

# MultiRam Software Manual

For all  
MultiRam™  
Memory  
cards



Checkmate  
Technology

*Downloaded from  
Apple2Online.com*

# **MultiRam™**

## ***Software Manual***

**For All  
MultiRam™  
Memory Cards**

***First Edition  
July 1986***

**Checkmate  
Technology, Inc.**

509 South Rockford Drive

Tempe, AZ 85281

(800) 325-7347 • (602) 966-5802

## Disk Replacement Policy

If the MultiRam™ disk fails within 90 days of purchase, please return the disk with proof of purchase to Checkmate Technology, Inc. for FREE replacement.

After 90 days or if the disk has been physically damaged, include \$10 for replacement. Outside the United States, please include \$15 in U.S. funds for air mail replacement.

Replacement disks may be obtained FREE from your MultiRam dealer at any time. Take two blank disks to your dealer and you may copy the latest MultiRam software release to replace your non-working disk.

## Limitations on Warranties and Liability

Even though the software described in this manual has been tested and reviewed, neither Checkmate Technology, Inc. nor its software suppliers make any warranty or representation, either express or implied, with respect to this manual or the software described in it, their quality, performance, merchantability, or fitness for any particular purpose. As a result, the disk, software and manual are sold "as is," and you, the purchaser are assuming the entire risk as to their quality and performance. In no event will Checkmate Technology, Inc. or its software suppliers be liable for direct, indirect, incidental, or consequential damages resulting from any defect in the disk, software, or manual, even if they have been advised of the possibility of such damages. In particular, they shall have no liability for any programs or data stored in or used with Checkmate Technology products, including the costs of recovering or reproducing these programs or data. Some states do allow the exclusion or limitation of implied warranties or liability for incidental or consequential damages, so the above limitation or exclusion may not apply to you.

Apple Computer, Inc. makes no warranties, either express or implied, regarding the enclosed software package, its merchantability or its fitness for any particular purpose.

## Copyright

This manual and the software described in it are copyrighted by Checkmate Technology, Inc. You may not copy or otherwise reproduce the manual or software, without the written consent of Checkmate Technology, except in the normal use of software to make backup copies.

© 1986 Checkmate Technology, Inc. All rights reserved.

## Updates

Checkmate Technology reserves the right to make improvements in this manual and the software described in it at any time without notice. Checkmate Technology cannot guarantee that you will receive notice of revisions. You should contact your MultiRam dealer or Checkmate Technology for update information.

Written by: Richard Blanco

Apple and the Apple logo are registered trademarks of Apple Computer. Apple Pascal, AppleWorks, Backup/, DOS 3.3, FID, File, ProDOS, ProFile, and UniDisk 3.5 are trademarks of Apple Computer. BusinessWorks is the trademark of Manzanita Software. Catalyst is the trademark of Quark. Copy II+ is the trademark of Central Point Software. CPM is the registered trademark of Digital Research. CPU /c System Clock is the trademark of Creative Peripherals. David-DOS is the trademark of David Data. Diversi-Copy and Diversi-Dos are the trademarks of DRS. Finger Tips is the trademark of Synergistic Software. Fiscalis is the trademark of Vaiscorp. Fontrix is the trademark of Data Transforms. Locksmith is the trademark of Applied Business Systems. Macroworks and ProntoDoe are the trademarks of Beagle Brothers. MouseDesk is the trademark of International Solutions. MultiRam is the trademark of Checkmate Technology. ORCA/M is the trademark of Byte Works. Pinpoint, Pinpoint Spelling Checker, RAM Enhancement Kit and Switcher are trademarks of Pinpoint Publishing and Virtual Combines. Slot 3 Card is the trademark of Southern California Research Group. SuperCalc 3.0 is the trademark of Computer Associates. WordPerfect is the trademark of SSI International.

# Table of Contents

## Introduction

- 1 Software updates
- 2 Manual updates
- 2 About this manual
- 2 Help

## CHAPTER 1 Preparing Your Work Disks

- 4 What you will need
- 4 Copy the MultiRam disk
- 4 Using the Filer
- 7 Copying other disks

## CHAPTER 2 Expanding AppleWorks

- 11 About this chapter
- 11 Why expand AppleWorks?
- 12 Use more memory
- 12 Use new features
- 13 How to expand AppleWorks
- 13 What you will need
- 14 Creating an expanded AppleWorks
- 17 Expansion problems
- 17 Errors on the Startup disk
- 19 Errors on the Program disk
- 20 Errors on Startup or Program disks

## CHAPTER 3 Using Expanded AppleWorks

- 21 About this chapter
- 23 New Features
- 23 More memory
- 24 The MultiRam options screen
- 25 Loading printer information
- 26 Start AppleWorks option
- 27 Change Data base Limit option
- 30 Loading overlays
- 32 Memory in use indicator
- 32 Clock options
- 33 Clock commands
- 34 Clocks & data bases
- 34 ProDOS clock preparation
- 35 MacroWorks users
- 35 Clock cautions
- 36 Changing ON/OFF defaults

**CHAPTER 4**  
**Using Other**  
**AppleWorks**  
**Programs**

37	Working with large files
37	General considerations
37	Time
39	MultiRam size
41	File size differences
43	Word Processor files
44	Spreadsheet files
45	Data base files
45	Merging old data base files
50	Saving and loading files
50	Large files
51	Preparing for segmentation
52	Saving large files
58	Saving small files
58	AppleWorks own backup procedure
59	Preventing small file segmentation problems
60	Loading segmented files
61	Problems saving or loading segmented files
62	Hard disks & 3.5 inch UniDisks
63	Customizing AppleWorks
64	To modify either default
64	To turn time display off
64	To turn memory in use indicator off
65	To reverse modifications
65	AppleWorks references
65	Books
66	Apple user groups
67	MultiRam updates
69	About this chapter
71	Using expanded AppleWorks with a RAM disk
71	RAM disk benefits
72	How it works
73	Sizing the RAM disk
73	Requirements
74	To use MRAM with AppleWorks
74	What you will need
75	3 steps to MRAM
77	Using the RAM disk
78	Exiting and reentering AppleWorks
78	Apple's memory card
79	Using expanded AppleWorks with accessory programs
79	In memory programs
79	Pinpoint
79	Version required
80	Installation

	80	Updates
	81	Pinpoint & RAM disks
	81	MacroWorks
	81	Version required
	82	Installation
	82	Other features
	83	Jeeves
	83	Installation
	83	Jeeves & RAM disks
	84	File programs
<b>CHAPTER 5</b>		
<b>RAM Disks</b>	89	About this chapter
<b>Expalined</b>	90	What is a RAM disk?
	92	Why use a RAM disk?
	92	Speed
	93	Size
	94	How to use a RAM disk
	95	Which MultiRAM RAM disk should you use?
	97	RAM disk rules
<b>CHAPTER 6</b>		
<b>The ProDOS</b>	105	About this chapter
<b>RAM Disk</b>	106	The ProDOS RAM disk programs
	107	How the ProDOS RAM disk programs work
	107	ProDOS RAM disk specifications
	108	How to use the ProDOS RAM disks
	110	A ProDOS tutorial: Running programs with ProDOS
	110	Run programs, do not boot them
	110	Only system files can be run
	110	What is a system file?
	111	To identify a system file
	112	Finding system files to run
	115	Run commands and prefix
	115	Running one program after another
	116	"QUIT": ProDOS's program selector
	117	Prepare auto boot disks
	117	What you will need
	117	To create the auto boot work disks
	120	Using the ProDOS RAM disk manually
	120	The MultiRam Utility disk
	122	To use the Filer to copy files
	130	Keyboard commands
	130	Using the ProDOS RAM disk automatically: MULTIDRIVE.PRO & COPY.ALL
	131	Creating RAM disks from a program
	131	COPY.ALL to create and load MRAM
	132	Creating MRAM
	132	Copying files

	133	Customizing COPY.ALL
	134	Customization examples
	135	Auto-load Pinpoint accessories (and AppleWorks) to MRAM
	139	Using the ProDOS RAM disk automatically: MRAM.SYSTEM & LOADMRAM.SYSTEM
	140	MRAM.SYSTEM as the first system file
	142	Using LOADMRAM
	144	Time stamping without a clock
	144	Limitations
	145	Other utility programs
	145	File copiers
	146	Backup and restore programs
	146	Program selectors
	147	Desktop programs
	148	Customizing MRAM
	154	Programming tips and technical data
	156	COPY.ALL
	157	Error messages
<b>CHAPTER 7</b>		
<b>The DOS 3.3</b>		
<b>RAM Disk</b>		
	159	About this chapter
	160	The DOS 3.3 RAM disk programs
	160	How the DOS 3.3 RAM disk program works
	161	DOS 3.3 RAM disk specifications
	164	How to use the DOS 3.3 RAM disk
	164	Create a master disk
	165	What you will need
	165	To create the DOS 3.3 RAM disk master
	167	Using the DOS RAM disk manually
	170	Using the DOS RAM disk automatically
	171	An EXEC file for complete automation
	171	To create the Auto Boot disk
	173	Using the Auto Boot disk
	173	Customizing the DOS RAM disk
<b>CHAPTER 8</b>		
<b>Help</b>		
	181	But first...
	182	How to get help
	183	Disk replacements
	183	Disk updates
<b>Index</b>	185-188	



**List of Figures  
and Tables**

5	Figure 1.1	MultiRAM Utility main menu
5	Figure 1.2	Filer main menu
6	Figure 1.3	Filer volume commands
6	Figure 1.4	Volume copying
13	Figure 2.1	AppleWorks version number
16	Figure 2.2	Prefix or path screen
23	Figure 3.1	Expanded Desktop space
24	Table 3.1	Expanded Desktop space with MultiRam RAM sizes
25	Figure 3.2	MultiRam options screen
27	Figure 3.3	Data Base Limit screen
28	Table 3.2	Desktop space used for records
38	Table 3.3	Sample times
40	Figure 3.4	Example of overwriting overlays
40	Figure 3.5	Example of differnt overlay capacities
42	Figure 3.6	Large file BIG.DATA on disk
42	Figure 3.7	Large file BIG.DATA in memory
52	Figure 3.8	File size to be saved
55	Figure 3.9	File segmentation screen
56	Figure 3.10	Large file spanning multiple disks
58	Figure 3.11	AppleWorks normal save process
59	Figure 3.12	File segmentation with a small >68K file
60	Figure 3.13	Segemented file on one disk
72	Figure 4.1	Example of memory partitioning
73	Figure 4.2	Memory partion selector example
90	Figure 5.1	RAM disk created
91	Figure 5.2	RAM disk attached
91	Figure 5.3	RAM disk translation
96	Figure 5.4	ProDOS identification screen
106	Table 6.1	ProDOS RAM disk programs
109	Table 6.2	ProDOS RAM disk (MRAM) sizes and useable memory
111	Figure 6.1	System files on the MultiRam Utility disk
113	Figure 6.2	Pathname example
118	Figure 6.3	Format from the Filer
120	Figure 6.4	MultiRam Utility screen
121	Figure 6.5	ProDOS RAM disk menu
121	Figure 6.6	RAM disk installed screen
122	Figure 6.7	Filer main menu
123	Figure 6.8	Volume commands menu

123	Figure 6.9	MULTIRAM.UTIL volume listing
124	Figure 6.10	File commands menu
124	Figure 6.11	Listing of MULTIRAM.UTIL files
126	Figure 6.12	<b>To copy</b> one file
127	Figure 6.13	<b>Copy</b> all files by wildcard
128	Figure 6.14	<b>Setting</b> a prefix
129	Figure 6.15	The Filer's quit screen
142	Figure 6.16	LOADMRAM menu
149	Figure 6.17	MultiDrive.Pro options screen
151	Figure 6.18	Partitioning box
156	Table 6.3	MULTIDRIVE.PRO and MRAM.SYSTEM optional parameters
157	Table 6.4	ProDOS MLI error codes
160	Table 7.1	MULTIDRIVE.DOS RAM disk programs
162	Table 7.2	DOS 3.3 RAM disk general specifications
162	Table 7.3	RAM disk sizes and useable memory
163	Table 7.4	DOS 3.3 RAM disk sizes and drive distribution
166	Figure 7.1	MR.FID main menu
168	Figure 7.2	DOS 3.3 RAM disk screen
174	Figure 7.3	MULTIDRIVE.DOS options screen
179	Table 7.5	MULTIDRIVE.DOS optional parameters

# Introduction

This manual will show you how to use the AppleWorks™ expansion program and RAM disk software on the MultiRam™ Disk:

- Chapter 1 will show you how to prepare working copies of your MultiRam disk.
- Chapters 2 to 4 guide you in preparing and using MultiRam expanded AppleWorks.
- Chapters 5 to 7 detail the use of ProDOS and DOS 3.3 RAM disks.

Instructions for using other utility programs included on the disk, such as the RAM test software, are found in the MultiRam card manual.

The MultiRam disk is included with your MultiRam card.

## Software Updates

MultiRam's AppleWorks expansion software and RAM disk software are frequently updated to offer you more features and improved performance.

Updated software is available at no charge from your MultiRam dealer (bring blank disks to copy the new software) or at a nominal charge from Checkmate Technology.

Contact your dealer or Checkmate Technology for the latest update information.

## Manual Updates

Because AppleWorks expansion and RAM disk software are frequently updated, documentation for these programs has been put into this separate manual.

You may get information about updated software in two ways in the future.

- First, information about updates can always be found in the text file "RECENT CHANGES" on the back of the MultiRam disk.

This file will outline additions and changes made since the last revision of the software. Select option "4" from the MultiRam Utilities screen to print the "RECENT CHANGES" file to your screen or printer.

For most new features or upgrades, this file will give you all the information you need to use the new disk.

- Second, updates of this manual will also be available at a nominal cost from Checkmate Technology with more detailed information about the upgrades than is found in the "RECENT CHANGES" file.

## About This Manual

These notes are explanations of terms you see in *bold italics* in the text or an important side note.

To make the best use of this manual, you should be at your Apple following the instructions and trying the examples as you read.

You will see some notes in the margins as you read.

Keys that you are to press together at the same time are shown in smaller bold type with a "+" between them:

⌘ + **Control** + **Reset** means press the Open-Apple, Control, and Reset keys at the same time. No plus signs means press the keys one after the other.

Characters you should type in from the keyboard are shown ....in this type face.

## Help

Refer to the Help chapter at the end of this manual if you have any questions about your MultiRam software that this manual does not answer.

## Chapter 1



# Preparing Your Work Disks

The MultiRam™ disk will allow you to expand AppleWorks™ to use your MultiRam card's memory and will create ProDOS and DOS 3.3 RAM disks from MultiRam's memory.

The front side of the MultiRam disk contains the AppleWorks expansion program and the DOS 3.3 RAM disk software. The back side of the MultiRam disk contains the ProDOS RAM disk software and other utility programs.

Both sides of your MultiRam disk are unprotected and can be easily copied.

You should now prepare a backup working copy of both sides of the disk and use these working copies in the rest of the manual.

You should NOT use the original disk to protect it from accidental damage.

## What you will need

### ■ A disk copy program

You may use any disk copy program to make a backup copy.

Newer versions of COPY II+™, Diversi-Copy™, Locksmith™ and other copy utilities will copy most of a disk into MultiRam's memory to make copying fast. If you have more than 128K on your MultiRam card, some programs can copy *all* of a 5-1/4 inch floppy disk into memory in one pass to make copying *very fast*.

If you are using a one drive Apple, you may want to purchase one of these newer copy programs to make any future copying fast and easy.

If you do not have a copy program, the Filer, Apple's ProDOS disk copy program, is included on the Utility side of the MultiRam disk (back side) to make your backup copies.

### ■ Two blank disks.

You will copy the front of the MultiRam disk to the first blank disk, the back to the second blank disk.

## Copy the MultiRam Disk

Put a write protect tab on the front of your original MultiRam disk before you copy it. Store the original disk safely away once you finish copying it.

Use your copy program to make a copy of the front of the MultiRam disk and a copy of the back of the disk.

Label the copy of the front "MultiRam AppleWorks Expansion & DOS RAM Disk." Label the copy of the back "MultiRam Utilities & ProDOS RAM Disk."

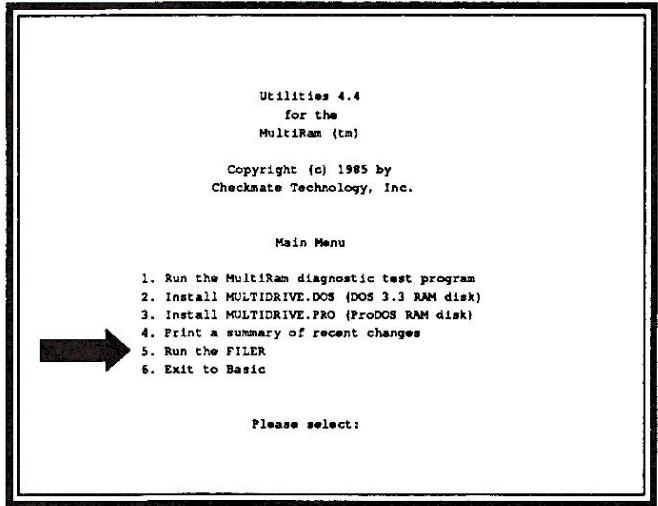
## Using the Filer

Use the following instructions to first make a copy of the front of the MultiRam disk. Then repeat the instructions to make a copy of the back of the MultiRam disk.

- 1** *Boot* the Utility side (back) of the MultiRam disk.
- 2** Press "5" to choose "Run the Filer" from the Utility menu.

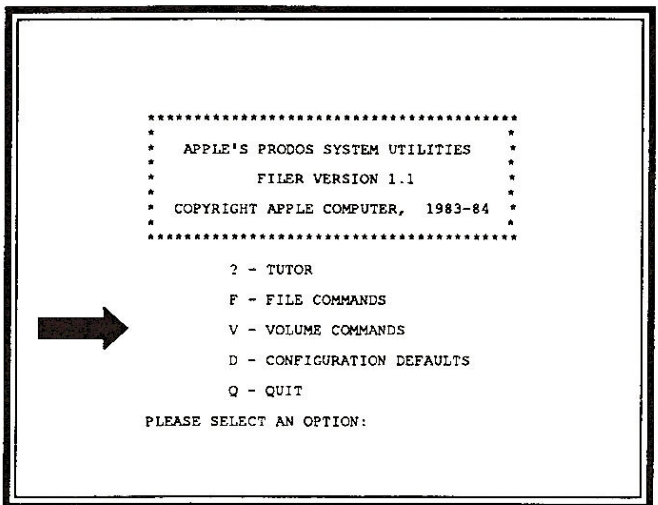
**Figure 1.1**  
**MultiRam**  
**Utility main**  
**menu**

You "cold boot" a disk by turning on the Apple with a disk containing an operating system on it in slot 6, drive 1. With the Apple on, you "warm boot" a disk by pressing the  $\text{⌘}$ , Control, and Reset keys at the same time and then release the Control and Reset keys while holding the  $\text{⌘}$  key for a second longer.



- 3** Press "V" to choose the "VOLUME COMMANDS" option from the Filer's main menu

**Figure 1.2**  
**Filer main**  
**menu**







- 6 Insert your MultiRam disk (with a write protect tab on it) into the "copy from" disk drive and your blank disk into your "copy to" disk drive. Press the **Return** key twice.

One drive users should put in the original disk and press the **Return** key twice. When you see "INSERT DESTINATION DISK" at the bottom of the screen, put in the blank disk and press the **Return** key.

- 7 If you placed a formatted disk into the destination drive instead of a blank disk, you will see a "DESTROY?" message.

Remove the formatted disk and press "N" if the disk has files you want to save. Press "Y" otherwise and the disk's contents will be erased.

- 8 Follow the on screen messages until you see "COPY COMPLETE".

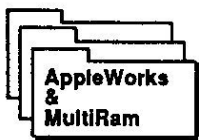
One disk drive users will need to swap disks about 18 times before copying is completed.

## **Copying other disks**

If you will use AppleWorks from 5-1/4 inch floppies, leave the "COPY A VOLUME" program on screen to use in making AppleWorks copies in Chapter 2.

You should make backup copies of the disks you will create when following instructions in the rest of the manual. Use the Filer's volume copy command to make those backup copies.





# AppleWorks™ & MultiRam™

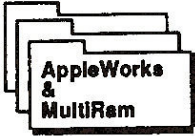
MultiRam cards and software release the power locked up within AppleWorks!

