type T)

(The \$ just means "Give it the same name"—that is, BOOT.DATA.)

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 and you're done.

4.4.7 To be sure BRINGUP: is complete, list its directory:

FILER: G, S, N, L, R, C, T, D, Q [C.2]
DIR LISTING OF ? BRINGUP:

(You type E)

The system should respond with something like this:

BRINGUP:
SYSTEM.APPLE
SYSTEM.PASCAL
SYSTEM.MISCINFO
SYSTEM.EDITOR
SYSTEM.FILER
SYSTEM.LIBRARY
SYSTEM.CHARSET
SYSTEM.SYNTAX
BOOT.DATA
PFORMAT.CODE
<UNUSED>
10/10 FILES, 73 UNUSED, 73 IN LARGEST

(The information presented here will vary.)

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 section 4.4.6.

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 sections 4.4.3 through 4.4.5.

4.4.8 Turn on the Corvus disk drive. The drive will make a chirping noise, then that will dissolve to a windy purr. These are the normal sounds of a healthy drive.

4.4.9 Now it's time to write data to the Corvus drive. Place the BRINGUP: floppy that you have made into the floppy drive. If you are in the filer, type Q (for QUIT). You should see this:

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

You should execute PFORMAT.CODE. Type X.

EXECUTE WHAT FILE ? PFORMAT
PASCAL/BASICS FORMATTER
IT IS OK TO ERASE 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
.....

Here's what's happening. Your Apple is running a Pascal program called PFORMAT.CODE that prepares the Corvus drive for operation. First, it creates a "boot area" on the disk and fills the area with the information in BOOT.DATA. The boot data is used to boot your Apple when it is turned on. Then, PFORMAT copies the entire contents of BRINGUP: onto the drive as volume 1. (The disk structure is described more completely in section 6.8, "How the Corvus disk is organized.")

4.4.10 After PFORMAT finishes running, the computer will say

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

and wait for a response. You have successfully configured your Corvus 11AP Pascal system—go to section 4.4.12.

If, after 70 seconds, the above message has not appeared, something went wrong. Go to section 4.4.11, "What If It Doesn't Work?"

4.4.11 What If It Doesn't Work?

If when you try to execute PFORMAT, the system answers:

NO FILE PFORMAT.CODE

then check the contents of the BRINGUP: floppy (using the FILER's E command) to be sure PFORMAT.CODE and BOOT.DATA are present. If not, go to section 4.4.6. If they are present, go to 4.4.9 and try again.

If PFORMAT simply doesn't work, double check your cabling, check to see that the correct files are on BRINGUP: (see section 4.4.7), especially the file BOOT.DATA, and carefully repeat the procedures.

4.4.12 After you have successfully configured your 11AP disk drive, rearrange the cards into their final configuration. Here's how:



First, turn off the power to both your Apple and your 11AP.

Place the 11AP personality card into slot 6, making sure the flat cable exits gracefully (no kinks in the cable) 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 4. If you have two controllers (i.e., more than two floppy drives) plug the second controller card into slot 5. Arrange all the cables neatly and close your Apple.

4.4.13 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**

Note that the computer booted itself from the Corvus drive, not from the floppy!

(Don't worry if the system revision number and the date are different.)

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

The display should look like this:

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

Type F to get into the FILER.

Then type V to see a volume directory:

WARNING UNITS 4 & 9 HAVE THE SAME NAME

VOLS ON LINE:
1 CONSOLE:
2 SYSTEM:
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:. Since this is potentially dangerous, remove the floppy (after all, you won't need it now that your Corvus drive is up). Save the BRINGUP: floppy in case you ever have to reformat the drive.

Now, change the name of BRINGUP: to CORVUS1:. Be sure the floppy has been removed! Use the FILER's C(HANGE command:

CHANGE? BRINGUP:

CHANGE TO WHAT ? CORVUS1:

BRINGUP: --> CORVUS1:

Use the V command to verify that it worked:

VOLS ON LINE:

1 CONSOLE:
2 SYSTEM:
4# CORVUS1:
ROOT VOL IS — CORVUS1:
PREFIX IS — CORVUS1:

Now place any Pascal floppy into the floppy drive.

Type V again. You will get the same volume directory, but now unit 9 will bear the name of whatever floppy you inserted into the floppy drive.

Now type E to get a file directory.

DIR LISTING OF ? CORVUS1:

You will recognize the resulting directory as the same one you saw when you listed the directory of the BRINGUP: floppy, but this time the files are on CORVUS1:, a volume on the Corvus drive.

You can also list the contents of the floppy (type E followed by "#9:" or by the name of the floppy.)

4.4.16 Your Corvus 11AP Pascal/BASICS system is almost ready. The next step is to transfer some useful files onto CORVUS1:, the first volume on the disk.

But first, a word about transferring from floppy to disk. When you transfer between floppies, you often use this sort of dialogue:

TRANSFER ? VOL1:

TO WHERE ? VOL2:

That works, but requires that VOL1: and VOL2: are the same length and that you don't mind that VOL2: 's name is changed to VOL1:.