This chapters in this section will help you get the most from your AppleWorks and MultiRam card combination:

- **Chapter 2: Expanding AppleWorks**  
Step-by-step instructions to expand your AppleWorks disks to use all of MultiRam's memory.
- **Chapter 3: Using expanded AppleWorks**  
How to effectively use AppleWorks' expanded memory and new features.
- **Chapter 4: Using other programs**  
How to use expanded AppleWorks along with MultiRam's ProDOS RAM disk and with popular AppleWorks accessory programs.



## Chapter 2



# Expanding AppleWorks™

This chapter will show you how to expand AppleWorks so it can use your MultiRam card's large memory.

### About this chapter

This chapter explains the additions MultiRam software will make to AppleWorks, describes what you will need to expand AppleWorks, gives step-by-step instructions for expanding AppleWorks, and provides help if you should have any problems expanding AppleWorks.

### Why expand AppleWorks?

AppleWorks is the most widely used program for the Apple® //e and //c. But AppleWorks' real usefulness is limited by the small 55K Desktop provided by an ordinary 128K Apple //e or //c.

With a 55K Desktop, although twelve files can be on the Desktop, only one medium size file can be on the Desktop at a time. You would have to remove a 45K spreadsheet file from the Desktop to make room for a 12K word processor or data base file.

With a 55K Desktop, file sizes are also limited to 55K so that large files must be broken into parts to use. You would have to split your 90K customer database into two 45K files, A-L and M-Z, based on your customers last names.

MultiRam cards and software eliminate such 55K limitations and add new features to AppleWorks to increase its usefulness.

With MultiRam you can:

### Use more memory

- Expand Desktop space up to 758K (3,793K with an extension card) in the //e and up to 425K in the //c!
- Create individual files as large as the Desktop!
- Put many medium size or large files on the Desktop at once!
- Enter up to 23,000 records into a data base versus the standard 1,350!
- Type 4,850 lines in a word processor file (about 100 single spaced pages) versus the standard 2,250!

### Use new features

- Automatically save large files over multiple floppy disks!
- Load ALL of AppleWorks into memory *including printer information* to:
  - Speed up AppleWorks!
  - Minimize the need for a second floppy drive!
- Easily use a large RAM disk along with a large Desktop!
- Show the date and time on screen in AM-PM or 24 hour formats with all //e and //c ProDOS clocks!
- Enter the date or time into databases with one keystroke!
- Automatically date all database reports!
- Use Desktop accessories like Pinpoint , MacroWorks, or Jeeves with an expanded AppleWorks program!

## How to expand AppleWorks

When you finish the following instructions, you will have created a modified copy of AppleWorks on a floppy or hard disk that can use MultiRam's added memory and added features.

Your modified AppleWorks program will be ready to use immediately. Simply start AppleWorks and use all its new features. You will not have to reconfigure the program even if you later add more memory to the card.

## What you will need

### ■ The AppleWorks Expansion Disk

This is the work disk you created in Chapter 1 labeled "MultiRam AppleWorks Expansion".

### ■ 128K or more RAM on MultiRam

AppleWorks expanded with MultiRam software will NOT work with less than 128K of RAM on your MultiRam card!

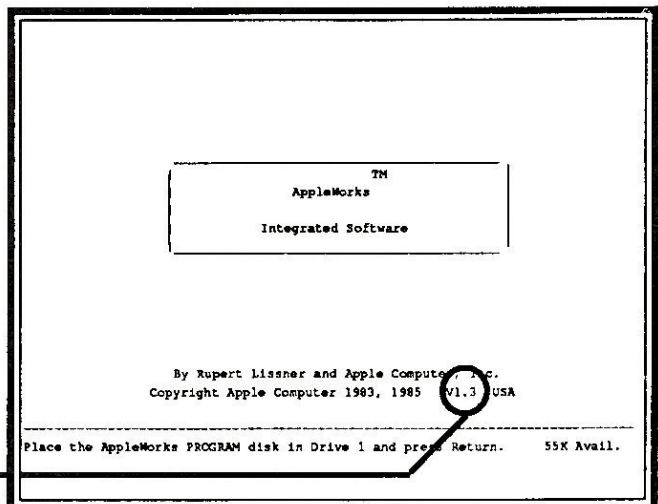
### ■ AppleWorks Versions 1.2 or 1.3

MultiRam Version 4.4 or higher AppleWorks expansion software works ONLY with AppleWorks versions 1.2 or 1.3.

Upgrades from older versions 1.0 or 1.1 are available from authorized Apple dealers: 1.2 upgrades are free, 1.3 upgrades cost \$20.

## Figure 2.1 AppleWorks Version Number

To see your AppleWorks version number, insert your original AppleWorks Startup disk into drive 1 and turn on your Apple. The version number is shown at the bottom right of the first AppleWorks screen.



## ■ 1 to 2 blank disks

If you use AppleWorks from 5-1/4 inch floppy disk, you will need two blank disks to prepare your modified AppleWorks disks.

If you use AppleWorks from a 3.5 inch UniDisk, you will need one blank 3.5 inch disk.

Hard disk users will need a subdirectory with about 200K free.

## Creating an expanded AppleWorks

6 steps

### 1 Make backup copies of your AppleWorks disks.

#### 5-1/4 inch Floppy Disk Users

Copy the AppleWorks Startup disk and Program disk to blank disks. Use the same copy program and procedure you used in Chapter 1.

#### Hard Disk or 3.5 Inch UniDisk Users

Copy all programs from the Startup and Program disks to the same directory or subdirectory on the hard disk or UniDisk following copy instructions in the AppleWorks manual.

## ■ Original or modified AppleWorks

To eliminate any potential problems, you may wish to make your copies from your **original** AppleWorks disks.

You can also make your backup copies using *some* already modified AppleWorks disks.

## ■ DO COPY modified AppleWorks disks that have:

- √ Custom printers saved to disk
- √ Custom data disk drives or pathname
- √ ProDOS modified for clock drivers
- √ Modified help files (from the MacroWorks disk)
- √ Modified error beeps (from the MacroWorks disk)

These modifications will be included in the new expanded AppleWorks disks you will create.



■ **DO NOT COPY** AppleWorks disks previously modified for:

- √ MultiRam or other large memory cards
- √ PinPoint
- √ MacroWorks
- √ Fingertips
- √ Time display within AppleWorks for clock cards

These modified AppleWorks disks **WILL NOT** be recognized by the MultiRam expansion program.

See "Using expanded AppleWorks with accessory programs" later in this chapter for more information about these programs.

Pinpoint and MacroWorks modifications must be made AFTER MultiRam modifications in order to work.

**2** Boot the backup working copy of the AppleWorks memory expansion disk you made in Chapter 1. Press the **Return** key to begin the program.

**3** Press the **Return** key to continue after you have read the "Getting Started" screen instructions.

A pathname tells ProDOS how to find files. A pathname normally starts with a slash followed by a volume name (the name of your disk or hard drive). One or more directory names separated by slashes can follow the volume name – for example `"/Volume name /Directory/`. See Chapter 5 for more information.

**4** Enter a *pathname* –or– press the **Return** key at the "Prefix or Path" screen.

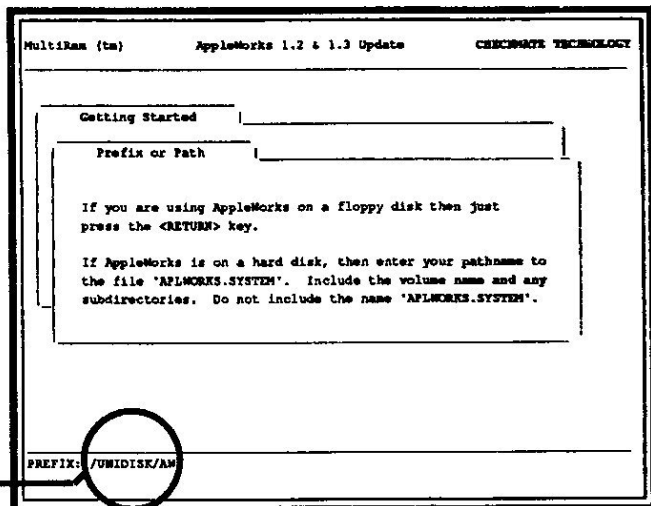
### Floppy Disk Users

Press the **Return** key to continue.

### Hard Disk or 3.5 Inch UniDisk Users

Enter the pathname leading to the `APLWORKS.SYSTEM` file. Press the **Return** key after you have entered the pathname and AppleWorks will be automatically configured. Skip steps 5 and 6.

**Figure 2.2**  
**Prefix or**  
**Path Screen**



Example of what to enter if your AppleWorks files are on the pathname "/UNIDISK/AW."

- 5** Insert your backup Startup disk into disk drive 1 when prompted to do so by the "Startup Disk" instructions on screen. Press the Return key.

The floppy drive will stop in about twenty seconds. When it stops, your expanded Startup disk will be ready for use with the MultiRam card. Label this disk "AppleWorks Startup/MultiRam V4.4" to avoid future confusion.

- 6** Insert your backup Program disk into disk drive 1 when prompted to do so by the "Program Disk" screen. Press the Return key.


The disk will stop in about 40 seconds. Your Program disk is now ready for use with MultiRam. Label your disk "AppleWorks Program/MultiRam V4.4" to avoid future confusion.

You should see a message informing you that AppleWorks has been successfully modified.

AppleWorks can now use all of your MultiRam card's memory.

Follow the on-screen instructions to start expanded AppleWorks so you can follow the examples in the next section "Using Expanded AppleWorks."

In the future, simply boot AppleWorks as you always have to run the new, expanded AppleWorks the MultiRam card provides you.

**Run your  
new  
AppleWorks** 

NOW...turn to Chapter 3 to learn how to use your newly expanded AppleWorks.

If you did not succeed in expanding AppleWorks, read "Expansion Problems" before going on.

## **Expansion Problems**

You may see an error message when trying to expand your AppleWorks program. The most common error messages and solutions for the problems causing them follow.

### **Errors on the Startup Disk**

See Chapter 5 for pathname information.

#### **■ Can't follow the path**

The volume name is not the same as the one given at the "Prefix or Path" screen. The AppleWorks expansion program looks for the default volume name "APPLEWORKS", or the pathname you enter at the "Prefix or Path" screen, to find the files it needs to modify.

To check the volume name, insert your suspect floppy in slot 6, drive 1. Type "CAT, S6, D1" after you are at the Applesoft prompt. The disk's name will be printed at the top of the screen.

If you are modifying AppleWorks on 5-1/4 inch floppies, **check the volume name** of the Startup and Program disks to see if they are named "APPLEWORKS". If not, you can rename the volumes using the Filer's volume command "R - RENAME A VOLUME". You could also enter the actual name at the "Prefix or Path" screen.

You can also use the Filer's Volume command "L-LIST VOLUMES" to check the suspect disk.

If you are not sure why the volumes have been renamed, to be safe, recopy AppleWorks from ORIGINAL, unmodified AppleWorks V1.2 or V1.3 disks and try again.

If you are using a 3.5 inch floppy or a hard disk drive, recheck the pathname leading to the AppleWorks files to make certain it is the same name you specified at the "Prefix or Path" screen. Make certain that you have included all subdirectory names. You can use the Filer file command "L - LIST PRODOS DIRECTORY" to check this.

### ■ Can't recognize this version of AppleWorks

The most common problem.

You made your backup copy from AppleWorks version 1.0 or 1.1. -- or -- you made your backup copy from a disk that was already modified for MultiRam, Pinpoint, or another manufacturer's large memory card.

Recopy AppleWorks from ORIGINAL, unmodified AppleWorks 1.2 or 1.3 disks and try again.

### ■ Can't find : APLWORKS.SYSTEM

The file "APLWORKS.SYSTEM" is not on the pathname given at the "Prefix or Path" screen.

List the names of the files on the pathname you used. You can list the files using the Filer's file command "L - LIST PRODOS DIRECTORY" or by entering "CAT/<pathname>" if you are at the Applesoft prompt. The file "APLWORKS.SYSTEM" spelled exactly as shown must be on the pathname.

If the file is spelled differently, the file has probably been modified by another program. For example, MacroWorks renames the file to "APLWORKS.SYS". If the file is spelled differently or if it does not appear, recopy AppleWorks files from an ORIGINAL, unmodified 1.2 or 1.3 version of AppleWorks.

## ■ Can't find : SEG.00

The file "SEG.00" is not on the pathname given at the "Prefix or Path" screen.

List the names of the files on the pathname you used. You can list the files using the Filer's file command "L - LIST PRODOS DIRECTORY" or by entering "CAT/<pathname>" if you are at the Applesoft prompt. The file "SEG.00" spelled exactly as shown must be on the pathname.

If it is spelled differently or if it does not appear, recopy AppleWorks files from an ORIGINAL, unmodified 1.2 or 1.3 version of AppleWorks.

## Errors on the Program Disk

### ■ Insert your backup of the AppleWorks Program disk in disk drive 1 and press the <RETURN> key

This message appears once to prompt you to insert your backup Program disk.

If the message appears again, you are inserting the wrong disk or the Program files "SEG.M0" or "SEG.M1" are missing or do not have these exact names.

If you are using a 5-1/4 inch floppy, check the volume name of the disk you are using. It should be "APPLEWORKS". If it is not, then it must be the same name as the Startup volume.

You can use the Filer volume command "L - LIST VOLUMES" to check the floppy volume name. Rename the volume using the Filer volume command "R - RENAME VOLUME" or recopy the original Program disk if the volume name is incorrect.

List the files on the pathname given at the "Prefix or Path" screen. If the required files are missing or remained, or if they are correct but the error message continues, recopy these files from an original AppleWorks 1.2 or 1.3 Program disk.

You must turn off the Apple to exit from this error if your AppleWorks disk is not correct.



**Errors on  
Startup or  
Program  
Disks**

■ **Problem during read**

-or-

■ **Problem during write**

The floppy disk drive door may be open. Close the disk drive door and press the **Return** key to try again.

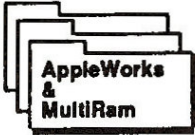
The floppy disk or the area of the hard disk used may have a physical flaw that prevents it from being written to or read. Try copying AppleWorks to another floppy or to a different area of the hard disk.

■ **Disk is write protected**

A write protect tab is on the floppy disk. Remove the write protect tab from the floppy disk

The hard disk volume is not write enabled. Use your hard disk utilities to write enable the hard disk volume.

## Chapter 3



# Using expanded AppleWorks

Once you have expanded AppleWorks, you are ready to use it with your MultiRam card.

### About this chapter

This chapter will show you how to:

- Use new features added to AppleWorks.
- Work with large files.
- Save and load files over multiple disks.
- Customize some new features.

References at the end of the chapter will help you get even more benefits from your expanded AppleWorks.

Each of expanded AppleWorks new features is discussed in the order you will see them on screen when you use the program.

Follow along with the discussion at your Apple as you read.

You may want to skim chapter sections about working with large files and return to read them once you start creating large files.

If you do skim over sections on large files, be sure you carefully read "Small Files" under the "Saving and Loading" files heading.

If you are not aware of changes made to AppleWorks to allow large files to be saved over multiple disks, you may find some peculiar things happen when you save small files.

If you have read "Saving and Loading" files, you will have no problems when saving any size file with your expanded AppleWorks.

If you have split one or more large data base files into several parts because they would not fit into the old 55K Desktop, you may want to gather those disks together now to try some of the suggestions in "Merging old data base files."

Once you have read this chapter and feel comfortable working with your newly expanded AppleWorks, read Chapter 4 on using expanded AppleWorks with a RAM disk or with accessory programs such as Pinpoint and MacroWorks.

You will find that using expanded AppleWorks with a RAM disk and an accessory program significantly improve the performance of AppleWorks.

Refer back to this chapter if you find AppleWorks doing something you did not expect. All changes to AppleWorks are detailed in this chapter.



## New features

Expanded AppleWorks has many new features. Most of the new features can be seen when you boot the AppleWorks Startup disk.

Following are explanations of each of the new features you will see and instructions on how to use these new features.

Insert your newly expanded AppleWorks Startup disk into your boot drive and turn on your Apple.

## More Memory

Stop at the first screen and note the size of your Desktop at the lower right corner. This is the first difference from ordinary AppleWorks you will see.

The size of expanded Desktop you see depends upon the type of MultiRam card you are using and the amount of memory on the card.

Desktop sizes can range from 93K to over three megabytes.

**Figure 3.1**  
**Expanded Desktop space**

The Desktop size you would see with a 1 megabyte MultiRam card when first booting AppleWorks.

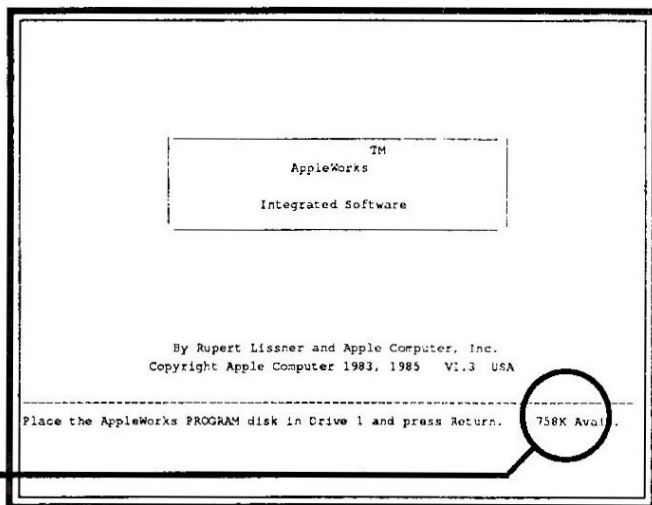


Table 3.1 shows the most common sizes for each card

**Table 3.1**  
**Expanded**  
**Desktop**  
**space with**  
**MultiRam**  
**RAM sizes**

MultiRam RGB or //e	Desktop Size	MultiRam RGB + //e	Desktop Size 2	MultiRam CX	Desktop Size
128K	93K	1088K	805K	256K	235K
192K	140K	1152K	852K	320K	283K
256K	188K	1216K	900K	512K	425K
320K	235K	1280K	947K		
384K	283K	1344K	995K		
448K <sup>1</sup>	330K	1408K	1042K		
512K	378K	1536K	1137K		
576K	425K	1600K	1185K		
640K <sup>1</sup>	473K	1792K	1327K		
704K <sup>1</sup>	520K				
768K	568K				
832K <sup>1</sup>	615K				
896K <sup>1</sup>	663K				
960K <sup>1</sup>	710K				
1024K <sup>1</sup>	758K				

1 MultiRam RGB card only

2 If you see 64K less memory on the Desktop, you will need a new PAL for your //e card. PAL upgrades are FREE through Checkmate.

The MultiRam™ Plus expansion card, which also attaches to the back of the MultiRam RGB card, allows a maximum 3,793K Desktop.

### The MultiRam Options screen

Proceed to the next AppleWorks screen "GETTING STARTED".

Press **Return** to continue. Enter the current date if needed.

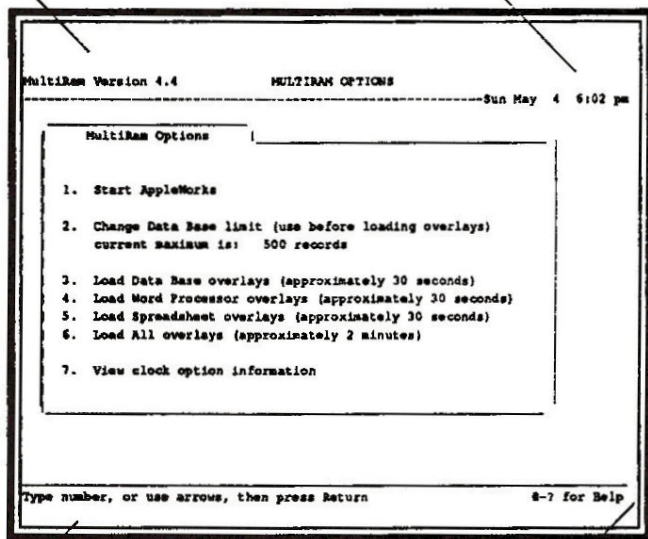
You will then see a new screen appear:  
MULTIRAM OPTIONS.

This is the second difference from ordinary AppleWorks you will see.

Shows which version of MultiRam software updated AppleWorks.

On-screen time and date display.

**Figure 3.2**  
**MultiRam**  
**Options**  
**screen**



Location for "Loading printer information" message.

Location for Memory IN USE indicator.

### Loading Printer information

While the Program disk is still spinning, if you look very quickly at the bottom left corner of the MULTIRAM OPTIONS screen (where "Type number...." is in Figure 2.4), you will see the message "Loading Printer information . . ." appear very briefly.

The message tells you that all current information about your printer(s) has been loaded into memory.

Normally, the Program disk must be in a disk drive when you print because it contains commands for your printer. With all printer information loaded into memory by expanded AppleWorks, you will not need the Program disk in a disk drive to print.

Loading printer information occurs without regard to the amount of RAM available. As you will see later, if you have 256K or more RAM on the MultiRam card, you may actually put ALL of AppleWorks functions into memory, including printer functions, and remove the Program disk completely!

### Important

Startup is the only time printer information is loaded. If you re-configure your printer(s) when working in AppleWorks, any following printing will use the information that was loaded into memory during startup, not the printer information you just entered. The new printer configuration will be saved to disk as always but will not be copied into memory until you next bootup AppleWorks.

To create a new printer configuration:

1. Boot AppleWorks. Do not load any files.
2. Make your printer changes and let AppleWorks save them to disk.
3. Reboot AppleWorks so that the changed printer configuration can be loaded into memory.

Now that your disk has stopped loading printer information, let's examine our new options.

### **Start AppleWorks option**

Choosing option 1 will take you to AppleWorks main menu screen.

If you choose option 1 now, you will have a 500 record database and, as usual, the Program disk must be left in a disk drive so AppleWorks can load program parts into memory as needed.

Using other options before choosing option 1, you can have up to 23,000 records in your database and you can load all of AppleWorks into memory so that the Program disk is no longer needed.

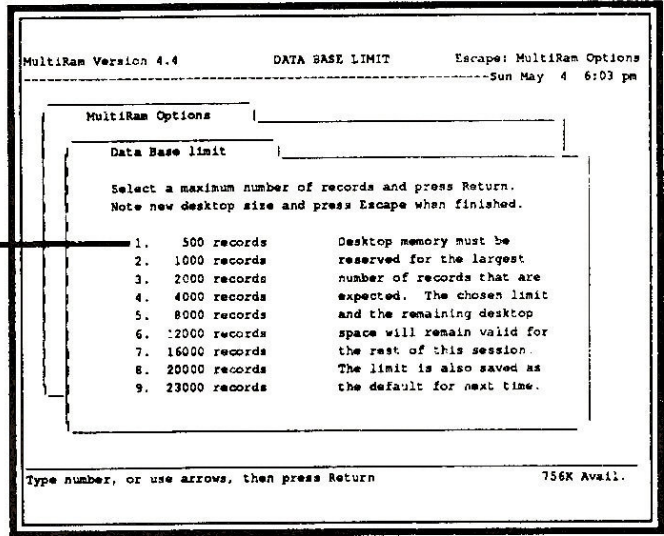
Let's experiment with other options before starting AppleWorks.

## Change Data Base Limit option

Choose option 2 and press the **Return** key to change the number of records you can use in the data base. A "Data Base Limit" screen will appear.

**Figure 3.3**  
**Data Base Limit Screen**

The default number of records is 500 when you first use expanded AppleWorks. When you change to another number, that number becomes the new default.



Note the amount of Desktop available you see at the lower right corner of the screen with 500 records, the default amount, selected.

Now press the number 9 and then press the **Return** key.

You have just increased maximum data base records from 500 to 23,000.

You will also see at the lower left corner that the amount of Desktop memory available has decreased by approximately 45K from what you saw with 500 records.

## Why the reduction in Desktop size when you increase data base records?

To provide for large data bases, a part of the Desktop must be used to keep track of the added records. The larger the data base, the larger the Desktop space used.

Rather than take away the same amount of Desktop space from everyone, no matter how much RAM is on a card, the "Data Base Limit" screen lets *you* chose how much Desktop space to give the data base.

If you have a lot of RAM and need big data bases, then select a large amount of records. The memory you lose from the Desktop is more than offset by the larger data bases you can handle.

If you have less RAM and don't need a large data base, then select a small amount of records. You can use the released Desktop space to put more files on the Desktop or to use bigger spreadsheet or word processor files.

Try selecting different sizes and note the affect on the Desktop remaining. Table 3.2 shows Desktop reductions for all record selections. The reduction you see may be 1K greater in some cases.

Select a maximum record size you now feel is best. You can easily change the size anytime you start AppleWorks.

**Table 3.2**  
**Desktop**  
**space used**  
**for records**

Record Size	Desktop Used
500	1K
1000	2K
2000	4K
4000	8K
8000	16K
12000	24K
16000	31K
20000	39K
23000	45K

**"Maximum"  
records  
versus actual  
maximum**

Keep in mind that the most records you can *actually* use is limited by the amount of RAM on your MultiRam card.

To get a rough approximation of the maximum records you can actually use:

1. Multiply the available Desktop space you saw when you booted up by 1,024, and
2. Divide the result by the smallest average record size you will use (that's the number of characters that can be entered into one record).

For example, if your Desktop is 425K and 100 characters will be the smallest record size you will use (about the size of an address file), then you can fit about 4,400 records on your Desktop:

(1)	1,024	(2)	435,200
	x 425		+ 100
	-----		-----
	435,200		4,352

**Save the  
new  
maximum  
record  
default**

Once you select a size, press the **Escape** key. The Program disk will spin as a new maximum record limit is saved to your disk. You are then returned to the MULTIRAM OPTIONS screen.

The amount you now see for "current maximum" at the MULTIRAM OPTIONS screen will be used the next time you start AppleWorks.

If you change your mind before picking any other options, you can again select option 2 at the MULTIRAM OPTIONS screen and choose a new maximum record size.

**Important**

- ||| Note the warning "use before loading overlays" at option
- ||| 2. If you chose options 3 to 6 and then select a new
- ||| record size, the overlays will be removed and you will
- ||| have to load the overlays again.

## Loading overlays

Choosing options 3 to 6 to load overlays can *greatly* speed up AppleWorks. These options load some or all of the AppleWorks program into memory.

AppleWorks is a BIG program. The ordinary Apple has 128K of memory. The AppleWorks program is over 130K in size!

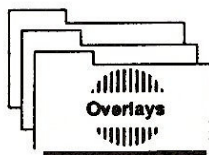
How do you put a 130K program into a 128K computer and *still* have room for data files? You break the program into pieces.

When using AppleWorks, you may have noticed that the Program disk is read *frequently* when you move between a file and the main menu, change from a spreadsheet to a data base, etc.



The Program disk is read often because only part of AppleWorks is in memory at once. When you ask AppleWorks to do something for you, if the part of the program needed to do that something is not in memory, AppleWorks calls an "overlay manager" that loads the right "overlay"-- the part of the program that can do what you requested -- from the Program disk into memory.

While loading overlays from disk when needed is a good way to put a big program into a small computer, the drawback is that loading can take what sometimes seems forever.



Options 3 to 6 eliminate annoying delays by allowing you to load all or selected parts of the AppleWorks program into memory each time you begin AppleWorks. They put AppleWorks back together again to let it run at RAM speed.

## Help

While the MULTIRAM OPTIONS menu is on screen, you can request a brief explanation of the "load overlays" options by pressing  $\text{⌘}+?$ . Try it.



## Which loading option ?

You may choose a different overlay option --or none-- each time you boot AppleWorks.

If you are going to use AppleWorks for only a few minutes to update a file, do not load any overlays; instead select "1" to start AppleWorks. You will not save any time loading overlays in this case as it may take you longer to load overlays than it will to update and save your file.

Select options 3, 4, or 5 if you will work with only one part of AppleWorks this session. These options take less time to load than option 6 and will save most disk access time. You may select more than one of these options before you start AppleWorks.

Select option 6 "Load All overlays" if you intend to use AppleWorks for more than a few minutes and you will use different parts of AppleWorks. The time savings you will gain from having all overlays in memory on extended sessions will far outweigh the two minute loading time.

## Important

||||| You should have 256K or more RAM on your MultiRam card to best use option 6. Large RAM sizes are needed as about 130K of Desktop space is filled with overlays.

See "Using expanded AppleWorks with a ProDOS RAM disk" in Chapter 4 for a different way to get fast access to overlays.

The overlays you load may not stay in memory. The remaining space indicator in the lower right corner does not show the 130K of Desktop memory overlays use because AppleWorks will allow data files to overwrite all but a few key parts of the overlays. Remember that AppleWorks can search for the Program disk and load the required overlays from it if they are not in memory ( see "Working With Large Files" for more information).

So, do not load overlays if you know you will work with one or more files that will consume most of your Desktop space; they will be overwritten and you will have wasted the overlay loading time.



For now, select an option from 3 to 6 to experiment with part or all of AppleWorks loaded into memory and to see the "MEMORY IN USE" indicator.

## Memory In use Indicator

The letter in the inversed square tells you exactly which 64K bank of auxiliary memory is used: @=bank 0, A= bank 1, B= bank

758K Avail.

A

Notice while overlays are being loaded into memory that an inversed square appears at the bottom right corner of the screen, immediately after the remaining Desktop size.

This inversed square tells you that memory on your MultiRam card is being used.

This indicator will become important to you when you work with large files. For example, a sort on a large data base can take a long time and you might wonder if anything is happening at all. The "IN USE" indicator lets you know that AppleWorks is still at work using added memory.

If you are using MultiRam in a //e, you could always remove the Apple's lid and look at MultiRam's twinkling LEDs to reassure yourself that AppleWorks is really doing something.

If you find the indicator distracting, you can turn it off. Refer to the "Customizing AppleWorks" section at the end of this chapter for details.

## Clock options

When you start expanded AppleWorks, if you are using any ProDOS compatible clock, it will automatically display the date and time at the upper right corner of the screen. You will see on-screen day of the week, month, date, hours, and minutes -- e.g., Mon May 26 9:38 pm.

If you use a ProDOS compatible clock card with your //e or //c, you will see option 7 on the MULTIRAM OPTIONS screen as well as see the date and time at the upper right corner of the screen.

If you do not have a clock, you will not see option 7 or the time.

If you do have a clock but do not see the time, refer to the following section "ProDOS Clock Preparation" for help.

You will be able to turn the clock on, turn it off, or switch between 12 and 24 hour modes at any time and any place in AppleWorks that you can see a flashing cursor. You will also be able to enter the current date or time into a data base date or time field with a single keystroke.

Choosing the clock information option at the MULTIRAM OPTIONS screen will display a help screen with the keys shown to control the clock. Choose option 7 now.

## Clock commands

These keystrokes control the clock display:

### ■ CLOCK DISPLAY ON      ⌘ + {

Press and hold down the ⌘ key while pressing the { key (SHIFT key and [ key).

The time and date should instantly appear in the upper right corner of the screen.

### ■ CLOCK DISPLAY OFF      ⌘ + }

Press and hold down the ⌘ key while pressing the } key (SHIFT key and ] key).

The display will stop but remain on the current screen. To clear it off, simply change screens (pressing ⌘ + Q and the Return key will usually do this).

### ■ 12/24 HOUR MODE      ⌘ + |

Press and hold down the the ⌘ key with the | key (SHIFT key and \ key).

The mode will instantly change to 24 hour format. For example, Mon May 26 9:38pm becomes Mon May 26 21:38. Press the same keys again and the mode will return to AM/PM format, the default format.

## Clocks & data bases

- Using a clock, the current time or date can now be automatically entered into a time or date field if you press the "\n" key at the start of the field and then press **Return**.

These keys must be the only keys you press when in a time or date field for the date to be automatically entered.

If there are already characters in the field, press **Control + Y** after you enter the "\n" at the start of the field. This will delete all following characters. Then press **Return**. If you do not clear the characters already in the field, the current time or date will not appear.

The same "\n" key works in either time or date fields (the program knows whether to enter the date or the time into the field) and works only in time or date fields. Press the "\n" key anywhere else in AppleWorks and you will either see a "\n" or hear a beep.

If you print your report to screen with the clock display on at the upper right corner, the clock display will write over the report's

- Data base reports will now automatically show the current date in "MM/DD/YY" form when printing a report. Press **Return** to print the current date or type in a different date.

The date you enter at startup at the keyboard will appear at print time if you do not have a clock.

These features are independent of the screen display, so they will work even if the screen clock is turned off.

## ProDOS Clock Preparation

Almost all ProDOS compatible clocks will display the time on screen without any preparation.

Some //e and //c clocks will not show the time on screen until you first add their own clock drivers to ProDOS.

You have a clock that requires ProDOS preparation if you must run a program from your clock disk, such as "INSTALL CLOCK.SYSTEM", before ProDOS can time stamp saved files. The Slot 3 Clock™ for the //e and the CPU™ //c System Clock are examples of such clocks.

To see time on screen with these clocks, install your clock's add-on driver to the ProDOS operating system on your expanded AppleWorks' disk.

For example, with the CPU clock run the "INSTALL CLOCK.SYSTEM" option and insert the expanded AppleWorks disk when it requests the disk to install the clock driver on.

### Important

||| **DO NOT** choose an option on your clock disk to specifically add a time display feature to AppleWorks. If you do this after expanding AppleWorks, expanded AppleWorks will not work correctly. If you use this option before expanding AppleWorks, you may not be able to expand AppleWorks.

### **MacroWorks Users**

If you use MacroWorks version 1.0 along with expanded AppleWorks, the clock display and clock commands will not be available.

If you are using a more recent MacroWorks version, the clock display and commands will be available if you follow MacroWorks instruction for using MultiRam expanded AppleWorks. You will need to run a separate program on the MacroWorks' disk to convert the names of some files on MacroWorks **before** you add macros to AppleWorks.

Look for Checkmate or MultiRam specific instructions in the "Notes" area of the MacroWorks' disk as well as in the MacroWorks' manual.

### **Clock Cautions**

#### Disabling the clock

During AppleWorks startup, you are asked for the current date. A clock will automatically supply the current date. If you instead enter the date from the keyboard, the new clock features will be completely disabled. Unless you need to backdate a file, do not enter the date manually when a clock is installed or you will lose the time-on-screen and data base time-stamp features.

#### Dropping characters

When the clock display is on you may infrequently drop a character when typing at faster speeds, especially if you are using a Desktop accessory program like Pinpoint or MacroWorks.

If this happens, either turn off the clock display or manually enter the date on startup to completely disable clock features. Reactivate the clock only when you want to see the current time if you used **⌘+}** to turn off the clock.

#### Spreadsheet use

The clock display should not be left on screen when you use the spreadsheet because scrolling to the right beyond column H will replicate the clock display over and over as a column label.

If this happens, simply turn off the clock display and clear it from the screen. Any command that changes screens will clear the old time -- e.g. **⌘ + Q** followed by a **Return** key. You can restore the display later when you need to see the time.

#### Frozen clock

The clock display will freeze during disk action. This is normal as disk drives are extremely timing sensitive and all other devices, including clocks, are ignored while they are operating. The clock display will be updated to the correct time at the end of the disk action.

The clock display is refreshed only during cursor flashes and there are a few AppleWorks screens that have no flashing cursor -- e.g., no flashing cursor appears when you select the "Copy" option in the word processor. When you are on one of those screens, although the clock is still operating, the clock display will freeze until the cursor reappears. When the cursor reappears, the display will jump forward to the correct time.

#### Changing ON/OFF defaults

The clock display is automatically turned on when you start AppleWorks.

You can modify the AppleWorks program to turn it off.

If you will use Jeeves with AppleWorks, a Desktop accessory program, you will want to do this as Jeeves automatically turns on its own time display in the same location as MultiRam's display.

Refer to the "Customizing AppleWorks" section at the end of this chapter for details.

This concludes the differences in AppleWorks you can see without loading a file.

Following are two sections detailing changes you will see when you work with and save large files.

### **Working with large files**

You will notice some differences in AppleWorks when working with very large files.

This section explains general considerations as well as specific comments about the word processor, spreadsheet, and data base segments of AppleWorks.

### **General considerations**

To successfully work with large files, you will need to keep in mind time requirements, space requirements, and file sizes.

### **Time**

The larger a file becomes in memory, the longer many AppleWorks functions will take to produce results.

Searches, sorts, calculation times, etc. will take more time as a file grows in size. The speed of the Apple's 6502 processor is the determining factor in calculation times.

AppleWorks will show you an approximate time for performing many operations when you first select the operation. For example, a message will appear telling you how long it will take to sort records in the database when you request a sort.

**The time approximations shown on screen are designed for a 128K AppleWorks; they are not accurate for larger files.**

The actual time an action on a large file takes may be as little as half the time AppleWorks shows or more than twice the stated time. The differences in actual versus approximate stated times will vary depending on the type of file in use, the action, and the file size.

For example, a sort on a large data base file could be double the time indicated if the sort is being performed on several fields with each record having information in the fields selected. A sort on the same data base with only a few records having information in the fields being sorted could take half the time AppleWorks approximated.

Other activities that do not show estimated completion times, like deleting a large data base file from the Desktop, may also take what seems to be an extraordinarily long time to finish.

### Important

Remember that AppleWorks is working on your last command as long as you can see the MEMORY IN USE indicator light flashing at the bottom right corner of the screen.

In general, the larger the file and the more complex the task, the longer the time required.

Some examples of times required to do a small sample of tasks follow:

**Table 33**  
**Sample**  
**Times**

<u>Load/save a full disk (135K) of data</u> .....		1:15 min
<u>Word Processor</u>		
no. of lines in document.....	500.....1000...2250	
load/save time, minutes.....	17.....:31...1:03	
time to insert 20 lines at beginning.....	11.....:25	
time to insert 20 lines at end.....	:02.....	:05
<u>Spreadsheet</u>		
Recalculate 10,000 formulas "n=n+1".....	2:10 min	
Change cell size (⌘+V) for 20,000 cells.....	negligible	
Insert 250 rows at top of large (250K) file.....	:48 min	
Insert 250 rows at bottom of large file.....	:08 min	
<u>Database</u>		
number of records.....	100.....1000...3300	
total size of file.....	6K.....57K...310K	
individual record size		
(no of characters.....	100.....100...100	
time for alpha sort, min.....	:02.....:14.....:38	
time for numeric sort, min	:02	:30 1:30



Cursor dependent commands use the cursor to mark an area in AppleWorks for change.

Cursor independent commands do not require the cursor to be at any specific location to work.

**Cursor dependent** commands (move, copy, delete, insert etc.) take more time to work at the beginning of a file than at the end. Table 3.3 word processor and spreadsheet examples show this fact.

You can speed up moving characters within a file or deleting large amounts of characters by moving the characters to the clipboard rather than moving characters within the file or using the delete command to remove characters.

## Important

Cursor independent commands given at the beginning of a large file take less time to complete than the same commands given later in the file.

Speed up cursor independent commands that operate on the entire file (find, calculate, arrange, etc.) by returning the cursor to the beginning of the file with **⌘+1** before giving the command.

## **MultiRam size**

If you load all of AppleWorks' program overlays into memory when you start AppleWorks, approximately 130K of Desktop space will be used for the program. As explained previously, this 130K is not deducted from the remaining Desktop space shown on screen.

If the cumulative size of Desktop files grows larger than the available Desktop memory (remaining Desktop memory shown less 130K), then parts of the overlays will be overwritten by data files. See Figure 3.4 on page 40.

Floppy disk users should have the Program disk in a disk drive if overlays are overwritten as AppleWorks will have to read the Program disk to return the overwritten overlays to memory when they are needed.

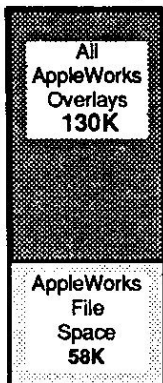
With larger amounts of RAM on your MultiRam card, you can place larger files and more files on the Desktop before data will overwrite overlays.

For example, Figure 3.5 on page 40 shows that with a 256K MultiRam //e card, approximately 58K could be filled before overlays are overwritten; with 512K, approximately 248K could be filled.

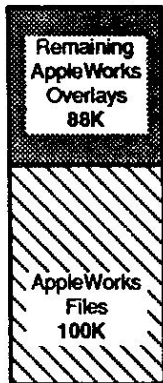
**Figure 3.4**  
**Example of**  
**overwriting**  
**overlays**

In this example, about one third of AppleWorks overlays are overwritten. The Program disk must be in a disk drive to load overwritten

**188K Desktop**  
**Before Loading Files**



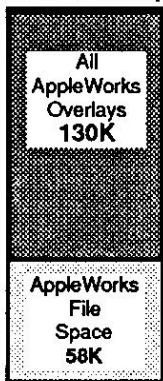
**188K Desktop**  
**After Loading Files**



**Figure 3.5**  
**Example of**  
**different**  
**overlay**  
**capacities**

Notice that while RAM on the card is doubled, the file space available before overlays will be overwritten is more than

**256K MultiRam RGB**  
**188K Desktop**



**512K MultiRam RGB**  
**378K Desktop**



- **Do load** all AppleWorks program overlays into memory if you will be working for a long session and do not anticipate filling the Desktop.