When you transfer VOL1: to VOL2:, you are saying, "transfer the whole volume." Sometimes that's convenient—in fact, part of the Pascal/BASICS installation procedure did that sort of transfer. But in general it is better to transfer VOL1:= to VOL2:\$, which means, "transfer all the files on VOL1: to VOL2:". The difference is that the directories are updated correctly, volume lengths are handled properly, and the destination volume name stays the same. For more information, consult the Apple Pascal Reference Manual.

4.4.16.1 Transfer all the files on the CORVUS PASCAL UTILITIES DISKETTE to

CORVUS1: on the disk. Place the PASCAL UTILITIES floppy in the floppy drive. Use the Filer's T command:

```
TRANSFER ? CORVUS:=  
TO WHERE ? CORVUS1:$
```

(\$ 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.

4.4.16.2 Transfer all the files on APPLE2: (supplied with Apple Pascal) to CORVUS1:. Place APPLE2: in the floppy drive.

```
TRANSFER ? APPLE2:=  
TO WHERE ? CORVUS1:$
```

4.4.16.3 Transfer the following files from APPLE3: to CORVUS1:.

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

Note that not all the files on APPLE3: will be transferred. The easiest way is to transfer using the ? wild card which asks for confirmation before it transfers:

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

... and so on, replying 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.

4.4.16.4 Use the Filer's E command to see what's on CORVUS1:.

DIR LISTING OF ? CORVUS1:

If you followed the procedures in this section exactly, CORVUS1: will contain the following files (not necessarily in exactly this order):

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

These are the files we suggest you have in CORVUS1:. The rest of this manual assumes that these files are there.

4.4.17 That completes the installation procedure for the Pascal/BASICS system.

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

Then proceed to Chapter 6 where you will learn to use the full storage capacity and data transfer speed of your Corvus 11AP Pascal/BASICS mass storage system.

CHAPTER 5 USING YOUR CORVUS 11AP WITH BASICS

This chapter assumes you are familiar with how your Apple with BASICS and the DOS 3.2 operating system works. Please refer to Chapter 1 if you are not familiar with Apple DOS 3.2.

This chapter describes how data is stored and files are manipulated using DOS 3.2 and the Corvus extensions. These features can be used from DOS 3.2, whether it is part of a BASICS/only system (installed as described by section 4.3, "Bringing Up BASICS/only") or part of a Pascal/BASICs system (installed per section 6.4, "Bringing Up Pascal/BASICs"). However, Pascal/BASICs users will find that they may have less than 82 DOS 3.2—format volumes and that their boot procedures are somewhat different. Please refer to Chapter 6, "Using Your Corvus 11AP with Pascal/BASICs" for boot procedures if you are using Pascal/BASICs.

WARNING

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

Section 5.1 describes how your 11AP BASICS system boots and how to change it.

Section 5.2 describes how to create a turn-key system.

Section 5.3 describes volumes.

Section 5.4 tells how to use DOS 3.2 and BASIC commands with your 11AP system.

Section 5.5 describes the utilities programs.

Section 5.6 tells how the BASICS/only disk is organized.

5.1 Booting

This section describes how your 11AP BASICS system boots and how you can tailor the boot procedures to fit your needs.

This section assumes your 11AP disk has been set up for BASICS operation according to the procedures in section 4.3, "Bringing Up BASICS/Only" or section 6.6, "Creating and Using DOS 3.2 Format Volume Under Pascal/BASICs".

5.1.1 How to Boot

If you have a BASICS/only system you boot using the command:

*6<CTRL>P, >PR#6, OR |PR#6,

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 X(ECUTE BASICs, or you can set the SETBOOT utility. See section 6.6, "Creating and Using DOS 3.2 Format Volumes Under Pascal/BASICs" and section 6.7, "Cold Boot Facility".

5.1.2 How Booting Works

No matter how you boot BASICS, the first thing that happens is that your

Apple executes the machine code stored in the "Cold Boot Area" at the beginning 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 "snapshot" of the Apple's main memory. The snapshot is taken by either a program called BOOT PREP, a program called APPLESOFT BOOT PREP, or a user program constructed as described in section 5.2, "Turn-key Systems". The Warm Boot is copied back into RAM when BASICS is booted, whether from a BASICS/only system or a Pascal/BASICs system.

WARNING

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. For instance, if your Apple was in Applesoft and the slot default was 6 when you ran APPLESOFT BOOT PREP, then it will be in the Applesoft with slot 6 the default when the Warm Boot Area is copied back into RAM.

5.1.3 Changing the Boot

When you first configured your BASICS system, the Warm Boot Area was automatically set up with RAM-based Applesoft. If that's the way you want your Apple to boot, fine. 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 5.2).

Example: You are now running Applesoft, but you want your Apple to boot Integer BASIC. Simply switch to integer BASIC:

JINIT
>

and run BOOT PREP:

>RUN BOOT PREP, S6

Note that 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.

Now, suppose you want to make your system boot in Applesoft again, with the default slot set to slot 4 (the floppy).

(to change to Applesoft)

]LOAD APPLESOFT BOOT PREP, S6

(to load BOOT PREP from the Corvus disk)

]CATALOG,S4

(to set the default slot to S4)

]RUN

(to run APPLESOFT BOOT PREP).

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.

5.1.4 What To Do If The Boot Doesn't Work

The boot method used by the Corvus 11AP is simple and powerful because when you boot, it gives your Apple the same exact system memory it had when you ran BOOT PREP (or APPLESOFT BOOT PREP or your own boot preparing program). But you can confuse it if you change your hardware configuration (for instance, 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 (for instance, if the switch on the ROM card is in the wrong position or if the wrong language is loaded into the Apple Language Card). You can usually recover by pressing <RESET>.

In a BASICS/only system, when the boot doesn't work, you can boot from diskette and run BRINGUP on the CORVUS BASICS UTILITIES DISKETTE, to connect the Corvus drive. Then set up the system the way you want it and run BOOT PREP, APPLESOFT BOOT PREP, or your own boot preparing program to re-write the Warm Boot Area.

5.2 Turn-key Systems

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 6.7, "Cold Boot Facility".)

To boot from a BASIC program, you must understand how the Warm Boot works. Read section 5.1, "Booting". Then try the program:

```
]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
```

Continued on
Page 35

THIS IS SAM'S BOOT PROGRAM

]NEW

Now, turn off your Apple, turn it on again, and boot it from slot 6. Here's what will happen:

THIS IS SAM'S BOOT PROGRAM

]

Here's what happened: When you ran the program, statement 40 called a Corvus machine language routine, located in a ROM on the Corvus Personality Card plugged into slot 6, that copies all of 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 no coincidence at all—look at the code:

```
]LOAD APPLESOFT BOOT PREP, S6
]LIST
```

Note 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.

5.3 About Volumes

Your Corvus 11AP has 82 DOS 3.2 format volumes, called V1 through V82. 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 3.2 commands allow you to specify a volume number. For instance,

```
]LOAD FISH,V8,S4
```

would load the file FISH if the floppy in slot 4 happens to have been initialized as volume 8. DOS 3.2 uses the volume number simply to check that the correct volume is in the floppy drive. (See the DOS 3.2 manual's section on "Drive, Slot, and Volume Options" for more information.)

Your Corvus 11AP uses the volume number to specify which of the 82 volumes on the disk you want. So, if the Corvus drive were plugged into slot 6,

```
]LOAD FISH,V8,S6
```

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

Continued from
Page 34

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

```
|LOAD BURD,V8  
|SAVE PORK BELLY
```

would load the program BURD from volume 8 and save it as PORK BELLY on volume 8.

5.4 Using DOS 3.2 and BASICS Commands With Your 11AP BASICS System

Most of the DOS 3.2 commands work exactly as they do for floppy-based systems except that the V option specifies which volume on the drive the command should operate on.

5.4.1 Catalog

The CATALOG command is special. Normally, it does what you'd expect:

```
|CATALOG,V10 |,S6|
```

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

But there's also a special form of CATALOG:

```
|CATALOG,V99 |,S6|
```

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 each volume is.

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. (Hint: 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 section 5.4.2).

5.4.2 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 LOCK-ing the first file on the volume. (Remember, good practice dictates that the first file on each volume is an explanatory "title" file.)

Consider the example:

```
|CATALOG,V99  
VOL DIRECTORY — CORVUS 11A — DRIVE 1  
  
01 CORVUS UTILITIES  
02 VENDORS  
07 EMPLOYEES  
  
|CATALOG,V7  
  
DISK VOLUME 007  
A 028 EMPLOYEES  
A 052 ADDRESSES  
A 003 SALARIES
```

```
|LOCK EMPLOYEES,V7  
WRITE PROTECTED
```

Now no one may write on volume 3. In fact, the command:

```
|UNLOCK EMPLOYEES,V3
```

will not work because V3 is protected and you cannot alter the EMPLOYEES file, even to unlock it! To unlock a volume, use these commands:

```
|POKE 1278,1  
|UNLOCK EMPLOYEES, V7
```

5.4.3 Using Files In Two Volumes

The READ and WRITE commands in DOS 3.2 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 1150 before performing the READ or 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/from different volumes.

5.5 Utility Programs

These programs are located on the CORVUS BASICS UTILITIES DISKETTE, (and, if you followed the installation instructions, are also on volume 1 of the disk).

5.5.1 COPY2

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

WARNING

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

COPY2 asks 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.

5.5.2 COPY3

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 cannot copy non-DOS 3.2-format diskettes. It requires 48K Bytes of RAM and will not run under RAM-based Applesoft. Use COPY2 if one of these limitations becomes a barrier.

5.5.3 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. (See the discussion of "hidden files" in section 5.4.1.)

VOLUME INIT asks for the numbers of the first and last volumes to be initialized. It initializes all volumes between the first and last, inclusive.

VOLUME INIT cannot modify a write-protected volume.

5.5.4 FILE FINDER

Suppose you forgot 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, enter N.

WARNING

When it finds the file, FILE FINDER unlocks it.

5.6 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 82 DOS 3.2 format volumes, each 227½ blocks long.