The two minute wait to load overlays before starting AppleWorks will be offset by time savings achieved from the program being all in memory.

- **Do not load** overlays into memory if you will be using AppleWorks only a short while or if you expect to fill most of the Desktop with data files.

If data files do fill most of the Desktop, most of the program overlays that would take two minutes to load during bootup would be overwritten.

## File size differences

You have to check two places to know if you have enough room on the Desktop to put a file onto it:

1. The free space indicator shown at the lower right of all AppleWorks' screens, and
2. The size of the file on the floppy or hard disk.

The indicator showing available space remaining on the Desktop is always accurate; you will not be able to load a file that is larger than the amount of memory shown remaining on the Desktop.

Do not be surprised, however, if AppleWorks refuses to load a file that is smaller than the remaining Desktop available.

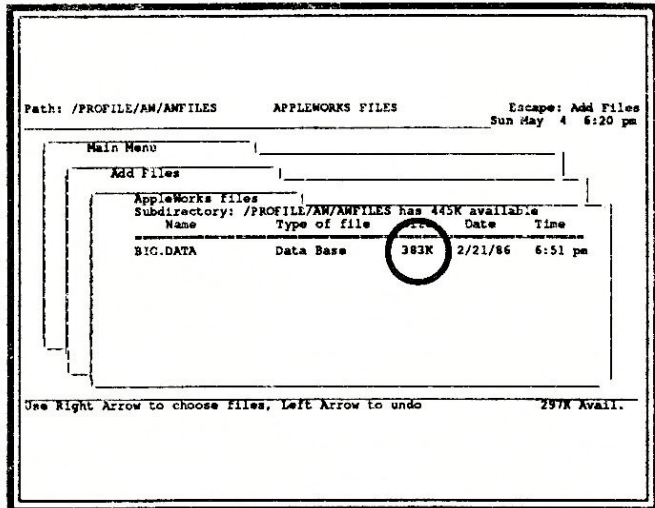
For example, a file may read 100K on disk and you may have 105K left on the Desktop but AppleWorks will tell you the file is too large to load.

This happens because files expand when they are put on the Desktop. They can expand far beyond the size they show on a disk.

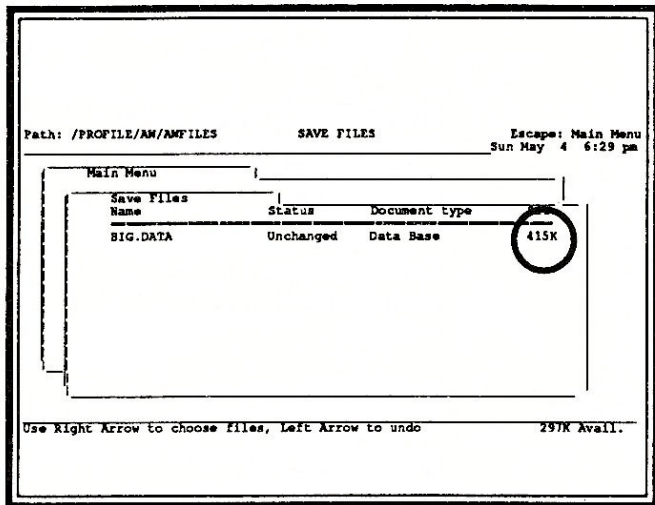
Figures 3.6 and 3.7 demonstrate this fact.

Figure 3.6 shows the file BIG.DATA is 383K on a hard disk but Figure 3.7 shows the same file once loaded into memory uses 415K, 32K more memory.

**Figure 3.6**  
**Large file**  
**BIG.DATA on**  
**disk**



**Figure 3.7**  
**Large file**  
**BIG.DATA in**  
**memory**



There are two reasons files are larger on the Desktop than on disk.

- First, AppleWorks uses a compaction scheme when it saves files. This is a normal AppleWorks function.

- Second, MultiRam modifications creating a larger Desktop unavoidably cause every record or row of a file to have some unusable bytes associated with it.

Unusable bytes per row or record range from 0 to 16 bytes if you have from 64K to 1-1/4 megabytes on your card ; from 0 to 31 bytes if you have from 1-1/4 megabytes to 2-1/2 megabytes; and from 0 to 63 bytes above 2-1/2 megabytes. The actual number of unusable bytes can vary widely depending upon many variables.

These unusable bytes take up space only when a file is on the Desktop; they are not saved to disk. Therefore, the larger the number of rows or records in a file, the more likely you will see a large difference between the file size reported on disk and the size of the same file shown on the desktop.

For the same reason, when large files are on the Desktop, the total of the file sizes shown on the Desktop and the amount of available space shown remaining on the Desktop may not exactly equal the original empty Desktop's size.

## **Word processor files**

Expanded AppleWorks word processing files can contain up to 4,850 lines. That is the equivalent of about 100 single-spaced pages or about 200 double-spaced pages with standard margins.

If you want to create a file that spans more than 100 pages, save the current file to disk when you reach its limit and then create a new file from scratch by choosing selection 1, "Add a file to the Desktop" from the main menu. Continue entering text into the new file from where you left off with the first file.

Be sure to use the same file specifications (platen width, top margin, left margin, etc.) as on the first part of the file.

If you leave both files in memory, you may jump back and forth between files using the **⌘+Q** command and you can transfer text between them using the clipboard and either **⌘+C** (Copy) or **⌘+M** (Move).

## Important

Stay away from the bottom.



End your word processor files a few lines short of 4,850.

Several peculiarities occur in the word processor when the file size approaches 4,850 lines. When the cursor is on line 4,850, the **Delete** key usually will not work. Also, with 4,850 lines in memory, you will be unable to use the **⌘+O** (Print options) or **⌘+P** (Print copy) commands.

There is no discernible slowing of many commands when working on a large word processor file. The **⌘+1** and **⌘+9** cursor commands bring you to the top or bottom of the file in a flash. Speed of text entry is also unaffected.

However, copying and moving text around, along with re-formatting text (e.g., changing platen width from 8.0 inches to 8.5 inches) can take a long time. Inserting text from the clipboard can take from 8 to over 30 seconds, depending on how much or where the text is placed. Certain commands such as **⌘+D** (Delete) and **⌘+S** (Save) may also take a bit longer to function.

Keep these potential delays in mind, and do not panic if the keyboard refuses to respond to your command. Wait a minute or so, and allow the program to finish its task.

## **Spreadsheet files**

The AppleWorks spreadsheet has a huge capacity: 126,873 cells in a matrix of 127 columns and 999 rows.

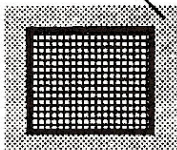
With expanded AppleWorks, a spreadsheet can now grow to enormous proportions; exceeding the cell limits in AppleWorks, even with over a megabyte of Desktop space, is unlikely.

Before creating large spreadsheet files, however, please keep in mind that calculation speeds will lengthen with larger spreadsheet files.

For example, a spreadsheet file consisting of 10,000 cells (primarily formulas of the form " $n = n + 1$ ") takes up 252K of memory and requires over 2:10 minutes to recalculate. Spreadsheet files should be kept as small and compact as possible for best results.

## Important

Stay away from  
the edges



As in the word processor, moving data (move and copy commands) won't always operate as expected at the edges of the worksheet.

When working with a very large worksheet in memory, you should leave an empty border of 2 or 3 rows at the top and bottom and 2 or 3 columns at the sides.

For example, if you fill every cell of a worksheet that stretches from A1 (upper left) to A999 (lower left) to K1 (upper right) to K999 (lower right), and then move the bottom 250 lines to the clipboard using  $\text{⌘}+\text{M}$  (Move), an error message "Not enough space to move aside existing data" would result when you try to move the same 250 lines back. Delete one row (A999), however, and you can move the 250 rows back and forth to the clipboard with no problem.

## **An AppleWorks limitation**

While 127 values can fit across a row, AppleWorks normally does not allow 127 formulas to fit. Expanded AppleWorks has this same limitation.

If you copy a complex formula from one cell across an entire row, you will probably see the error message "Some cells were lost from row r" where r is the row you are on. How many duplications will actually occur depends upon the size of the formula.

If this happens and you cannot rearrange your spreadsheet to avoid the problem (make it column rather than row oriented), then:

1. Find the last column where the formula was successfully copied.
2. Blank the last copied cell.
3. Move the cursor down one row.
4. Continue copying the formula with appropriate changes in the formula for the shift in rows.

If you save the worksheet without blanking the last copied cell, AppleWorks will refuse to load the spreadsheet giving the error message "Getting error trying to read ."

## Data base files

MultiRam modifications to the AppleWorks database allow up to 23,000 record database files to be created and saved to disk.

The actual number of records that can be entered into a file will depend upon the size of the records. The larger the record, the fewer records can be put into a file.

AppleWorks maximum record size is 1K (1,024 characters) which would permit approximately 1 record for each K of Desktop space you show available.

Such large records are not typical. A typical address record consisting of a persons name, address, telephone number and a few fields of other information would average 100 characters. A 425K Desktop, for example, could hold over 4,000 such records.

## Speeding up sorts

One of the most time consuming actions using a large data base is sorting or arranging records.

When sorting large files, the more orderly the file is before sorting, the faster the sort will occur. Alphabetic sorts will take less time than numeric sorts.

For faster sorts, move the cursor to the top of a data base file before you arrange. Arrange commands given at the top of a large data base file process faster than the same command given at the end of a file.

## Merging old data base files

You may have a number of data base files that you split into small segments to fit the old 55K Desktop space.

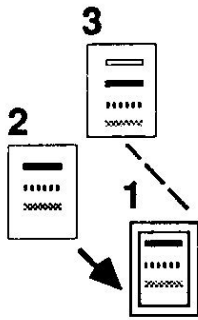
These split files can now be merged into one large file if they contain exactly the same categories in the same order.

For example, if you have these separate files, you can now merge them into one large file:

Our example

FILE 1 -	Name	Address	City	State
FILE 2 -	Name	Address	City	State
FILE 3 - Company name	Name	Address	City	State





In our example, you can see that records can be easily moved between file ONE and file TWO because they contain the same categories in the same order. But merging file THREE with file ONE or file TWO would seem to create difficulties because it has an added category.

In fact, it is possible to combine THREE with the others, but some changes must be made.

Instructions for merging files ONE, TWO and THREE follow. These instructions can be used to merge any database files with AppleWorks.

When working with your own files, don't be afraid of making a mistake when combining files. No damage or change can possibly be done to your files on disk while you are working with them in memory. If you are wary of a problem, make a backup copy of your data disk before you experiment.

### To merge small files into one large file

- A. Merge like files
- B. Add categories to the merged file to match remaining file(s)
- C. Merge remaining file(s)

#### A. Merge like files

- 1 Load all files to be merged onto the Desktop (in this example, files ONE, TWO, and THREE).
- 2 Press **⌘+Q** (Desktop index). A window will appear in the center of the screen showing the names of all the files in memory.
- 3 Select the file you want to merge all of the records into and the first file to move.

We will use ONE as the merged file in this example, moving first TWO, then THREE into it.

Move the cursor to file TWO and press the **Return** key to select it.

- 4 Press **⌘+Z** to make sure the display is in the "MULTIPLE RECORD LAYOUT" format on the screen.

## 5 Move the first 250 records to the clipboard.

Place the cursor on the first record in file TWO and press **⌘+M** (Move).

Use the arrow keys to choose "To the Clipboard (cut)". The entire top line will turn inverse. Follow the prompts, using the down arrow to move the cursor to cover the records you want to move.

Pressing the **⌘** key in conjunction with the arrow key will allow you to move the cursor one whole screen (15 lines) at once; holding this key combination down will repeat, screen after screen, until 250 records are covered with this inverse cursor. Alternately, you may press the **⌘** and a number key to select up to 250 records at a time.

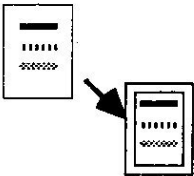
From one to 250 records may be moved at one time. If you attempt to move more than 250 records at once, no records will be copied into the buffer and you are returned to your starting point.

When all of the records that you selected are covered with the inverse cursor, press the **Return** key and those records will disappear from the file. The selected records are now on the Clipboard, a temporary storage area that cannot be seen.

## 6 Press **⌘+Q** (Desktop index), choose file ONE and press **Return**. File ONE will replace file TWO on the screen.

## 7 Press **⌘+M** (Move), choose "From the Clipboard (paste)" and press the **Return** key. All the files from the clipboard will appear on the screen.

## 8 Repeat this process until all of the records are moved from file TWO to file ONE.



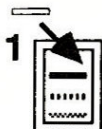
Although only three files are used in this example, twelve files can be on the Desktop at one time and can each be worked with individually.

## **B. Add categories**

When merging dissimilar database files, the files must be changed so that both have the same number of categories. This means that either one or more categories must be added to one file, or one or more categories deleted from the others.

The type of information in each category is not important to AppleWorks; as long as the number of categories match in both files, no information will be lost

It is critically important to you, however, to arrange the categories in the same order in each file (i.e., company name, name, address, city, and state in our example). Ignore this you will not be able to properly sort or do other field related functions.



In our example, the merged file (ONE) is modified by the addition of another category so that none of the data in the last file (THREE) is lost.

Further, the categories will be arranged so that ONE is in the same order as THREE. Field names do not have to match, but they must be in the same sequence.

Field names in the merged file (ONE) will remain while field names in the last file (THREE) will be lost.

- 1** With file number ONE on the screen, press **⌘+N** (Category Name change).
- 2** Move the cursor to the first Category position (NAME in our example).
- 3** Press **⌘+I** (Insert) and make a new Category above NAME.

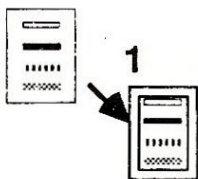
Type in "COMPANY NAME," press the **Return** key, then press the **Escape** key. You have now matched the format of file THREE, i.e., COMPANY NAME, NAME, ADDRESS, CITY, and STATE.

### C. Merge remaining file(s)

**1** Press **⌘+Q** (Desktop index), choose file THREE and press "Return".

**2** Repeat the process discussed in "A. Merge like files" using **⌘+M** (Move) to transfer the records from file THREE to file ONE, until all records are moved.

**3**



Now that all three files are now merged into one, you can manipulate that file as you normally would any AppleWorks database file.

Change the name of the final file using **⌘+N**, then save it under the new name.

### **Saving and loading files**

The MultiRam card makes it possible to create very large AppleWorks files.

If a file is larger than the space left on a disk, expanded AppleWorks will automatically split and save the file over many disks.

### Important

Large files and small files are equally affected by the automatic segmentation process. Be sure you read **both** the following "Large files" and "Small files" sections to avoid possible future problems.

### **Large files (>136K)**

AppleWorks data disks prepared on the typical 5-1/4 inch Apple floppy drive hold a maximum of 136K of AppleWorks data. Therefore, an AppleWorks file larger than 136K in memory must be segmented or divided into parts and saved over a series of disks. MultiRam modifications allow AppleWorks to do this automatically.

When you save a file that is larger than the space remaining on a data disk, the file will be automatically split when the disk is full. On-screen prompts will allow you to save the file over a number of floppy disks. When you are ready to reload the file, AppleWorks will prompt you to load each segment of the file from its disk.

## Preparing for segmentation

Saving very large files involves some planning and time when you are using standard Apple 5-1/4 inch disk drives that hold only 136K per disk.

## Disks



The first requirement for using large files and floppy disk drives is disks, and lots of them!

Don't consider starting a session with one or more large files without having at least three to five blank or recycled disks per large file you will be working with. Any file over 260K will require three blank disks to save the file.

## Important

- ||| You should have double the number of calculated disks to make backup copies of the segmented file.
- ||| **ALWAYS** make backup copies when using large files.

**Do not** save a modified large file back to the same disks you originally loaded it from.

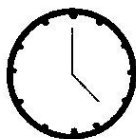
If you overwrite the original file and something happens before you finish saving the file -- the power goes out, the disk drive develops a problem, you accidentally open the disk drive door, etc. -- you will have lost some, most, or all of the large file you worked long and hard on.

**Forever.**

For this reason, please always save your newly modified large files to blank or recycled disks. This will protect the time investment you made in creating your file.

You should consider overwriting an existing set of disks **only** if you have made one or more backup copies of the set of disks involved. To overwrite existing files, return to AppleWorks "Other Activities" menu and select "4. Delete files from disk."

## Time



The second requirement is time and peace of mind.

It will take over a minute to save each full 5-1/4 inch floppy and an equal amount of time to load the segmented file back into memory. A 300K file can take from 3 to 5 minutes to save and load.

## Important

Do not be in a hurry when saving large files as you can make mistakes that may later cost you more time or worse yet, lose your file!

Forgetting to label each disk to show which segment is on what disk; starting to save a file without having enough disks prepared; and forgetting to format disks as required, causing you to start all over again are but a few mistakes you can make when you are impatient.

## Saving large files

7 steps

### 1 Determine the file size and number of disks needed to save the file.

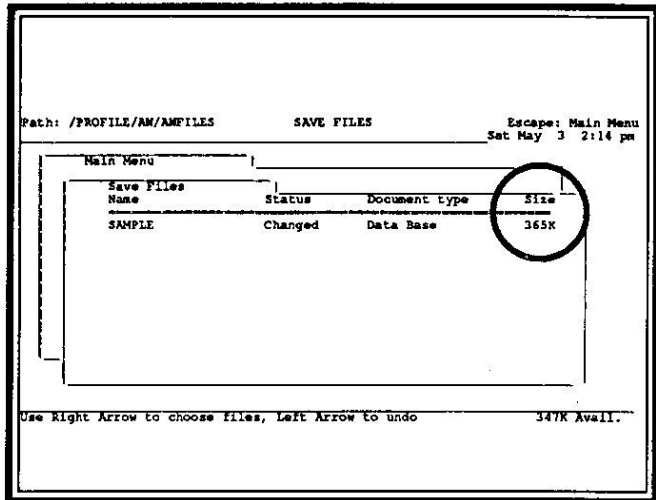
Press the **Escape** key to return to the main menu from the file you are working on.

Press **"3"** to save Desktop files.

The save menu shows the size of the file to be saved (see Figure 3.8).

### Figure 3.8 File size to be saved

Remember, as shown in Figures 3.6 and 3.7, a file's size on disk will always be smaller than what is shown on the file save screen.



Divide the size of the file by 136K to determine the number of disks required to save the file. Always round up to the next highest number.

For example, to save the 365K file in Figure 3.8, three disks would be needed ( $365K/136K = 2.7$  or 3 disks).

Press **Escape** to return to the main menu. **DO NOT** attempt to save the file yet.

## **2** Format the required number of data disks with the same volume name.

From AppleWorks main menu choose "5" to go to "Other Activities".

Select "5" to format a blank disk.

Enter a disk name no more than 15 characters long.

After the first disk is formatted, press the space bar to return to the disk formatter.

Remove the first disk and place the next blank disk in the drive.

Label the first disk with a "1" to indicate that you will use it to save the first file segment.

Continue formatting data disks with the same name until you have formatted the required number of disks. Also continue labeling the disks in sequence.

Press the **Escape** key to return to the main menu when you finish.

## **3** Save the first part of the file.

Choose "3" from AppleWorks main menu to save Desktop files to disk. Use the arrow keys to select the correct file.

The name you save the file under should not be more than 13 characters long.

The segmentation routine adds two characters to the end of your file name -- a period and a number from 2 to 9 indicating the segment sequence number.

ProDOS allows only 15 characters in a file name. If your file name is 15 characters long, to satisfy ProDOS's 15 character limit, the last two characters will be deleted and replaced with a period followed by the segment number. This is why your file name should not be longer than 13 characters.

The first segment will not have a ".1" appended but the segment after the first disk will end with a ".2" suffix.

The segmentation routine searches the end of a file name for a period and a number. If it finds none, they are added to the name of the file segment to be saved. If a period is found followed by a number at the end of the file name, the number is increased by one.

## Important

||||| **Do not end your file name with a period and a number.**  
||||| For example, if you name your file "FILE.5", the *second*  
||||| segment saved will be labeled "FILE.6" not "FILE.2"  
||||| causing possible future confusion.

Insert the blank, formatted disk labeled "1" (and also labeled with the disk name and any other descriptive information) into the data disk drive and press the **Return** key.

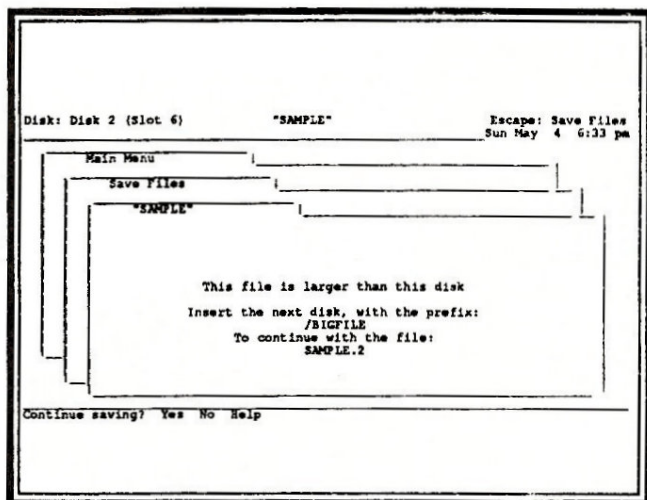
Assuming the file is larger than one disk, like our example "SAMPLES", it will take just over one minute to save the first segment of the file.

## **4** Continue saving, stop saving, or ask for help.

When the first disk is full, you will be prompted to insert the second disk as Figure 3.9 shows.



**Figure 3.9**  
**File**  
**Segmenta-**  
**tion screen**



Select YES to "Continue saving?" and the next file segment will be saved.

### Important

||||| If you select NO, the saving will end. The file segments already saved should be deleted as they will be useless; part of a segmented file cannot be loaded into memory, only a complete file.

||||| **Do not** select NO and then turn the Apple off if you have never saved the large file. Once you turn the Apple off after selecting NO, the entire file will be lost!

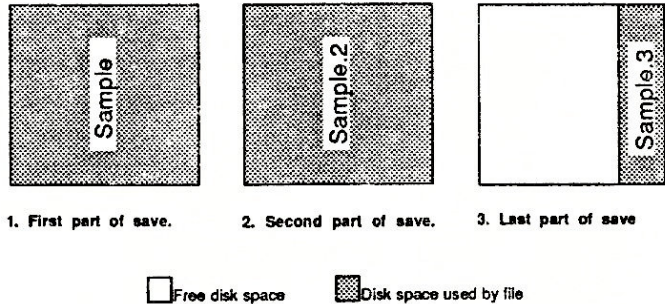
You may also stop saving while the disk is spinning by pressing the **Escape** key; you do not have to wait until a disk is full to end a mistaken save.

You may also see on-line help by selecting "HELP". A summary of information about saving large files is available and can be exited by pressing the **Escape** key.

You will be prompted to insert disks in sequence until all parts of the large segmented file are saved to disk. When the second disk is full in our example, you will be instructed to insert the next and last disk.

The disks in our example named "BIGFILE" will have the file "SAMPLE" saved to them. Disk 1 will have saved to it the first segment "SAMPLE", disk 2 the segment "SAMPLE.2", and disk 3 the last and smallest segment "SAMPLE.3".

**Figure 3.10**  
**Large file spanning multiple disks**



## 5 Record the total file size.

Using the "2. List all files.." selection from AppleWorks' "Other Activities" menu, write the lengths of each of the segments on their separate disks.

Add the lengths of the segments and write this total on the first disk so you will know how big the total file is.

The total file size is needed so you will know if you have enough memory left on your Desktop to load the file in the future.

## 6 Make backup copies of your large file.

Always create a backup copy of your large file that has been saved over multiple disks. This is good insurance against possible loss of data through accidental disk damage, erasure, etc.

### Important

||||| If AppleWorks cannot read any one disk in a series of segmented disks, the ENTIRE file *will not be recoverable*. Backups are extremely important for this reason.

## Originals



You can make a backup copy of your disks by using a copy program or using AppleWorks.

To make backups with AppleWorks, format twice the number of disks that will be required to save the large file. Then save the file twice, first to the original disks, last to the backup disks.

## Backups



### 7 Saving the large file in the future.

After you have created original and backup copies of the file, you may rotate these two sets of disks to save future modifications of the large file.

Save the latest file modifications first to the backup copies. Once these are safely and completely saved, copy the file again onto the original set of disks. Using this rotation will always insure one good copy prior to changes.

To make room on the already formatted disks to save the modified file, delete the file on them. Deleting is much faster than formatting since you will have only one file per disk with large files.

To delete a file from disk with AppleWorks:

- Choose AppleWorks' "Other Activities" selection from the main menu.
- Choose "4. Delete the files" from the "Other Activities" menu, and
- Choose the file name from the disk in the data drive to be deleted.

Once you have deleted all files segments on the backup set of disks, save the modified file.

**Do not** delete files on the original set of disks until you have first saved the modified file to the backup set of disks.

## Saving small files (<136K)

If you have a file saved that is smaller than the size of a disk, and you then load the file into AppleWorks, add some information to it, and try to save the file back to disk, you may be surprised to see the segmentation screen come up.

While segmentation was designed to save files that are larger than can be saved on a 5-1/4 inch floppy, a smaller file can also be segmented.

Segmentation is activated when AppleWorks detects no more room on a disk but still has part of a file left to save. The segmentation routine will cause a file to be saved over two disks if it can not fit in the space left on one disk.

This can occur under two conditions with small files:

1. With many small files on disk, or
2. With only one large file (larger than 68K) on disk.

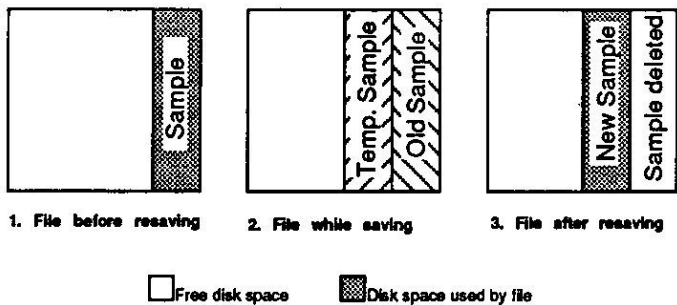
This unexpected and probably undesired segmentation occurs due to AppleWorks built-in backup process.

## AppleWorks own backup procedure

AppleWorks normally first saves a selected file in memory to a temporary file on disk.

If you save the file under an existing name on disk, after the temporary file is successfully saved, AppleWorks then renames the temporary file to the original file name and deletes the old file.

**Figure 3.11**  
**AppleWorks normal save process**

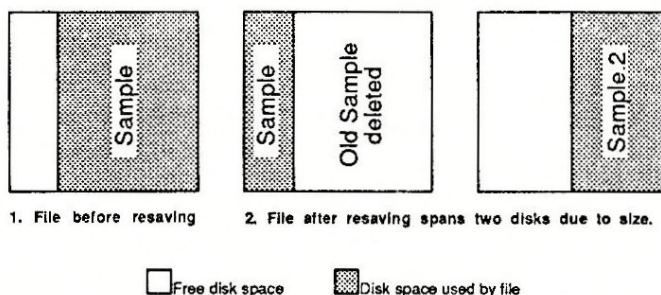


This way, an updated file is created only after it has been safely saved. If any problem occurs while trying to write the disk, the old file still remains on disk as a backup.

The MultiRam file segmenting procedure does not affect AppleWorks internal backup safeguard as long as there is room on the disk for the temporary file being saved and the old, existing file.

But if there is no room on the disk to save the temporary file, even though the file could easily be saved to a blank disk, the segmenting routine will save the first part of the temporary file to the disk, delete the old file, and then request a new disk with the same volume name to finish saving the file.

**Figure 3.12**  
**File segmentation with a small, >68K file**



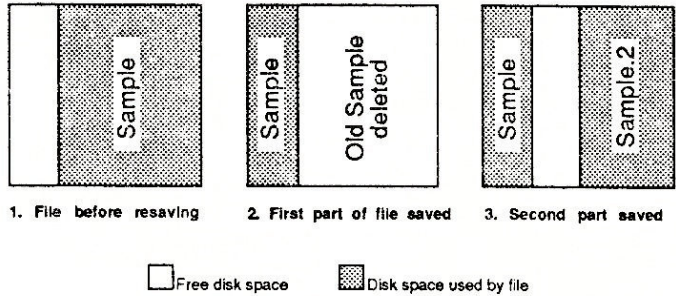
### Preventing small file segmentation problems

If you do not want a file that could be saved on one disk saved to two disks, you can take one of three actions:

- 1 Save the file to a new, freshly formatted disk. This is the safest method; it preserves the old file.
- 2 Save the file under the same name on the old disk, thereby deleting the old file. Then, when the file segmenting routine asks you to insert the next disk into the drive, instead leave the same disk in the drive and continue to save.

You will have saved the file to the same disk in two parts as in Figure 3.13: the original file name and a segment with ".2" added to the file name.

**Figure 3.13**  
**Segmented file on one disk**



- 3 Choose the "Other Activities" menu, select "4. Delete the files", select the file name being saved to be deleted, and then save the file to the original disk as one file.

## Loading Files

Loading segmented files back into memory is easy.

Insert the first segmented disk into the data drive.

Select "Add Files" and choose the first segmented file.

Once the first segment has loaded into memory, you will see a screen message similar to that in Figure 3.9 showing you which file segment to load next.

The file will be ready for use when the last segment loads into memory.

## Problems saving or loading segmented files

Some problems with saving and loading segmented files may produce error messages.

Two types of error messages are likely to occur if you are not correctly saving or loading segmented files.

### ■ Can't write on disk

This can occur if you insert a disk during a segmented save whose name does not match that of the first disk.

Find the data disk with the proper name and insert it to continue the save

If you have not prepared enough data disks to handle the entire file, you will have to press **Escape** to stop the present file save. Reread the section on disk preparation and format enough disks for the file. You will not lose any of your data but you will have to start saving from the beginning again.

This error can also occur if your disk is write protected or has a media flaw.

### ■ Getting errors trying to read

This can occur if you try loading a disk out of sequence.

Simply remove the incorrect disk and insert the disk requested by the prompt.

## Important

If the first disk you load is not the first disk in the sequence, unpredictable results can happen as only the first file contains critical information relating to the segmentation.

At best, error messages that make no sense will appear. At worst, AppleWorks will hang or crash!

Be very careful to always correctly and boldly label the first disk of a segmented file to avoid potentially disastrous results.

## The worst problem

The worst problem that can cause the "Getting errors trying to read" message is actual magnetic or physical damage to your disk.

If one part of a large segmented file is damaged, then the entire file cannot be loaded back into memory.

Because disks can be damaged from many sources, you should always keep at least one backup copy of your large file. This is the only sure way to avoid this problem.

## Hard disks & 3.5 Inch UniDisks

Using a hard disk drive or an 800K 3.5 inch UniDisk drive with the MultiRam card and AppleWorks can greatly ease your file management efforts.

All hard disk drives and 3.5 inch floppies can easily store a large number of files without any special preparation.

An additional advantage of a hard disk is that it takes much less time to store and retrieve AppleWorks files than does a floppy drive. The same 300K file that would take 3 to 4 minutes to load from standard 5-1/4 inch floppy would take less than a minute to load from a hard drive.

## Important

||| **Do not** allow the area you have partitioned for your AppleWorks files on the hard disk to become too full.

||| If you run out of room on the hard disk while saving a file, MultiRam modifications that allow large files to span multiple floppy disks will be activated and will instruct you to insert a new "floppy" disk for the next file segment. ||| You cannot do this on a hard drive.

Always check the remaining space you have available on your hard drive before saving a file to avoid this potential problem.

You should seriously consider purchasing a hard disk drive or a UniDisk if you intend to regularly use large AppleWorks files.



## Customizing AppleWorks

You can turn off two default settings that are automatically set to come on when you boot expanded AppleWorks:

- On-screen time display.
- Memory IN USE indicator.

You may want to have the time display off at boot if you use a program such as Jeeves that puts its own clock display into AppleWorks. You can still turn on the time by using the clock-on command  $\text{⌘} + \{$ .

You may find the memory IN USE indicator distracting if you do not work with large files. It is set to on so that large file users can tell when AppleWorks is still working on a large file. Once you have turned it off, it cannot be turned on again unless you reverse the following turn-off procedure.

To turn these default settings off, you will need to modify one expanded AppleWorks file, APLWORKS.SYSTEM.

### Important

Use the following instructions **after** you have used the MultiRam disk to expand AppleWorks but **before** you install Pinpoint or MacroWorks modifications.

You will need to enter Applesoft commands from the keyboard to use the following instructions. Use your MultiRam Utility work disk to load Applesoft.

**To modify  
either  
default**

**1** Enter into Applesoft Basic.

Enter Basic by booting your work copy of the MultiRam Utility disk and then select "Exit to Basic" from the Utility menu.

You should see the Applesoft prompt "]" on screen followed by a flashing block cursor.

**2** Remove the Utility disk.

**3** Insert the expanded AppleWorks Startup disk into a disk drive.

**4** Enter one set or both sets of the following lines.

**5-1/4 inch floppy users**

Enter the following lines from the keyboard exactly as they appear.

**Hard disk or 3.5 inch Unidisk users**

Substitute the pathname leading to the file "APLWORKS.SYSTEM" for the volume name "APPLEWORKS" used in these lines.

End each of the lines by pressing the **Return** key:

**To turn time  
display off**

```
BLOAD/APPLEWORKS/APLWORKS.SYSTEM,AS2000,T$FF  
POKE 16128,0  
BSAVE/APPLEWORKS/APLWORKS.SYSTEM,AS2000,T$FF
```

Now, when you boot AppleWorks, the date and time will not appear on screen until you command it.

**To turn  
Memory  
IN USE  
indicator off**

```
BLOAD/APPLEWORKS/APLWORKS.SYSTEM,AS2000,T$FF  
POKE 16129,0  
BSAVE/APPLEWORKS/APLWORKS.SYSTEM,AS2000,T$FF
```

Now, when you boot AppleWorks, the Memory IN USE indicator will not appear.

## To reverse modifications

To have the time display at boot again, reenter the preceding lines but substitute "POKE 16128,128" in place of "POKE 16128,0."

To see the Memory IN USE indicator again, reenter the preceding lines but substitute "POKE 16129,128" in place of "POKE 16129,0."

If you do decide to reverse what you have done, remember that the disk should not have been modified by other programs since you turned off the defaults.

## AppleWorks references

There are many referencesources that can help you get more out of AppleWorks. A sample follow.

## Books

If you are new to AppleWorks, two books that assume little knowledge of AppleWorks that can help you learn more about the program are:

Using AppleWorks by Arthur and Elaine Arin (Que Corporation)

AppleWorks: The Program for the Rest of Us by Michael L. Sloan (Scott, Foresman & Co.)

If you are an experienced AppleWorks user, two books that explain how to better use AppleWorks on a professional level are:

AppleWorks: Tips & Techniques by Robert Ericson (Sybex, Inc.) Contains many, many excellent and innovative ways to use AppleWorks. Explains numerous AppleWorks shortcomings and how to overcome them. Large memory card tips are given. Highly recommended.

AppleWorks: Boosting Your Business With Integrated Software by Charles Rubin (Microsoft Press) One of the first and best books to give in depth information on using AppleWorks in specific business settings. Advanced program information is also included.



## **Apple User Groups**

Many Apple user group members use expanded AppleWorks and can provide excellent help to new AppleWorks users.

Most local Apple users groups have AppleWorks special interest groups (SIGs). Contact your local group to see if they have an AppleWorks SIG. Many tips for using AppleWorks are available from local AppleWorks SIGs.

Nationally, there are two membership organizations that provide newsletters, templates, tutorials, notes, reviews, and public domain utilities for AppleWorks users.

Contact these two national groups at:

### **The AppleWorks User Group**

P.O. Box 24869  
Denver, CO 80224

--or--

call (303) 756-5222 bulletin board number

--or--

contact the group on-line on the GENie telecommunications network

### **The Q-mar group**

5677 Oberlin Drive, Suite 100  
San Diego, CA 92121

-- or --

call (619) 286-8165 for more information

AppleWorks users groups also exist on telecommunications services such as CompuServe and the Source. You can share information as well as ask for help on these interactive boards. You will generally find an AppleWorks board listed under the main Apple board.

## MultiRam updates

MultiRam AppleWorks expansion software is updated from time to time with new features and improvements.

Updated expansion software is available from your dealer at no charge (bring two blank disks to copy the new programs) or through Checkmate Technology at a nominal charge.

You may call your dealer or Checkmate Customer Service for the latest update information.

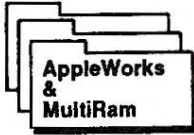
When you use a new MultiRam disk to expand AppleWorks, AppleWorks should be unmodified or should have only those approved modifications listed in the expansion instructions early in this chapter.

The one AppleWorks modification you should make before expansion is custom printer configurations. Keep a disk with your custom printer commands saved to it as a master. Use this disk to make your AppleWorks backups when you receive a new MultiRam disk. This will save you the trouble of reentering custom printer commands.

When you update software, be sure you use the RAM disk software on the new disk if you use a RAM disk with your newly expanded AppleWorks.

*Downloaded from  
Apple2Online.com*

## Chapter 4



# Using other AppleWorks programs

You can use expanded AppleWorks with a MultiRam ProDOS RAM disk and with all popular AppleWorks accessory programs.

### About this chapter

This chapter will show you how to use expanded AppleWorks with:

- MultiRam's ProDOS RAM disk "MRAM".
- Three popular Desktop accessory programs.

You can use expanded AppleWorks together with a RAM disk and many popular accessory programs.

Most accessory programs can benefit from being used with a RAM disk. A RAM disk speeds up any program that uses the disk drive, which almost all accessory programs do.

Some examples of using expanded AppleWorks together with a RAM disk and an accessory program are given in detail in Chapter 6.

You should read the RAM disk section of this chapter first. You will need to know how expanded AppleWorks uses a ProDOS RAM disk before you can use accessory programs together with expanded AppleWorks and a RAM disk.

You should have your expanded AppleWorks disks, your MultiRam Utility work disk, and any accessory programs in front of you while reading this chapter.

Try the examples as you read.

You will soon discover that expanded AppleWorks is an even better program using a RAM disk or other accessory programs.



## Using expanded AppleWorks with a RAM disk

Expanded AppleWorks is ready to use with your MultiRam ProDOS RAM disk (described in detail in Chapter 6).

The expansion modifications you made early in this chapter gave AppleWorks the ability to recognize and use a RAM disk if the RAM disk is in memory when you start AppleWorks.

## RAM Disk benefits

All the features of expanded AppleWorks combined with the lightning speed of a RAM disk turn your Apple into a fast workhorse.

Using a ProDOS RAM disk along with AppleWorks, you can exit AppleWorks and INSTANTLY have another ProDOS program running on the RAM disk... and then just as quickly reenter AppleWorks!

The types of programs that could be useful on a ProDOS RAM disk when using an expanded AppleWorks program are:

- AppleWorks itself. Rather than load overlays from the MULTIRAM OPTIONS menu, you may instead load all of AppleWorks onto a RAM disk for fast response. AppleWorks loads into the RAM disk in about the same amount of time overlays load.
- Programs that offer utilities to use specifically with AppleWorks, e.g., you could load all Pinpoint desktop accessories into the RAM disk for *fast* access.
- Programs you use often but whose functions are totally unrelated to AppleWorks, e.g. a comprehensive modem program such as AE Pro.
- Programs whose functions duplicate AppleWorks but have greater power, e.g., you may prefer Word Perfect for its advanced word processing features and RAM disk capability.

To make the transfer of data among other programs and AppleWorks even easier and faster, you could also use the ProDOS RAM disk to store your data files.

## How It works

When expanded AppleWorks starts, it checks for a ProDOS RAM disk *named MRAM*.

If there is no MRAM, AppleWorks will create as large a Desktop as RAM on your MultiRam card allows (see Table 3.1 on page 24 for Desktop sizes).

Expanded AppleWorks and MRAM cannot be in memory at the same time at maximum size. Set to maximum size, both programs would claim the same space and overwrite one another.

If it finds MRAM as large as RAM on your MultiRam card allows (see Table 6.2 in Chapter 6 for MRAM sizes), you will see:

```
WARNING! /MRAM TOO LARGE.  
OK TO DESTROY (Y/N) ?
```

Choose "Y" to allow AppleWorks to take over all memory and overwrite MRAM.