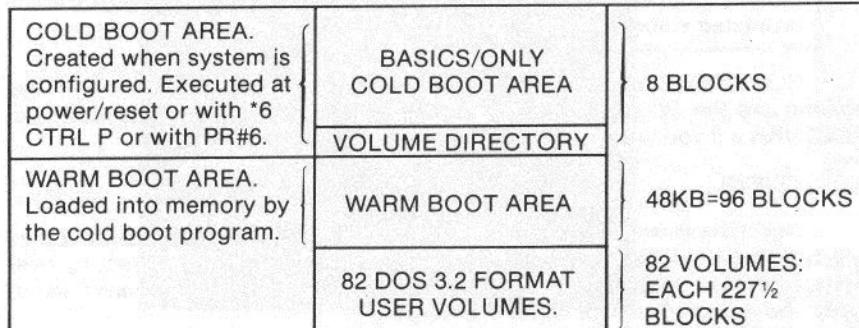
The Cold Boot data blocks were created by BFORMAT, the program you ran to format the disk for BASICS/only operation when you installed the system. These blocks comprise a machine language program that is executed at power-on/reset. The Cold Boot loads the Warm Boot Area into your Apple's RAM and causes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

The 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 6.7, "Pascal Cold Boot Facility".)

In fact, if you set up a Pascal system using SETBOOT to set up for BASICS boot, and VMGR's D(OSVOL command to set up an 82-volume DOSVOLUMES file, your disk would look exactly like the disk you have with a BASICS/only system.

For more information, see section 6.8, "How The Pascal/BASICS Disk Is Organized".

CORVUS 11AP BASICS/ONLY DISK CONFIGURATION:



CHAPTER 6 USING YOUR CORVUS 11AP PASCAL/BASICS

This chapter assumes you have installed your Corvus 11AP as a Pascal/BASICS system according to the instructions in section 4.4, "Bringing Up Pascal/BASICS". It also assumes you are familiar with how Apple Pascal works. Please refer to Chapter 1 if you are not familiar with Apple Pascal.

This chapter describes 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.

Section 6.1 describes volumes and how they are set up on the disk.

Section 6.2 is a step-by-step exercise that helps you quickly get acquainted with the Corvus Volume Manager (VMGR).

Section 6.3 describes the Volume Manager commands in detail.

Section 6.4 is a quick-reference guide to the Volume Manager commands.

Section 6.5 describes the BACKUP and RESTORE utilities.

Section 6.6 tells how to create and use DOS 3.2-format volumes.

Section 6.7 describes the Pascal booting facilities and turn-key operation.

Section 6.8 tells how the Corvus 11AP Pascal/BASICS disk is organized.

6.1 About Volumes

Your 11AP drive consists of 18,928 blocks of user-accessible data storage area. (There are 8 blocks on the disk that are not accessible; they are used for booting the system and for storing the volume directory and related information. See section 6.8.)

The data is divided into up to 63 volumes. A volume is like an imaginary floppy disk. Like a floppy, it has a name (such as CORVUS1: or APPLE1:) and up to six of them can be mounted at once (on Pascal I/O units 4,5,9,10,11 or 12).

A Pascal format floppy is 280 blocks long, but a Corvus volume can be any length in multiples of 8 blocks. You can divide the disk space in many ways; for instance, you can have one huge volume, 18,928 blocks long or up to 63 volumes of different lengths.

You can make the last volume on the disk a special DOS volume that contains DOS 3.2-format volumes. (See section 6.6.)

The volumes are manipulated by the Corvus Volume Manager (VMGR), described in this chapter, and the files in each volume are handled by the standard Pascal Filer, described in the Apple Pascal Reference Manual.

6.2 Getting Acquainted With The Corvus Volume Manager (VMGR)

This section helps new users rapidly learn how VMGR works. Sections 6.3 and 6.4 describe the commands in detail.

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

If you have just installed your system using the procedure in section 4.4, you will have one volume called CORVUS1: on the disk (and you may have volumes mounted in your floppy drives). Use the Filer's V command to see what is mounted. CORVUS1: should appear on unit #4.

Type Q to exit the Filer and start the Corvus Volume Manager by typing X, (for X(ECUTE) and then VMGR <RETURN>. (Hint: Make a copy of VMGR and call it V. Then you can use the volume manager by typing XV <RETURN>.) You will be greeted with:

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

And if you type <CTRL>A you will see the rest of the line:

D(OSVOL U(NMOUNT):

Use <CTRL>A to get back to the left-side of the screen.
Run through this exercise to quickly become familiar with VMGR.

6.2.1 Start by listing the volumes.

L CORVUS VOLUME DIRECTORY					
WP	NAME	LENGTH	ADDR	DRV#	UNIT
	CORVUS1:	1024	8	1	#4
<UNUSED>	17904		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 #1. It is 1024 blocks long, starts at block #8 on the drive, and it mounted on unit #4. Drives #2, 3, and 4 are offline (not connected). A "*" would appear in the WP column next to any volumes that are write-protected.

6.2.2 Write protect CORVUS1:.

W
ENTER VOLUME NAME: CORVUS1:
CORVUS1: NOW WRITE PROTECTED "*"

6.2.3 List volumes again. You will see a "*" in the WP column, adjacent to "CORVUS1:".

6.2.4 Remove the Write-Protect from CORVUS1:.

W
ENTER VOLUME NAME: CORVUS1:
CORVUS1: NOW UNPROTECTED

6.2.5 Use L to confirm that it worked.

6.2.6 Create a new volume called "NEW:".

N
NEW VOLUME: ENTER VOLUME NAME: NEW:
ENTER LENGTH (BLOCKS): 1024
ENTER CORVUS DRIVE # (1...4) : 1
ENTER ADDRESS (BLOCKS): 1032

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.