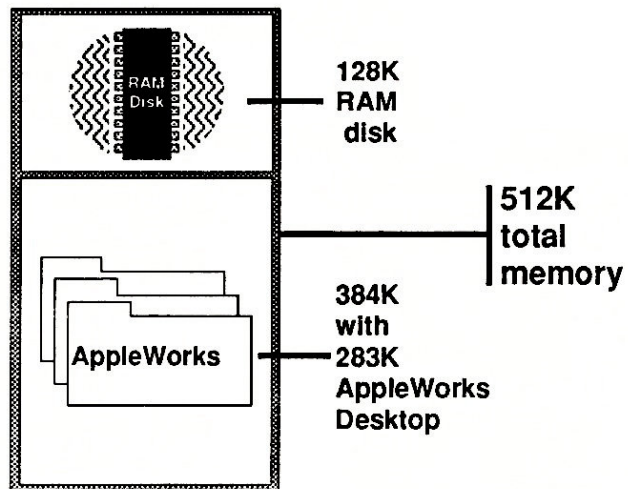
Choose "N" to cancel AppleWorks. Then use a file copy program to save any important files from MRAM to a floppy before restarting AppleWorks with a smaller MRAM.

If MRAM is smaller than maximum memory, AppleWorks subtracts MRAM's size from total memory and then creates a Desktop as large as the remaining memory allows.

### Figure 4.1 Example of memory partitioning

For example, if your MultiRam RGB or //e card has 512K of RAM and MRAM is 128K, then expanded AppleWorks will create a 283K Desktop, the size of a 384K card (512K-128K=384K).

See Table 3.1 on page 24 for Desktop sizes with RAM..



## Sizing the RAM disk

You control how much memory you give to both the Desktop and MRAM by selecting the size of MRAM. You can choose a new size every time you use MRAM or you can save a size that you like and use that same size all the time.

The ProDOS RAM disk software on your MultiRam Utility disk provides an easy and quick way to customize several features of MRAM.

The customization program will show you the exact size of the Desktop for every MRAM size you can create. Pressing arrow keys adjusts the memory allocation or partition between the Desktop and RAM disk 64K at a time so you can easily see which combination suits you best.

**Figure 4.2**  
**Memory partition selector example**

Memory available to programs	Total 512K	Memory available to /MRAM
(AppleWorks Desktop = 283K) 384K		128K

Use arrows to adjust the partition. Press <RETURN> when set.

If you tell the customization program to save the allocation, you will have the same RAM disk size and associated Desktop size until you run the customization program again.

RAM disk customization is described in detail in Chapter 6.

## Requirements

To get the best advantage from a RAM disk, since there is loading time involved in transferring files to a RAM disk, you should expect to use AppleWorks for an extended session.

## Important

||||| You MUST have at least 192K of RAM on your MultiRam card to use a RAM disk with expanded AppleWorks.

## To use MRAM with AppleWorks

The following instructions will introduce you to the simplest way of using the RAM disk MRAM with AppleWorks. It is also the longest way as it is not automatic.

In Chapter 6, you will learn several advanced ways to automatically set up MRAM, one of which will show you how to make a disk that will create MRAM, load all of Pinpoint accessories to MRAM, and then start AppleWorks ... all by just booting the disk you made!

The following instructions **are not** comprehensive. They are brief. They assume you already know how to use file copy programs and how to use ProDOS pathnames to run programs. No information is given here about these two topics. They are covered in detail in Chapter 6.

Read all the instructions before you try them. If you do not succeed or find them unclear, read Chapter 6 for detailed instructions on RAM disk use.

## Important

Be sure you read Chapter 6 before you seriously use MRAM with AppleWorks. There are many "do's and don'ts" regarding RAM disks you must know before you can consistently use a RAM disk without problems. You risk losing all data on your RAM disk if you are unaware of these cautions.

## What you will need

- Expanded AppleWorks.
- MultiRam Utility work disk.
- 192K or more RAM on MultiRam.

## 3 steps to MRAM

No matter how sophisticated a method you use to set up the RAM disk MRAM with AppleWorks, all consist of three steps.

### 1 Create the ProDOS RAM disk, MRAM.

Boot the working copy of the MultiRam Utility disk.

Choose "3. Install MultiDrive.Pro" from the Utility menu.

Choose "2. Customize MultiDrive.Pro" at the MultiDrive.Pro menu.

Choose "2. Set the amount of memory" at the MultiDrive.Pro Options menu and read all of the on-screen instructions.

The ProDOS RAM disk MRAM **must** be customized to use less than maximum memory because it is initially set to use all memory for MRAM. Remember, if you do not reduce MRAM size from maximum, expanded AppleWorks will overwrite MRAM.

- Use the right and left arrow keys to select a RAM disk size less than maximum.
- Press **Return** to select the new size.

Choose "3. Save the custom changes and create /MRAM" from the menu.

The modified MRAM will be saved to your disk and you will see on screen a message showing the RAM disk sizes created. Two RAM disk names are shown; only MRAM will remain after AppleWorks boots.

### 2 Copy any desired files to MRAM.

If you want to copy some files to MRAM, press "Y" to use the Filer at the "Run the Filer now?" prompt. When you finish, exit to the Filer's "QUIT" code.

You must use ProDOS pathnames to copy files with the Filer. See Chapter 3 for instructions on using the Filer or other copy programs to move files to MRAM.

If you do not want to move files to MRAM or want to use a different copy program, press "N" at the prompt.

After you press "N" you will return to the main Utility menu. Select "6. Exit to Basic." You will then be in Applesoft and you should see the Applesoft prompt "]" followed by a flashing cursor.

### 3 Start AppleWorks using a pathname .

Do not turn off the Apple to boot AppleWorks. If you do, MRAM will disappear.

Do not boot AppleWorks by pressing  $\text{⌘}+\text{Control}+\text{Reset}$ . If you do, MRAM will be disconnected and expanded AppleWorks will overwrite it

Do start by running the startup program "APLWORKS.SYSTEM" on the Startup disk.

- To start AppleWorks from the Applesoft prompt, insert the Startup disk into drive 1, enter "RUN/APPLEWORKS/APLWORKS.SYSTEM" and press the Return key.

If AppleWorks Startup files are on a hard disk or a 3.5 inch UniDisk subdirectory, enter the complete pathname with all directories leading to the Startup files, eg. "Run/<volume name>/<subdirectories names>/APLWORKS.SYSTEM".

See Chapter 6 for ProDOS pathname and "QUIT" information.

- From a copy program or any program that ends in the ProDOS "QUIT" program, enter AppleWorks directly from the program and preserve MRAM by:

1. Entering "/APPLEWORKS" or the correct pathname when the "QUIT" code asks for the prefix to use, and
2. Entering "APLWORKS.SYSTEM" when the "QUIT" code asks for the pathname.

#### Important

Some programs, change the name of APLWORKS.SYSTEM. Use that name instead of "APLWORKS.SYSTEM." For example, MacroWorks changes the name to "APLWORKS.SYS".

## Using the RAM disk

You can now use the RAM disk named MRAM as you would any other disk. You can save AppleWorks files to MRAM and load them from it.

If you copied some desktop accessories to MRAM, like Pinpoint or Jeeves, you can now use these accessories from MRAM.

AppleWorks version 1.2 treats MRAM like an ordinary disk. You must transfer files to and from MRAM by its slot and drive number or by its volume name. If you did not customize MRAM for a different slot and drive, you will be able to use it as slot 3, drive 1 or through its volume name "MRAM."

AppleWorks version 1.3 will automatically label the MultiRam ProDOS RAM disk as "Ramdisk" and will address it as a RAM disk in all AppleWorks menus.

To see MRAM in action, go to AppleWorks "Other Activities" menu, select "1. Change current disk drive or ProDOS prefix" to MRAM and then select "2. List all files from the current disk drive." You will see a very quick response and AppleWorks will show you the files you have on MRAM, if any, and the free space left on MRAM.

If you do not change the current disk drive, AppleWorks will continue to use MRAM for files.

Be sure you copy files saved to MRAM to a physical disk or they will be lost when you turn off the power. See Chapter 6 for detailed copy instructions.

## Exiting and reentering AppleWorks

If you copied other system programs to MRAM (see Chapter 6 for information on "system" programs), exit AppleWorks as follows to run those programs:

**1** Go to AppleWorks main menu and choose "6. Exit."

After AppleWorks asks you about saving any changed files still on the Desktop, you will see ProDOS's "QUIT" screen asking for the next prefix to use.

**2** Enter "/MRAM" for the prefix.

**3** Enter the name of the system file on the RAM disk to run when you are asked for the pathname.

You can run only system files; these normally end with ".SYSTEM" like "BASIC.SYSTEM."

To run Applesoft programs on the RAM disk you must have BASIC.SYSTEM on the RAM disk and enter its name at the pathname prompt.

The program you choose will run immediately.

To go back to AppleWorks after you run other programs on MRAM, exit from them using the same procedure you used to run programs on MRAM.

If AppleWorks is on MRAM, enter "MRAM" for the prefix and "APLWORKS.SYSTEM" for the pathname. AppleWorks will instantly reappear.

If AppleWorks is on floppy or hard disk, use the volume name leading to "APLWORKS.SYSTEM" for the prefix. Enter "/APPLEWORKS" if you are using a 5-1/4 inch floppy.

## Apple's memory card

You may use MultiRam expanded AppleWorks with your MultiRam card in the auxiliary slot of an Apple IIe and Apple's one megabyte memory card in slots 1 to 7.



Expanded AppleWorks will use the MultiRam card for expanded AppleWorks features and will use all of the Apple card's memory as a RAM disk.

### Using expanded AppleWorks with accessory programs

There are a number of programs that can work with AppleWorks to increase its capabilities. The number and diversity of these AppleWorks accessory programs is constantly growing. All popular accessory programs will work with your MultiRam expanded AppleWorks.

All accessory programs fall into one of two types: in memory programs and file programs.

### In memory programs

Several accessory programs modify AppleWorks and run in memory at the same time AppleWorks is operating. Many of these programs require modifications to your AppleWorks disks. Most of these accessory programs cannot be used with one another.

Following are some cautions in using the most popular of these programs.

### Pinpoint™

Pinpoint is a desktop accessory program that can be used while you are running AppleWorks.

Pinpoint offers such desktop accessories as an appointment calendar, calculator, phone dialer, and telecommunication program that can be used while you are still in AppleWorks. Pinpoint's accessories can be further expanded if you purchase separate accessory programs such as spelling checker.

### Version required

There are several versions of Pinpoint.

To work with your MultiRam expansions, you **MUST** have Pinpoint version 1.2B or greater.

If you do not have the necessary version, you may receive an updated version for a nominal fee from Pinpoint.

## Installation

Pinpoint is installed onto the AppleWorks Startup disk.

Install Pinpoint **only** after you have made your MultiRam enhancements to a backup copy of the AppleWorks disks.

If you modify AppleWorks with Pinpoint before you expand AppleWorks, the MultiRam expansion program will not recognize it as an acceptable version.

Make a backup copy of your expanded AppleWorks disks **before** you make Pinpoint modifications. Use the backup to make Pinpoint modifications and keep the first expanded disk as a master to use if further changes are made.

Using a backup, if anything goes wrong, you will not have to repeat the MultiRam modifications but will **only** have to redo the Pinpoint modifications.

Once Pinpoint is installed, it will work correctly with **your** expanded AppleWorks.

## Updates

The Pinpoint program is occasionally updated to add new accessories or to improve the program.

If you add a new accessory to Pinpoint, such as the Spelling Checker, you may need to modify your Pinpoint installation disk and then modify AppleWorks again.

## Important

||||| If you do add a new accessory or get an improved version of Pinpoint, be sure you modify an expanded AppleWorks disk **WITHOUT** Pinpoint modifications. Do not try to modify your expanded disk with Pinpoint already on it.

Again, to save time if you have installation problems, create a backup copy of your expanded AppleWorks and use this backup to reinstall updated Pinpoint.

## **Pinpoint & RAM disks**

See Chapter 6 for instructions on sizing RAM disks, customizing slot and drive locations, copying files to and from the RAM disk and for automatically loading Pinpoint accessories each time you boot.

Be sure you copy any appointment, notepad or other modified files back to a physical disk after you finish AppleWorks or your changes will be lost.

Pinpoint's accessories are used from disk. Accessories can be GREATLY speeded up by copying desired accessories from the "/ACCESSORY" disk onto MRAM.

You should customize MRAM to a size which will have at least 64K of free space on it after you load accessories to it. Free space is needed as some accessories create temporary or permanent files.

So Pinpoint will first look to MRAM for accessories, set the standard location of accessories to the ProDOS pathname "MRAM" when you use Pinpoint's install menu. If you are using a //c, you should also customize MRAM with a slot 7, drive 1 location or Pinpoint will not check the RAM disk first. If you are using a 3.5 inch UniDisk drive with a //c, Pinpoint will always check it before MRAM if there is a disk in the UniDisk.

## **MacroWorks™**

MacroWorks adds macros to all AppleWorks functions. Macros allow one or two keystrokes to do the work of many. You can use MacroWorks built-in macros or create your own.

MacroWorks' macros are in memory while AppleWorks is in memory. The MacroWorks disk also has programs on it that work on files after you have finished AppleWorks. These programs do multi-column printing, analyze word content, and alphabetize files.

## **Version required**

There are several versions of MacroWorks.

Version 1.0 works with expanded AppleWorks but will not allow you to use the clock features of expanded AppleWorks.

Versions greater than 1.0 will allow the clock features of expanded AppleWorks to be used. To use them, however, you must run a program on the MacroWorks disk to convert the names of certain MacroWorks files.

Read the notes for MultiRam (or Checkmate) on the MacroWorks disk or manual **before** you install macros on expanded AppleWorks.

If you install MacroWorks without first following MacroWorks' MultiRam instructions, you will have to reinstall it on an expanded disk without MacroWorks modifications to allow clock features to work.

## Installation

Updated MacroWorks versions are available from Beagle Brothers for a nominal charge.

MacroWorks is installed on the AppleWorks Startup disk.

Install MacroWorks **only** after you have made your MultiRam enhancements to a backup copy of the AppleWorks disks.

If you modify AppleWorks with MacroWorks before you expand AppleWorks, the MultiRam expansion program will not be able to find "APLWORKS.SYSTEM".

Make a backup copy of your expanded AppleWorks disks **before** you make MacroWorks modifications. Use the backup to make MacroWorks modifications and keep the first expanded disk as a master to use if further changes are made.

Using a backup, if anything goes wrong, you will not have to repeat the MultiRam modifications but will only have to redo the MacroWorks modifications.

Once MacroWorks is installed, it will work correctly with your expanded AppleWorks.

## Other features

A separate program on the MacroWorks disk allows you to create custom help messages to replace AppleWorks own help lines.

If someone other than you will run your expanded AppleWorks program, you may want use this program to create help messages for them regarding using expanded AppleWorks.

For example, if your secretary never read this manual and wanted quick help on segmenting files (more than the MultiRam segment help screen already provides), you could replace some of AppleWorks help messages with segment help.

For advanced users, the MacroWorks disk contains a modified version of ProDOS that lets you select system files from a menu when you quit AppleWorks. This program selector replaces ProDOS's "QUIT" routine that you normally see when you exit AppleWorks.

If you are using MultiRam's RAM disk, a hard disk, or a 3.5 inch UniDisk, this selector will make moving between AppleWorks and other programs easier and faster.

To use the MacroWorks program selector, copy ProDOS from your MacroWorks disk to your expanded AppleWorks Startup disk.

## **Jeeves™**

Jeeves is a desktop accessory program that can be used along with AppleWorks. It offers desktop accessories such as an appointment calendar, calculator, and phone dialer that can be used while you are still in AppleWorks.

All of Jeeves accessories are in memory making access to them instantaneous.

## **Installation**

Jeeves requires no special preparation to be used with expanded AppleWorks.

Jeeves requires no special preparation because Jeeves is a preboot. You first boot the Jeeves disk and then, following Jeeve's on-screen instructions, run AppleWorks using its ProDOS pathname.

## **Jeeves & RAM disks**

You may wish to put the Jeeves program and any appointments, phonebook, and notepad files you create onto the MultiRam ProDOS RAM disk that can be used with AppleWorks (discussed earlier in this chapter and in Chapter 6).

Although Jeeves accessories are all in memory and are instantly available, its data files must be saved and loaded to disk at relatively slower disk speeds. On the RAM disk, access to these data files is instantaneous.

As explained in Chapter 3, a copy program provided on the MultiRam Utility disk can automatically set up the RAM disk and have the Jeeves data files automatically copied to the RAM disk for you. Follow the instructions for automatic loading of RAM disk files.

## Important

With early versions of Jeeves, to use the appointments, notepad, and phone book files from RAM disk, you must also run the Jeeves startup program "JEEVES.SYSTEM" from the RAM disk.

If you copy your appointment, phonebook, and notepad files to the RAM disk, be sure to copy them back to a floppy disk or any changes made in them will not be saved for future use.

## **File Programs**

Such programs include ReportWorks and ThinkWorks by Megahaus, GraphWorks by PBI, and Sensible Speller by Sensible Software

The second type of accessory programs work with AppleWorks files and are run after you have finished using AppleWorks.

Mail merge, spreadsheet graphing, spelling check, and outline programs are some examples.

If you have created a large file, one that is larger than the old 55K limitation, such programs may not work or may only work on data in part of your file. Some programs may work on large files but not on segmented files.

If such a program is important to you and you will be working with large files, first create several large test files to see how the accessory program will react. If the program does not work correctly with a test file and damages it, no harm will result since the file is not needed.

If you are using floppies, you should create one segmented test file as well as one unsegmented test file larger than 55K. Hard disk users need to create only one large test file.

If the accessory program works correctly with your test file, you may use it without modifying your data files. Be sure that your large test file modified by the accessory program can be used again by expanded AppleWorks before you use working files, however.

If the program works correctly with test files larger than 55K but will not work with segmented files you should (1) break your files into several smaller files, or (2) buy a 3.5 inch UniDisk or a hard disk so large files will not be segmented.

If the program does not work with files larger than 55K, you will have to break your large file into several smaller files to use the accessory program with it.







# Ram Disks & MultiRam™

All or part of a MultiRam card's memory can be turned into a *fast*, high capacity RAM disk for use with your Apple.

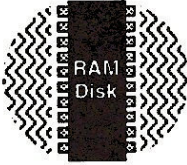
The chapters in this section explain how to create and use MultiRam's ProDOS and DOS 3.3 RAM disks:

- **Chapter 5: RAM disks explained**  
Explains the basics of using a RAM disk. Be sure you read "RAM disk rules" even if you have used a RAM disk before as some MultiRam features may differ from other RAM disks you have used.
- **Chapter 6: The ProDOS RAM disk**
- **Chapter 7: The DOS 3.3 RAM disk**

ProDOS and DOS 3.3 RAM disk chapters provide basic information about RAM disk software, demonstrate how to create and use a RAM disk both manually and automatically, and show how to customize the RAM disks.



## Chapter 5



# RAM disks explained

This chapter provides general information you will need to know to operate MultiRam's ProDOS or DOS 3.3 RAM disk programs.

### About this chapter

What is a RAM disk?  
Why use a RAM disk?  
How do you create and use a RAM disk?  
Which RAM disk should you use?  
What should you do or not do when using a RAM disk?

These are the most asked questions about RAM disks.  
This chapter answers these questions.

Be sure you feel comfortable with the material in this chapter before you go on to the chapters on MultiRam's ProDOS and DOS 3.3 RAM disks.

The most important part of this section is "RAM disk rules." If you ever have a problem when using a RAM disk, refer back to these rules and cautions for help.

Some basic knowledge of ProDOS and DOS 3.3 operating systems is assumed in this chapter and the following chapters, but you don't need to be an expert to understand the material.

Optional Pascal and CP/M RAM disk software is also available for MultiRam cards .

For more detailed information about ProDOS and DOS 3.3, refer to technical manuals available from your local computer dealer or bookstore.

## What is a RAM disk?

A RAM disk is an electronic storage device where files (programs, text, pictures, etc.) are saved to and read from RAM (Random Access Memory chips) rather than the magnetic media of floppy or hard disks.

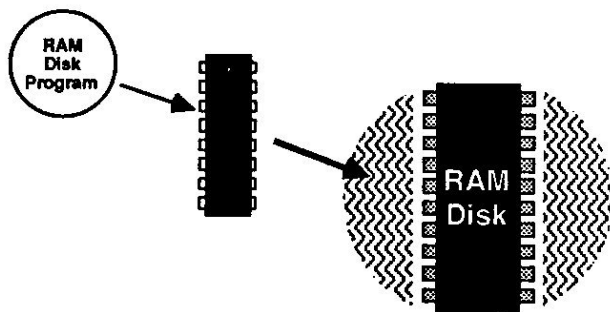
A disk operating system (ProDOS, DOS 3.3, etc.) determines how files are saved to and read from a disk.

A RAM disk can be used like a physical disk by a *disk operating system* only after running a RAM disk program.

The RAM disk program first arranges RAM to look like a disk to the operating system.

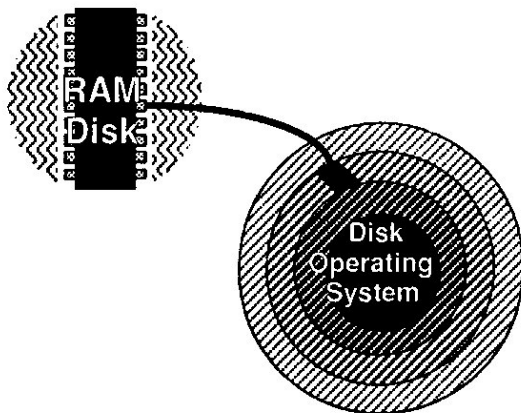
### Figure 5.1 RAM disk created

All or most RAM chips on the memory card are combined to form the RAM disk.



The RAM disk program next attaches the RAM disk to the operating system.

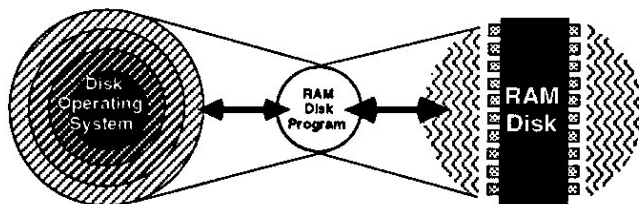
**Figure 5.2**  
**RAM disk**  
**attached**



Apple's operating systems were designed to use floppy or hard disks, not MultiRam's RAM disks. RAM disks must be connected to the Apple's operating system to be recognized as a disk.

Finally the RAM disk program acts as a translator between the operating system and the RAM disk so that all disk commands will work correctly.

**Figure 5.3**  
**RAM disk**  
**translation**



Look for new products from Checkmate Technology that will keep a RAM disk "alive" *after you turn off your Apple.*

As long as your Apple is on, the RAM disk will be available for use. Once you turn your Apple off, the RAM disk disappears.

## Why use a RAM disk?

There are two main reasons to use a RAM disk: speed and large size. Instantaneous access to files and large disk sizes give you the benefits of a hard disk drive without the added cost.

## Speed

A file in a RAM disk is read from and saved to *much* faster than from a physical drive.

RAM disks are faster because they are all electronic while a floppy or hard drive uses slower mechanical parts for disk access.

Depending upon the operating system used, RAM disk access speeds can be more than forty times faster than floppy disk access speeds.

## Disk intensive programs

Any program that frequently reads from and writes to disk can be significantly speeded up with a RAM disk.

Virtual memory programs move large chunks of a text file from disk to RAM as you scroll through a file so that it appears as though the whole file is in memory.

Word processors (like Word Perfect™) and other programs that use *virtual memory* techniques to store text files can be greatly speeded up. Large graphic programs (like Fontrix™), accounting programs (like BusinessWorks™), and assemblers (like ORCA/M™) are some other types of programs that can immediately benefit from RAM disk speeds.

## Quick switching

A RAM disk's speed makes it ideal to quickly switch between related or complementary programs on the RAM disk.

For example, you may load AppleWorks and a spelling checker, mailmerge, and graphing programs, all designed to work with AppleWorks files, and then instantly switch between programs to work with AppleWorks files on the RAM disk.

  
**Size**

Another benefit of a MultiRam RAM disk is that you can store many more files on a RAM disk (depending on the size of your MultiRam card) than on a standard 5-1/4 inch floppy disk or even a 3.5 inch UniDisk.

The number of files you can store on a RAM disk depends upon the storage limitations of the operating system and the size of the RAM disk (see "RAM disk rules" and the RAM disk sections for operating system limits).

RAM disk size is determined by the amount of RAM on your MultiRam card. Table 6.2 on page 109 shows sizes for MultiRam's ProDOS RAM disk that correspond to MultiRam memory sizes. Table 7.2 on page 163 shows the sizes and numbers of RAM disks for MultiRam's DOS 3.3 RAM disk.

**Multi-Disk programs**

Many programs store the main part of the program on one disk and other less used parts on other disks. When you use such large programs, you may have to frequently swap program disks and data disks.

Using a large RAM disk, you may be able to copy all of the program's scattered segments onto the RAM disk and have enough room to also store data files.

If you work with a number of different programs during the day, they can all be stored on a large RAM disk for quick access. If these programs can work with the same type of data files, you can also store data on RAM and quickly switch between programs to work on your data.

**Big programs and RAM disks**

You may even run some sophisticated programs that use more than 128K, like expanded AppleWorks and Supercalc 3a, and use a large RAM disk at the same time. You get the benefits of advanced programs that can handle large files *and* the speed of a RAM disk.

Instructions for using AppleWorks and Supercalc 3a with a RAM disk are covered later in this chapter.

## How to use a RAM disk

If you know how to use a floppy or hard disk, then you *almost* know how to use a MultiRam RAM disk. There are a few important differences between them you do need to know.

Using a RAM disk requires three steps. No matter how sophisticated and automatic a RAM disk becomes, all require the same three steps.

### 1 Create the RAM disk.

Just as you must format or initialize a floppy or hard disk before you can use it, you must run a RAM disk program to create and format the RAM disk before any files can be written to or read from it.

After the RAM disk program has first run, the RAM disk is empty but ready for use.

Look for new products from Checkmate Technology that will keep a RAM disk usable *after you turn off your Apple.*

Unlike a floppy or hard disk, because a RAM disk disappears when you turn off your computer, you must run a RAM disk program every time you turn on the Apple.

### 2 Copy any desired files to the RAM disk.

Just as you use a file copy program to transfer files to a floppy or hard disk once you format it, you must use a file copy program to transfer any desired programs or data files to the RAM disk.

Some programs CANNOT be copied to a RAM disk or to any other disk. See "RAM disk facts" for information on copy protected programs.

To copy files to a RAM disk, you use a file copy program such as ProDOS's Filer or DOS 3.3's FID.


Unlike a floppy or hard disk, you cannot use a disk copy program like the Filer's "COPY A VOLUME" program or DOS's "COPYA" to copy an entire floppy to a RAM disk.

### 3 Start a program to use the RAM disk.

Just as you can run a program on a floppy or hard disk by typing the operating system's run command followed by the name of the program (e.g., "RUN MYPROGRAM"), you can run a program on a RAM disk in the same way.



You can also run a program on a floppy or hard disk using the operating system's run command and that program can also access the RAM disk.

You "cold boot" a disk by turning on the Apple with a disk containing an operating system on it in slot 6, drive 1. With the Apple on, you "warm boot" a disk by pressing the  , **Control**, and **Reset** keys at the same time and then release the **Control** and **Reset** keys while holding the  key for a second longer.

Unlike a floppy or hard disk, you cannot boot a program's floppy disk and still be able to access the RAM disk. If you **cold boot** your Apple, the RAM disk disappears from memory entirely.

If you **warm boot** a program disk, the operating system on the program disk writes over the operating system in memory. The RAM disk and all files on it remains intact but the hooks that the RAM disk put into the overwritten operating system are gone (see "RAM disk rules" to see how to reconnect a RAM disk if you accidentally do a warm boot).

The process of creating a RAM disk, copying files to the RAM disk, and then running a program to use the RAM disk can be completely automated so that all you have to do is boot a disk and wait until the disk presents you with your desired program.

Instructions for manually and automatically creating and using RAM disks are given for both ProDOS and DOS RAM disks in the following chapters.



### Which MultiRam RAM disk should you use?

Use the ProDOS RAM disk programs with ProDOS programs; use the DOS 3.3 RAM disks with DOS programs.

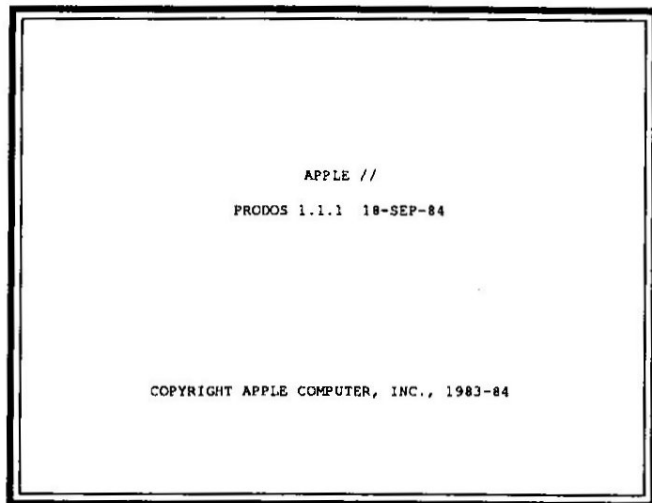
How do you know which operating system a program uses?

Most programs list in their manual or on their packaging the operating system they use. Refer to your program's documentation for this information.

If you cannot find this information in your program's documentation, almost all ProDOS programs can be identified by the ProDOS version screen seen when you boot a ProDOS disk.

Figure 5.4 shows the typical ProDOS identification screen.

**Figure 5.4**  
**ProDOS**  
**identification**  
**screen**



You must choose only one of the two sets of programs to setup your RAM disk because ProDOS and DOS 3.3 operating systems normally cannot be used at the same time. This is a result of the Apple's boot process.

An operating system is installed into your computer's memory when you boot a disk with the operating system on it. The boot process that installs an operating system will also overwrite any previous operating system in memory. So only one operating system and therefore only one MultiRam RAM disk can ordinarily be active in your computer at a time.

## RAM disk rules

Following are the most important facts about a RAM disk you should know to successfully use a RAM disk. You may want to reread these cautions after reading other parts of this manual.

### 1 RAM disks are temporary

Information stored on the RAM disk is lost when the Apple is turned off.

Look for new products from Checkmate Technology that will keep a RAM disk intact *after you turn off your Apple.*

Information on a RAM disk is stored as an organized pattern of electrons in RAM maintained by a constant flow of electricity. Therefore, just as a program will disappear from memory when you turn off your Apple, so will information stored on a RAM disk disappear.

- **Do** copy files you want saved from your RAM disk back to a floppy or hard disk before you turn off your Apple. All files will be lost when you turn off the power.
- **Do** move a file copy program to your RAM disk if there is room for it. A file copy program on the RAM disk is very convenient to use when you copy files from the RAM disk to a physical disk.

### 2 Programs larger than 128K can delete RAM disks.

Some programs, like expanded AppleWorks, Supercalc 3a, and Flashcalc will use all or most of the memory on the MultiRam card for their own purposes. They can write over a RAM disk without proper planning.

- **Do** prepare a properly sized RAM disk before you use such programs if you know how much memory the program will use or which auxiliary banks it uses.

Programs like MultiRam expanded AppleWorks and Supercalc 3a are designed to use a certain portion of memory while leaving other parts of memory free for RAM disk use (more on this in the ProDOS section). Be sure to read the program's instructions carefully before customizing the RAM disk for a certain size.

### **3 Some utility programs can delete RAM disks.**

Many newer utility programs can copy all or part of a floppy disk into RAM to make recopying to other floppies fast and easy. For example, Locksmith 6.0 or Diversi-Copy will copy all of a floppy into MultiRam's memory.

Such programs could write over part of a RAM disk making it unusable. RAM disks are more likely to be overwritten with small amounts of RAM on your card.

Other utility programs, such as the RAM test program on your MultiRam disk, will definitely write over a RAM disk.

- **Do** save any files you do not want to lose from an existing RAM disk to a floppy or hard disk before you use one of these utilities.

### **4 You can reconnect unhooked RAM disks**

RAM disks must remain attached to their operating systems to work.

You might accidentally disconnect a RAM disk by pressing **⌘+Control+Reset**. A program could possibly accidentally disconnect a RAM disk from its operating system, although this is *very unlikely* .

You will know a RAM disk has become unhooked if you see an error message like "Volume not found" or "File not found" or if you are unable to catalog the slot/drive where the RAM disk is located.

- **To reconnect the RAM disk, run the same RAM disk program you used to create the disconnected RAM disk.**

Files on your RAM disk remain intact after the RAM disk is reconnected. This is possible because the RAM disk program first check to see if a RAM disk already exists. If so, the RAM disk program simply rehooks the existing RAM disk to the operating system; it does not try to reformat a RAM disk.

Pressing **Control+Reset** will not affect any files on the RAM disk nor disconnect it.

- **Do** insert the disk containing your RAM disk software and an operating system in drive 1 and press **⌘+Control+Reset** to warm boot the computer if you believe the operating system may have also been overwritten.
- **Do not** turn off your Apple to reboot the operating system and RAM disk software! All data on the RAM disk **WILL** be lost if you turn off the power.
- **Do not** create a RAM disk for another operating system before you try returning to the original RAM disk or the original RAM disk will be overwritten.
- **Do not** restore the RAM disk using a RAM disk that you customized with different characteristics from the original RAM disk (different size, slot, etc.). The original RAM disk will be overwritten if you do.

To avoid accidental reformatting by using differently customized RAM disks, save your customized changes to disk and install the RAM disk using the same customized program each time.

## 5 Damaged RAM disks require a cold boot.

A RAM disk can be damaged from several causes and the files on it cannot be recovered.

You must rerun the RAM disk program to rebuild the RAM disk in such a case.

The RAM disk program first checks an area of MultiRam's memory for identification marks that show a RAM disk already exists. To protect files that are on the existing RAM disk, the program simply rehooks the RAM disk to the operating system and quits if it finds identification marks.

If identification marks of the blown RAM disk still are in memory, the program will be fooled into thinking a good RAM disk exists.

If you turn off the Apple to delete the old RAM disk and **immediately** turn it back on, the RAM chips may hold data long enough to show the identifying marks to the program.

- **Do** turn off the Apple for several seconds (10 should be the most needed) and then cold boot the RAM disk software to safely recreate a blown RAM disk.

- **Do not** warm boot the operating system and rerun the RAM disk software. The RAM disk program may rehook the damaged and unusable old RAM disk.

## 6 You cannot boot a disk.

- **Do not** start **any** program by booting the disk the program is on. This will unhook the RAM disk.

- **Do** use the operating system's run command to start a program after you have established a RAM disk. For example, to run an Applesoft program from a RAM disk, enter "RUN <program name>."

To use the ProDOS RAM disk, you **MUST** know how to use ProDOS system files, how to use pathnames to run a program, and how to use pathnames to exit a program.

See "A ProDOS tutorial: Running programs with ProDOS" in Chapter 6 for pathname information.

## 7 All disk commands work normally...but one.

You can use disk commands as you normally would. "CATALOG", "RUN", "DELETE", "LOAD", "LOCK", "RENAME", etc. all work correctly. There are no new commands to learn.

All RAM disks are initialized or formatted by the RAM disk program itself when starting; you do not need to initialize the RAM disk with an external command.

- **Do not** use a ProDOS disk format program such as the one in the Filer or Copy II+. They will report that the RAM disk is formatted but all information ProDOS will report about the RAM disk (free space, size, etc.) will be incorrect. The RAM disk is actually **DAMAGED** by using a ProDOS format.

- **Do not** use the DOS 3.3 "INIT" command. You will see "I/O ERROR" if you attempt to initialize the DOS RAM disk with this command. The RAM disk will not be affected if you do accidentally try to "INIT" the RAM disk, however.

- **Do** use a program's "delete all files" command or turn off the Apple to reformat the RAM disk if you want to clear a RAM disk of all files.

## **8** You cannot copy disks, only files.

Disk copy programs, like DOS 3.3's "COPYA" or VOLUME copy commands in the ProDOS Filter which duplicate the contents of one disk to another disk, cannot be used with a RAM disk.

Disk copy programs cannot be used because (1) they copy very small units of information which are organized differently on a floppy disk than on a RAM disk, and (2) while the disk they copy from must be exactly the same size as the disk they copy to, a RAM disk can be larger or smaller than a floppy disk.

- **Do** use a file transfer program like the Filer, FID, or COPYII+ to transfer programs to and from a floppy or hard drive after you have prepared it for use.

## **9** You cannot use copy protected programs.

You must be able to transfer files from a physical disk to a RAM disk to use the files there.

A copy protected program cannot be copied by a regular file copy program; it has a protection scheme on its disk to prevent duplication.

Programs which can be transferred to a hard disk usually can be copied to a RAM disk. At minimum, you must be able to catalog files on a floppy disk in order to move them to a RAM disk.

If you cannot successfully copy your program with a normal copy program, such as ProDOS's Filer or DOS's COPYA, the program is probably protected.

- **Do** check with the publisher of a copy protected program you would like to run on a RAM disk. Some software publishers produce two versions of a program, one protected and one unprotected so it can be run on a hard disk.

## 10 Some custom operating systems do not work.

For example, ProntoDOS and Diversi-DOS (which speed disk access) and Rana DOS (which allows larger-capacity drives to operate under DOS) all work with the DOS 3.3 RAM disk. Other versions, like David-DOS, have been modified more radically, and will not work with the DOS RAM disk.

Many forms of customized ProDOS and DOS operating systems exist. The RAM disks will work with most customized versions that have not made major changes to the operating system.

If you have made, or intend to make patches to ProDOS or DOS, almost all of the most common modifications should work properly with the RAM disk.

Examples of DOS 3.3 changes which should cause no problems are: increasing the number of files per disk, increasing the size of binary files, custom catalogs, and HELLO files that can be EXEC'ed or BRUN.

Some commercial programs relocate ProDOS or DOS to the auxiliary bank of memory or place DOS entirely into language card memory. MultiRam's RAM disks will not work with such programs.

## 11 Operating systems have file limits.

Both the ProDOS and DOS operating systems limit the number of files that can be stored to a disk. ProDOS allows only 51 files per volume directory; DOS 3.3 allows only 105 files per disk.

- **Do** create subdirectories on a ProDOS RAM disk if you find you still have room on the RAM disk but you already have 51 files on the disk. Each subdirectory can hold unlimited files and you may have unlimited subdirectories within a subdirectory.

You may create subdirectories with the Filer's File Command "M - MAKE DIRECTORY" or with the Basic command "CREATE /<volume name>/SUBDIRECTORY1..2...3...etc."

- **Do** remember DOS 3.3's 105 file limitation. If you use over 105 small files, save logically related groups to different RAM disks. Up to nine DOS RAM disks are possible.



## 12 You can switch operating systems.

You can create and use either a MultiRam ProDOS or DOS RAM disk, warm boot and use a program with a different operating system, and then reinstall the original RAM disk and all files on the original RAM disk will be intact.

Restoration of all RAM disk files is possible because the RAM disk program first check to see if a RAM disk already exists and simply rehooks the RAM disk to the operating system if it does. The program does not try to reformat the RAM disk.

/ If you use your computer most of the day and switch between programs with different operating systems, the following procedure should save you from rebuilding RAM disks:

- **To run a program with a different operating system:**

Press **⌘+Control+Reset** after placing a disk containing the new operating system in drive 1. The new operating system will boot, and you may run a program using that operating system.

- **To restore the original RAM disk:**

Press **⌘+Control+Reset** after placing a disk containing the original operating system in drive 1. Follow the appropriate RAM disk installation instructions. The RAM disk's hooks into the operating system will be reconnected, and you again have access to the RAM disk's files.

- **Do not** run a program that uses more than 128K of memory. The program may overwrite the RAM disk.

- **Do not** run a program that uses 128K of memory if you are using auxiliary bank zero for the DOS RAM disk. The DOS RAM disk may be overwritten. See "Customizing the DOS RAM disk" at the end of Chapter 7 to learn how to avoid this problem.

See rule 4 "You can reconnect unhooked RAM disks" for other cautions.

## **13** RAM files may grow too large to move.

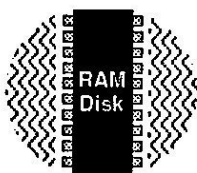
You can create a file as large as your RAM disk with many programs. Such a file could be many megabytes in size.

- **Do not** create files on a RAM disk larger than the free space on a blank floppy or the free space left on a hard disk.

While AppleWorks expanded for MultiRam will split and save huge files over several disks, almost all other programs must save their data files to one disk volume.