6.2.7 Type L to see your new volume listed.

L CORVUS VOLUME DIRECTORY					
WP	NAME	LENGTH	ADDR	DRV#	UNIT
	CORVUS1:	1024	8	1	#4
	NEW:	1024	1032	1	
<UNUSED>	16880		2056	1	

Note that NEW: has no unit assigned to it because it has not been mounted.

6.2.8 Mount NEW: on the next available unit.

M
MOUNT WHICH VOLUME: NEW:
MOUNT NEW: ON UNIT #12
NEW: MOUNTED

Note that you did not have to supply the UNIT# because VMGR suggested the response "12".

6.2.9 L to see the result. NEW: is now mounted on unit 12.

6.2.10 Remove NEW:.

R
ENTER VOLUME NAME: NEW:
OK TO DESTROY NEW?: Y

Note that you must type Y to confirm that you really wanted to destroy NEW:.

6.2.11 Use L to see that NEW: disappeared. Note that R(EMOVE is smart enough to unmount NEW:, then destroy it.

6.2.12 Create and mount NEW: again.

6.2.13 Unmount NEW:.

U
UNMOUNT: VOLUME "NAME" OR UNIT #:
NEW: UNMOUNTED ...

6.2.14 Mount a floppy. Place a floppy in the floppy drive. If you mount a Corvus volume in a unit that is occupied by a floppy, the floppy will no longer be accessible. If you want to access the floppy again, simply U(NMOUNT) the Corvus volume.

If CORVUS6: were mounted on #9; the floppy plugged into slot 4, drive 1 would be invisible. U(NMOUNT)ing CORVUS6: or mounting it on another unit would make the floppy available again.

6.2.15 If you list the volumes, the floppy does not appear because VMGR lists only the volumes on the disk drive. The Pascal Filer's V command, however, will show that the floppy is mounted on unit #9:.

6.2.16 List the volumes. The listing should look like this:

L CORVUS VOLUME DIRECTORY					
WP	NAME	LENGTH	ADDR	DRV#	UNIT
	CORVUS1:	1024	8	1	#4
	NEW:	1024	1032	1	
	<UNUSED>	16880	2056	1	

... etc.

6.2.17 Leave VMGR and use the Filer's V command to see the results:
Type Q to leave VMGR, F to start the Filer, and V for the V(OLS) command:

VOLS ON-LINE:	
1	CONSOLE:
2	SYSTERM:
4#	CORVUS1:
9#	(name of floppy in floppy drive)
	... etc.

Note that the floppy is mounted on #9:. NEW: does not appear because it is not mounted.

6.2.18 That completes the VMGR exercise. The next sections describe the commands in detail.

6.3 VMGR Commands

This section consists of a detailed description of the Corvus Volume Manager commands.

6.3.1 M(OUNT

The mount command assigns a volume to a specific unit (volume number). It is analogous to placing a floppy disk 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; for example, suppose a floppy is plugged into slot 4, drive 1. It would be unit #9. If a Corvus volume were mounted to unit #9, then the floppy would not be accessible—any references to unit #9 would refer to the Corvus volume.

To access the floppy again, simply U(MOUNT) the Corvus volume that is using the floppy's unit (or move the Corvus volume to a different unit).

6.3.2 U(NMOUNT

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

WARNING

When you turn your Apple on, it boots from the files on the disk. If you unmount the volume that contains the boot files SYSTEM, APPLE and SYSTEM.PASCAL, you will be unable to boot from the disk. You will then have to reconfigure the disk, effectively losing all the data on it. If you attempt to unmount this volume, VMGR will warn you of the danger and give you a chance to change your mind.

6.3.3 L(IST

Lists what volumes are on each disk in the system. A typical listing might look like this:

CORVUS VOLUME DIRECTORY					
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>	11104	3152	1	
	DOS1:	4680	14256	1	
	<OFFLINE>			8	2
	<OFFLINE>			8	3
	<OFFLINE>			8	4

The listing tells us that drive 1 contains 5 volumes: CORVUS1:, NEW:, TUNA:, ACCTS3:, and DOS1:. TUNA: is 72 blocks long, DOS1: is 4680 blocks long, and the others are each 1024 blocks long. There are 11,104 empty blocks between ACCTS3: and DOS1:.

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

The ADDR column gives the location (block address) at which each volume begins. Note that the first 8 blocks on each drive are unavailable. They are reserved for system use.

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 2, 3, and 4 are offline, that is, not connected. If they were connected, their volumes would be listed.

6.3.4 N(EW

Creates new volumes. The N(EW command asks for the name you want to give the new volume (the name must meet Apple Pascal volume name requirements) and for its length, drive number, and address. Default values for the length, drive, and address are provided—if you press <RETURN> when a question is asked, the displayed default is used.

6.3.5 R(EMOVE

Removes (and, if necessary, unmounts) and destroys the specified volume. R(EMOVE) gives you a chance to change your mind before it destroys the volume.

6.3.6 W(PROT)

If a volume is not protected, W(PROT) protects it. If it is protected, W(PROT) removes the protection.

6.3.7 D(OSVOL)

Creates a volume which can contain DOS 3.2 format volumes. See section 6.6.

6.4 VMGR Quick Reference Chart

Remember that volumes are similar to floppies. This quick reference chart describes the VMGR commands and the comparable floppy operation.

CORVUS VMGR QUICK REFERENCE CHART	
VMGR Command	Equivalent Floppy Operation
• L List volumes	Lists all floppies both mounted and not mounted
• N Create new volume	Format a new floppy and change its name
• R Remove a volume	Dismount and erase a floppy
• M Mount a volume	Place a floppy in a drive
• U Unmount a volume	Remove a floppy from a drive
• W Write protect (or un-protect) a volume	Place a write protect sticker on a floppy (or remove a sticker)
• D Create a DOS 3.2 format volume	No equivalent
• Q Quit (exit VMGR)	No equivalent

6.5 BACKUP and RESTORE Facilities

6.5.1 BACKUP is a Corvus utility that allows you to make backup copies of any Corvus disk volume. The backup copy can be made on a floppy or on 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). Call the first volume BAKUP1:, the second BAKUP2:, the third BAKUP3:, and so on.

X(ECUTE BACKUP. It will ask for the source volume name and proceed to make a back-up copy on BAKUP1:.

BACUP copies one files at a time from the source volume to BAKUP1:. If a file is too large for the space remaining on BAKUP1:, the program will stop and ask you to mount BAKUP2:. When BAKUP2: is full, the program will ask for BAKUP3: and so on.

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 occur if you are backing up to floppies and a file of over 280 blocks is encountered. BACUP 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.

6.5.2 RESTORE

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

RESTORE is a Corvus utility that reads fragmented backup files and recreates the originals, automatically merging the fragments created by BACKUP.

To use, simply X(ECUTE RESTORE.

Hint: If you use the Filer to restore a backup volume, be careful how you specify the transfer. If, for instance, you want to transfer from unit 9 to unit 5, don't transfer #9: to #5: instead, transfer #9:= to #5:= because it will preserve the name assigned to the volume on unit #5.

6.6 Creating and Using DOS 3.2 Format Volumes Under Pascal/BASICS

One of the main strengths of the Corvus 11AP Pascal system is that DOS 3.2 format files can be stored on the disk along with Pascal. This section describes how to create and use DOS 3.2 format volumes.

WARNING

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

6.6.1 Creating DOS 3.2 Volumes

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

To create DOS1:, simply use the D(OSVOL command in VMGR:

```
D  
CREATE DOS VOLUMES ON DRIVE:1  
BLOCKS RESERVED FOR SYSTEM.BASICS:24  
ENTER # OF DOS VOLUMES (MAX=78):20
```

VMGR will then create DOS1:. The process takes about 40 seconds for a 20-volume DOSVOLUMES and tells you what it's doing:

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

Here's what happened: First, VMGR created and mounted the volume DOS1: on #9:. It copied the file BASICS.DATA to DOS1: and created a file called DOSVOLUMES on DOS1: . Then it zeroed DOSVOLUMES and dismounted DOS1:

Mount DOS1: before you leave VMGR.

6.6.2 Configuring the DOS1: Volume

VMGR's D(OSVOL command creates a Pascal volume that contains a 48K Byte "Warm Boot Area" followed by a zeroed area that can hold DOS 3.2-format volumes and space for the file SYSTEM.BASIC.

It is important to understand what the Warm Boot Area and SYSTEM.BASIC are.

The Warm Boot Area contains a "snapshot" of the Apple's entire main memory—all 48K Bytes of RAM. (If your Apple has less than 48KB of RAM, the Area stores whatever you have.)

The DOS 3.2-format volumes are followed by space for a Pascal-format file called SYSTEM.BASIC. When you boot BASICS, SYSTEM.BASIC is loaded into the Apple Language card and the card is enabled, if the file is present. Note that when the card is enabled, your Apple will execute the language in it. There is no way to load the Language Card and 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: and does not create SYSTEM.BASIC. This section will tell you how to rewrite the Warm Boot Area and create SYSTEM.BASIC to make your BASIC SYSTEM come up the way you want.

6.6.2.1 What Do You Want?

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

Some examples:

Debbie has an Apple II with Integer Basic in ROM on the main board, wants Applesoft loaded into the Language Card, and wants to come up with Applesoft running.

Murray has an Apple II Plus with Applesoft in ROM but 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.

6.6.2.2 Loading The Language Card

Place the BASICS diskette, supplied by Apple, in your floppy drive. If, like Debbie in the previous section, you want Applesoft in the Language Card, use the Pascal Files to transfer the file FPBAS.DATA from BASICS: to DOS1: SYSTEM.BASIC.

```
TRANSFER? BASICS:FPBAS.DATA  
TO WHERE? DOS1:SYSTEM.BASIC
```

(Remember, you may need to use VMGR to mount the floppy. See section 6.3.1.)

If you want to put Integer BASIC in the language card, transfer BASICS: INTBAS.DATA to DOS1:SYSTEM.BASIC.

If you are like Murray and don't need the Language Card loaded, don't

create SYSTEM.BASIC. If you do, then when the system boots and loads the Language Card, the language in the card will start running, rather than the language in RAM or ROM.

6.6.2.3 Switch from Pascal to BASICS. Leave VMGR or the Filer (type Q) and X(ECUTE the Corvus program BASICS (not be to confused with Apple's BASICS diskette).

```
X  
BASICS  
>< -----><  
><  
><  
>< CORVUS 11A ><  
><  
>< -----><  
|
```

You are now in RAM-based Applesoft.

6.6.2.4 Next, you should copy all the files from the CORVUS BASICS UTILITIES DISKETTE onto volume 1 of the disk. That way, you will have all these handy programs available on the disk and you will get some practice putting programs on your disk.

Place the CORVUS BASICS UTILITIES DISKETTE into the floppy drive and copy it to volume 1 on the disk (You do not have to INIT the volume—COPY2 copies the whole floppy, complete with directory.)

```
|LOAD COPY2, S4
```

Reply N if you are done copying, reply Y if you want to copy more floppies. After you are done, try this:

```
|CATALOG,V1,S6
```

to list the file on volume 1 of the Corvus drive. You should see all the files you just copied from floppy to volume 1.

6.6.2.5 COPY2 initialized volume 1 when you copied the UTILITIES DISKETTE to it. But the remaining volumes on the disk were zeroed by BFORMAT and must be initialized. You can initialize each one 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.

```
|LOAD VOLUME INIT, S6  
|RUN  
BULK VOLUME INIT PROGRAM  
CORVUS SYSTEMS — 1979  
ENTER FIRST VOLUME NUMBER: 2  
ENTER LAST VOLUME NUMBER:
```

Enter the number of the last volume you want initialized. After it is done, (allow six minutes for 81 volumes) all the volumes will be initialized and ready for storing data and you will never have to run it again (unless you zero the disk for some reason). (For more information on initializing, see Chapter 2 of the DOS 3.2 Manual.)

6.6.2.6 Proceed to Chapter 5, where you will learn how BASICS boots and how to make it boot the way you want. Then you will learn how to use the DOS 3.2 commands to manipulate the volumes in your 11AP BASICS system.

6.7 Pascal Cold Boot Facility and Turn-key Operation

When you turn your Apple on (or press <RESET>), a "cold boot" occurs. The Apple executes the "cold boot" program on the disk in slot 6 (the Corvus drive).

The cold boot program will boot Pascal, using the files SYSTEM.APPLE and SYSTEM.PASCAL located in the first volume on the disk.

If you want your Apple to boot BASICS instead of Pascal at power-on/reset, then you should X(ECUTE the Corvus program SETBOOT. When SETBOOT asks:

P(ASCAL B(BASICS <ESC>

respond B for a BASICS boot. 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 5.1 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 (see section 6.6). If you do, your system will be unable to boot at all and you will have to reformat the disk, losing all your files.

If you wish to return to Pascal booting, enter

J(RUN PASCAL

to get back to Pascal and then X(ECUTE SETBOOT. When SETBOOT asks which system you wish to boot, respond P and your Apple will again boot Pascal.

You can make your Apple power-on running a BASIC program by using SETBOOT to set for BASICS boot and following the procedure described in section 5.2, "BASICS Turn-key Systems".

You can make your Apple power-on running a Pascal program by leaving SETBOOT configured for a Pascal boot and setting up Pascal to boot your program according to the procedure in Chapter 3 of the Apple Language System manual. The procedure is to change the name of a tested code file to SYSTEM.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, then your Apple will bomb every time you power-on and you may be unable to recover. Then you'll have to re-format the disk and lose all your files! The moral: Back-up your disk.

6.8 How The Corvus Pascal/BASICS Disk Is Organized

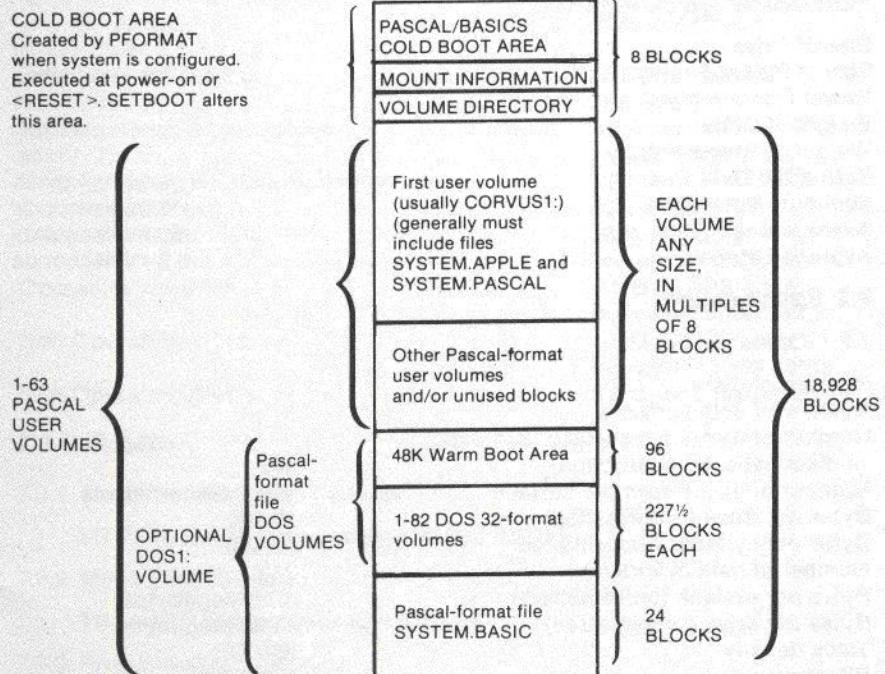
The Corvus disk consists of eight blocks (4K Bytes) of "Cold Boot" data followed by 18,928 blocks of user accessible space.

The Cold Boot data blocks were created by the program PFORMAT.CODE that you executed when you configured the disk. These blocks comprise a machine language program that is executed when you turn your Apple on or press <RESET>. It normally causes your Apple to boot Pascal, using the files SYSTEM.APPLE and SYSTEM.PASCAL that are located in the first volume (normally CORVUS1:) on the disk.

If you set the cold boot area to boot BASICS using the SETBOOT utility (see section 6.7), then the system will boot DOS 3.2 and BASICS at power-on.

When BASICS boots, whether at power-on or when the program BASICS is X(ECUTEd, the Warm Boot Area is loaded into Apple RAM and if the file DOS1:SYSTEM.BASIC is present, it is loaded into the language card and the card is enabled. See section 6.6 for more information.

CORVUS 11AP PASCAL/BASICS DISK CONFIGURATION



CHAPTER 7 HARDWARE SPECIFICATIONS

7.1 General Description

The Corvus 11AP Disk Drive is a fixed disk, sealed environment, "Winchester" technology drive. While not much larger than a floppy disk drive in size, it provides over 11 megabytes of storage (unformatted).

Its advanced technology base accommodates all major subassemblies. 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 d.c. drive motor with built-in disk spindle, motor electronics and speed control provides for universal 50/60 Hz operation.

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

Primary features of the Corvus 11AP Disk Drive are as follows:

- Fixed media (magnetically oriented and lubricated)
- "Winchester" type recording features
- Sealed environment, clean air filter system
- Brushless d.c. Drive Motor
- Small size
- No scheduled maintenance
- Daisy chain up to 4 drives

PERFORMANCE SUMMARY

Size of Drive.....	5.5 x 8.5 x 19.25 inches
Size of Power Supply	5.5 x 4.5 x 15.5 inches
Power Consumption.....	250 Watts
Weight of Drive.....	22 lbs.
Weight of Power Supply	13 lbs.
Formatted Data Capacity.....	9.5 Megabytes
Minimum Seek Time.....	10 milliseconds
Average Seek Time	50 milliseconds
Average Latency	8.3 milliseconds

7.2 Specifications

7.2.1 Operational

Number of disks	2
Number of data surfaces	3
Number of tracks per surface (354 data, 4 diagnostic, 60 guardband)	418
Number of data tracks per surface	350 + 4 Alternatives
Bytes per track (unformatted)	10,800
Bytes per cylinder (unformatted)	32,400
Number of data cylinders	350
Bytes per surface (unformatted)	3.78 Megabytes
Bytes per drive (unformatted)	11.34 Megabytes
Track density	300 TPI
Bit density	5,868 BPI
Rotational Speed	3,600 RMP ± 1%
Average Latency	8.33 ms

7.2 Specifications (cont.)

7.2.1 Operational(cont.)

Single track access time	10 ms
Average access time	50 ms
Maximum access time	100 ms
Data transfer rate	648 Kilobytes/second (5.1 mega Hz)
Recording code	MFM
Heads per surface	1
Data heads	3
Servo head	1
Start time	15 seconds (max.)
Stop time	15 seconds (max.)

7.2.2 Physical Dimensions

Height	5.5" max. (13.97 cm)
Width	8.57" max. (21.76 cm)
Length	19.25" max (48.89 cm)
Weight	22 lbs. (10 Kgm)

7.2.3 Environmental

Operating Temperature	50 F. to 120 F. (10 C. to 50 C.)
Operating Relative Humidity (no condensation)	20% to 80% R.H.
Operating Altitude	-1000 to +6000 ft. sea level
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

7.3 Reliability

7.3.1 Mean Time Between Failures	MTBF is calculated to exceed 10,000 hours.
7.3.2 Mean Time to Repair	The MTTR will not exceed 0.5 hours.

7.3.3 Preventive Maintenance

There is no preventative maintenance required on the Corvus 11AP disk drive.

CORVUS VMGR QUICK REFERENCE CHART

VMGR Command

- L List volumes
- N Create new volume
- R Remove a volume
- M Mount a volume
- U Unmount a volume
- W Write protect (or un-protect) a volume
- D Create a DOS 3.2 format volume
- Q Quit (exit VMGR)

Equivalent Floppy Operation

- Lists all floppies both mounted and not mounted
- Format a new floppy and change its name
- Dismount and erase a floppy
- Place a floppy in a drive
- Remove a floppy from a drive
- Place a write protect sticker on a floppy (or remove a sticker)
- No equivalent
- No equivalent