The largest file that can be saved to a blank 5-1/4 inch floppy is about 135K. A blank 3.5 inch UniDisk can hold about an 800K file. A file on a hard disk can be as large as free space on the hard disk.

## Chapter 6



# The ProDOS RAM disk

The ProDOS RAM disk programs on your MultiRam Utility disk convert all or part of your MultiRam card's memory into fast electronic disks, allow you to copy programs onto the RAM disk, and will customize your ProDOS RAM disk.

### About this chapter

In this chapter you will learn what each of the ProDOS RAM disk programs do, how they work, how to use them, and how to customize them.

Three examples are given to (1) create RAM disks, (2) copy programs to the RAM disks, and (3) run programs from the RAM disk. Each demonstrates a different way of doing these three key steps and a different combination of RAM disk programs.

*One of the examples will show you how to make a disk that when booted will automatically create a ProDOS RAM disk, copy AppleWorks and Pinpoint files to it, and start AppleWorks from the RAM disk.*

You MUST know how to use ProDOS commands and pathnames to work with a ProDOS RAM disk. Read the tutorial on page 110 before starting the examples.

## The ProDOS RAM disk programs

There are two programs on the Utility side of the MultiRam disk that can be used to create a ProDOS RAM disk, one program to customize RAM disks, and three programs to copy files to a RAM disk.

These programs are described in Table 6.1.

How these programs work and how to use them are the subjects of the next sections. Customization is discussed last.

**Table 6.1**  
**ProDOS**  
**RAM Disk**  
**Programs**

### **MULTIDRIVE.PRO**

A binary program that when run creates and formats the ProDOS volumes named "MRAM" and "/RAM" according to default slot, drive and size variables stored within the program.

### **MRAM.SYSTEM**

A system file made from MULTIDRIVE.PRO with two extra features: (1) MRAM.SYSTEM when placed after the ProDOS system file on a disk automatically creates MRAM when the disk is booted, and (2) MRAM.SYSTEM will automatically run the next system file on the disk.

### **MD.PRO.CUSTOM**

An Applesoft program that allows you to change the current slot, drive, and size values for MRAM and then save the new values to MULTIDRIVE.PRO and MRAM.SYSTEM files.

### **FILER**

Apple Computer's copy program. This system file copies volumes and files. It will allow you to manually copy files to and from the ProDOS RAM disks.

### **COPY.ALL**

An Applesoft program that allows you to automatically copy files to and from the ProDOS RAM disk MRAM.

### **LOADMRAM.SYSTEM**

A system program that allows you to semi-automatically copy files to the ProDOS RAM disk MRAM. Very small in size and very easy to use.

## How the ProDOS RAM disk programs work

Both MULTIDRIVE.PRO and MRAM.SYSTEM programs create two RAM disks when they are run: "/RAM" and "MRAM". /RAM is created first followed by MRAM.

When either of the RAM disk programs are run, they first find out how much RAM is on your MultiRam card.

Finding at least 64K, the program creates a small 64K RAM disk with the volume name "/RAM."

The small RAM disk /RAM is accessed either by its ProDOS volume name, "/RAM", or by its defined location, slot 3, drive 2. /RAM is almost identical to the RAM disk created by ProDOS (see Programming Tips at the end of this chapter for details on /RAM).

Through customization, you can cause MRAM to use only a part of the RAM it finds. You can create a RAM disk of a set size this way. See "Customizing MRAM" at the end of this chapter for details.

If there is more than 64K on the MultiRam card, the program will create the second RAM disk volume named "MRAM."

The program finds the highest bank of auxiliary memory on the card and adds all remaining 64K banks of memory to it in descending order to create MRAM.

Both /RAM and MRAM are then hooked to the ProDOS operating system and are ready to be used.

## ProDOS RAM disk specifications

MRAM can be up to 4 megabytes in size and has a default location of slot 3, drive 1.

The storage capacities of MRAM on MultiRam memory cards are shown in Table 6.2 on page 109.

## Important

Because MRAM is located above the first 128K of memory in the Apple, programs needing 128K of memory will not affect MRAM. Programs using 128K of memory will disconnect /RAM and take the 64K that would be used by /RAM for their own use. In this feature MultiRam's /RAM acts the same as ProDOS's own RAM disk.

MULTIDRIVE.PRO and MRAM.SYSTEM can be used with ProDOS versions 1.1.1 and earlier. They are compatible with floppy and hard disk drives. /RAM and MRAM drives will respond to all disk commands.

ProDOS RAM disks can be divided into subdirectories to make it easier to work with large numbers of files.

## Important

ProDOS allows only 51 files on a volume directory. If you still have room on the RAM disk but run into the 51 file limitation, create subdirectories to continue to place files on the RAM disk. You will see how to create subdirectories later in this chapter.

## **How to use the ProDOS RAM disks**

To use the ProDOS RAM disk, follow the three steps discussed in Chapter 5: (1) create the RAM disk, (2) copy files to the RAM disk, and (3) run programs from the RAM disk.

You may create a RAM disk and copy files to it either manually (from the keyboard) or automatically (from program control).

The following examples will show you how to use different programs on the Utility disk to create the ProDOS RAM disk MRAM and copy files to MRAM.

The first example shows how to create MRAM using menu selections from the Utility disk and how to use the Filer to copy files to the RAM disk you create.

The second example shows how to make a disk that when booted will automatically : (1) create MRAM by running "MultiDrive.Pro", (2) copy all programs on a disk to MRAM, and (3) run a program from the RAM disk. Specific instructions are given to auto-load both AppleWorks and Pinpoint accessories to MRAM and auto-run AppleWorks from MRAM.

The last example will show how to make a very small disk that will use "MRAM.SYSTEM" to automatically create a RAM disk and then run the copy program "LOADMRAM.SYSTEM," the easiest copy program to use.

**Table 6.2**  
**ProDOS RAM**  
**disk (MRAM )**  
**Sizes and**  
**Useable**  
**Memory**

ProDOS allows any type of storage device to be up to 16 megabytes in size. MultiRam's main ProDOS RAM disk, named "MRAM", is therefore created as one large disk.

MultiRam RGB & //e	MultiRam CX	MRAM Size	Total Blocks	Blocks Free	Blocks Used 6
64K		64K <sup>5</sup>	128	120	8
128K		64K	128	120	8
192K		128K	256	245	11
256K		192K	384	370	14
320K	256K <sup>4</sup>	256K	512	495	17
384K	320K <sup>4</sup>	320K	640	620	20
448K <sup>1</sup>		384K	768	745	23
512K		448K	896	870	26
576K	512K <sup>4</sup>	512K	1024	995	29
640K <sup>1</sup>		576K	1152	1120	32
768K		704K	1408	1370	38
832K <sup>1</sup>		768K	1536	1495	41
1024K <sup>1</sup>		960K	1920	1870	50
1792K <sup>2</sup>		1728K	3456	3370	86
4096K <sup>3</sup>		4032K	8064	7870	194

**Notes:**

1. Available on the MultiRam™ RGB card only.
2. A 1024K MultiRam™ RGB card combined with a 768K MultiRam™ //e card. Other sizes possible in 64K increments from 1024K to the 1792K maximum.
3. A 1024K MultiRam™ RGB card combined with a MultiRam™ Plus card with 3 megabytes.
4. Because the //c has 128K of memory built-in, all of the MultiRam card's memory in the //c can be used for MRAM.
5. /RAM takes the first 64K of a MultiRam™ card; 64K of the //c's motherboard auxiliary memory.
6. Represents protected space for RAM disk routines.

## **A ProDOS tutorial: Running programs with ProDOS**

Before you start the examples, read this section if you have not run programs using ProDOS commands.

You WILL NOT be able to successfully use a ProDOS RAM disk if you do not know the following information.

## **Run programs, do not boot them**

As you learned earlier, if you create a ProDOS RAM disk and then use the familiar **⌘+Control+Reset** to start a program on a floppy, the RAM disk will be unhooked.

To run a program after you have created a ProDOS RAM disk and not unhook the RAM disk, you must follow ProDOS's rules.

## **Only system files can be run**

Unlike DOS 3.3 and other operating systems, ProDOS can run only system files. Even Applesoft Basic programs cannot be run unless the system file "BASIC.SYSTEM" is run first.

## **What is a system file?**

System files are assembly language programs that load into a special location in memory when run. They are self-contained programs with standard beginning and ending procedures defined by ProDOS.

When ProDOS is given the proper run command, it can run any system file. All commercial programs you will buy are started by such a system file.

When ProDOS boots, it searches a disk and will automatically run the first system file it finds with a ".SYSTEM" on the end of the file name.

You will use this feature later to let ProDOS create a RAM disk for you.

The special system file "BASIC.SYSTEM" will also search for a file named "STARTUP" and will run that file automatically. The file can be anywhere on the disk.

You will use this feature later to let BASIC.SYSTEM create a RAM disk for you.



To identify a system file

- Catalog the disk the file is on. The letters under the "TYPE" heading must show as "SYS." If a file does not show this type, it is not a system file. See Figure 6.1.

**Figure 6.1**  
System files  
on the  
MultiRam  
Utility disk

Boot the MultiRam Utility work disk. Select "6. Exit to Basic". From the Applesoft Basic™ prompt, enter "CAT" followed by a Return. You will then see the screen display in Figure 6.1

Volume name

File names	File type			
/MULTIRAM.UTIL				
NAME	TYPE	BLOCKS	MODIFIED	
*PRODOS	SYS	30	18-SEP-84	
LOGO.SYSTEM	SYS	18	5-DEC-85	
*BASIC.SYSTEM	SYS	21	18-JUN-84	
STARTUP	BAS	6	25-APR-86	
MULTIRAM.TEST.E	BIN	27	3-FEB-86	
MULTIRAM.TEST.C	BIN	13	18-APR-86	
PRINT.DOC	BAS	5	24-FEB-86	
RECENT.CHANGES	TXT	12	25-APR-86	
MRAM.SYSTEM	SYS	8	18-APR-86	
MULTIDRIVE.PRO	BIN	7	18-APR-86	
MD.PRO.CUSTOM	BAS	12	29-APR-86	
*FILER	SYS	51	18-JUN-84	
COPY.ALL	BAS	13	1-FEB-86	
COPY.ALL.OBJ	BIN	1	27-NOV-85	
LOADMRAM.SYSTEM	SYS	5	25-APR-86	
BLOCKS FREE:	44	USED:	236	

- Commercial programs *almost* always have ".SYSTEM" at the end of the file name that starts the program. A system file does not need this designation to be a system file, however. Figure 6.1 shows several "SYS" files with ".SYSTEM" at the end of the file name and several without.
- Look at the program's manual. Check under the hard disk section to see which file it tells to run when you move the program to a hard disk. This is the system file you will need to run when using a RAM disk.
- Try to run the file (how to run explained shortly). If it runs it is a true system file. If it does not run, it is not a true system file. Some commercial programs have files on the disk labeled "SYS" but they serve an internal purpose only; they cannot be run independently.

## Finding system files to run

Now that you know which files can be run, how do you get to them?

ProDOS locates files using what is called a "pathname."

A pathname is a set of directions, a roadmap to ProDOS that tell it where to go to find a file.

A pathname has three parts:

- the volume directory name,
- one or more subdirectory names, and
- the program name you want to run.

A slash "/" starts the pathname and comes before each of the parts.

For example, the pathname for one ProDOS RAM disk program on the MultiRam Utility disk is "/MULTIRAM.UTIL/MRAM.SYSTEM".

The volume directory name is the name you give a floppy disk or hard disk when you format it. That name is how ProDOS will refer to the disk in the future. The volume directory contains up to 51 file names. These names can be of program, data, or subdirectory files.

To place more than 51 files on a volume, you create one or more subdirectory files. A subdirectory file can contain an unlimited number of files names. The file names can be of other subdirectories, programs or data.

Subdirectories are useful when you have a large volume with many files on it. You can group related files together in a subdirectory to make finding them easier. A disk does not have to have subdirectories, however. Most 5-1/4 inch floppies have only a volume directory.

Create a subdirectory from the Applesoft prompt by the Basic "CREATE" command, e.g., "CREATE/<volume name>/<subdirectory name(s)>". You can also use the Filer's File Command "M- MAKE SUBDIRECTORY" entering the name of the subdirectory at the prompt.

**An example**

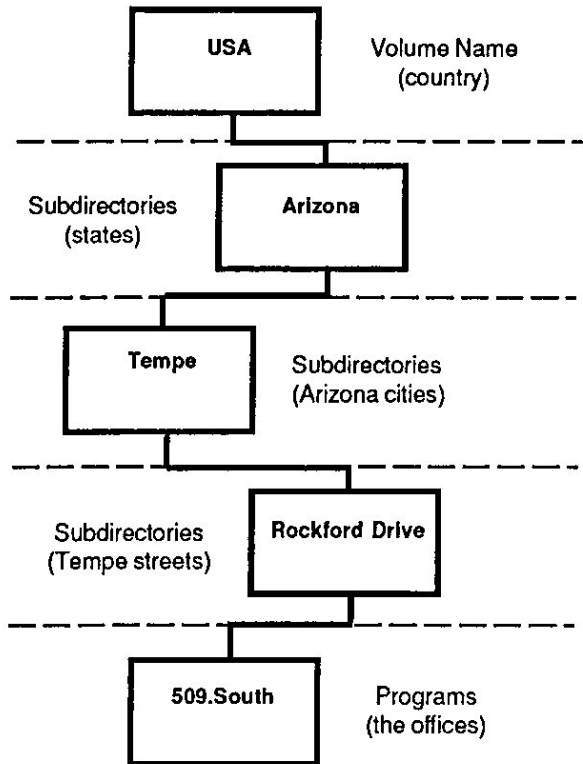
A program you may want to run is stored inside a directory. It can be stored in the volume directory or a subdirectory.

To find and run a file, you must start at the widest part of the path and narrow down the search using a disk's volume name, the subdirectory (if any) the file is in, and the name of the program.

For example, if you were to use a ProDOS like pathname to find Checkmate Technology's office, the pathname would look like:

`/USA/Arizona/Tempe/Rockford.Drive/509.South`

**Figure 6.2**  
**Pathname**  
**example**



Most commercial programs on floppy disk have only one directory, the volume directory. System programs are easy to find on these disks; they appear right on the volume directory.

For example, all system files on the MultiRam disk in Figure 6.1 are in the volume directory. You can run any system file on the disk by entering only the volume name followed by the program name.

You will find a few popular commercial programs that do use subdirectories like Apple's Mouse Paint. How do you find the names of system files on subdirectories in this case?

When you "CAT", use a "CAT,Ss,Dd" where s and d are the slot and drive numbers if you put the disk into a drive other than the drive where you booted Applesoft.

Catalog the disk and look for the file type "DIR" if you do not see a system file on the volume directory. You can do this from the Applesoft prompt by entering "CAT" and pressing the Return key. You can also use a file utility to catalog files, like the Filer's "LIST" command.

If you were to catalog our "USA" volume example, you would see only "DIR" files, the names of states.

You next catalog using a pathname made up of the volume name and the subdirectory name. From the Applesoft prompt you would enter "CAT/<volume name>/<subdirectory name>". Again look for system files. If you see none, you may want to look in another "DIR" file whose name sounds like it might contain the file you are seeking.

In our "USA" volume, the most likely subdirectory to look for the office is "Arizona". From there we need to keep searching.

If you are using only 5-1/4 floppies, you will probably never have to look more than one subdirectory deep to find the system file you want to run.

If you are using a 3.5 inch UniDisk or a hard disk you may have to look through as many subdirectories as in our office example. But since you are probably the one who created those subdirectories, the job of finding the right program should not be too hard.

## Run commands and prefix

Once you know where the system file is that starts your program, you next need to know how to run it.

To run a system file, enter a "-" (dash) or "RUN" in front of the pathname.

For example, to run the system file "MRAM.SYSTEM" on your MultiRam Utility work copy, enter at the Applesoft prompt "-/MULTIRAM.UTIL/MRAM.SYSTEM" and press **Return**.

To simplify pathname access, you can specify a prefix for ProDOS.

When you enter a file name without a leading "/" slash, it is an incomplete pathname. To complete it, ProDOS attaches the current prefix to the file name.

For example, if the current prefix is "MULTIRAM.UTIL", entering "RUN MRAM.SYSTEM" will create the pathname "/MULTIRAM.UTIL/MRAM.SYSTEM".

To specify a prefix from Applesoft, enter "PREFIX/<volume name>/<subdirectory name(s)>". You will then need to enter only program names to run a program in that prefix. You can always run a program from another pathname without changing the prefix by entering the complete pathname leading to that program.

## Running one program after another

After you set up your RAM disk, you will probably use the dash or "RUN" command to run only the first program

When you exit the first program to run the next one, most commonly, you will not be left at the Applesoft prompt; you will be left at ProDOS's "QUIT" program.

## "QUIT": ProDOS's program selector

ProDOS has a built-in program almost all commercial programs use when you exit them. This is ProDOS's "QUIT" program.

The "QUIT" program will let you select another program to run.

The "QUIT" program will show you a 40-column screen asking you to "ENTER PREFIX ." Enter a "/", the volume name and any subdirectories leading to the program you want to run next and press **Return**.

You are then asked to "ENTER PATHNAME." Enter the name of the system program you want to run and press **Return**. The program will start. Only system programs can be run from the "QUIT" routine.

"BYE" is the Applesoft Basic command that calls the "QUIT" program.

You can see the "QUIT" program in action with the MultiRam Utility work disk. Boot the disk and choose "6. Exit to Basic " from the main menu. Then type "BYE" followed by a **Return**.

ProDOS runs the first system file on a disk. On your work disk this is "BASIC.SYSTEM." BASIC.SYSTEM in turn will automatically run any Applesoft program with the name "STARTUP."

You will see the "QUIT" prompts appear. Enter the prefix "MULTIRAM.UTIL" and the pathname "BASIC.SYSTEM" and the Basic program "STARTUP" will run. You will see the MultiRam Utility menu reappear.

## Important

||||| ProDOS's "QUIT" selector is functional but *unforgiving*. You must know the exact spelling of the pathname to run the next program because the "QUIT" program will not let you catalog any volumes.

If you do not know the pathname in advance, you will have to either exit to a pathname and program you do know or do a warm boot to do a catalog. Of course a warm boot will disconnect the RAM disk.

If you intend to use the RAM disk and frequently switch between programs, please read "Other utility programs" on page 145 to learn about better program selector alternatives to "QUIT."

## Prepare auto boot work disks

To follow the instructions in the examples that show how to automatically create and use RAM disks, you will need to prepare two disks. Do this before you start the examples.

## What you will need

### ■ The "ProDOS RAM Disk & Utilities" work disk

This is the work disk you made in Chapter 1.

### ■ 2 blank disks

One blank disk will be used for example two, the other for example three.

### ■ Expanded AppleWorks Startup and Programs disks with Pinpoint Installed.

These disks will be used in the second and third parts of example two. They are optional.

### ■ Pinpoint accessory disk

To be used in the second part of example two. Optional.

## To create the auto boot work disks

### A. Format two disks

1. Boot the MultiRam Utility work disk you created in Chapter 1.
2. Press "5" to choose "Run the Filer" from the Utility menu.
3. Press "V" to choose the "VOLUME COMMANDS" option from the Filer's main menu.
4. Press "F" to choose "FORMAT A VOLUME" from the Volume Commands menu.
5. Remove the work disk and insert the first blank disk.
6. Enter the slot and drive where you put the first blank disk and enter the volume name "AUTO.BOOT.CA". Press **Return**. The "CA" stands for the COPY.ALL program the disk will demonstrate.

### Figure 6.3 Format from the Filer

If the disk is already formatted, the program will ask you if you want to destroy the contents of the disk.

```
*****
*                                     *
*                               FORMAT A VOLUME                               *
*                                     *
*****
--FORMAT--
THE VOLUME IN SLOT: 6
DRIVE: 1

NEW VOLUME NAME: (/AUTO.BOOT)

--PRESS <RET> TO ACCEPT:<ESC> TO EXIT--
```

7. Remove the newly formatted disk when you see the message "FORMAT COMPLETE" and insert the second blank disk.
8. Repeat step 6 except name the volume "AUTO.BOOT.SYS." The "SYS" stands for the "system" method of auto running a RAM disk that the disk will demonstrate.
9. Press the **Escape** key twice to return to Filer's main menu.

#### B. Copy Files

1. Press "F" to enter the FILE COMMANDS.
2. Choose "C" to copy files.
3. Enter for "FROM" pathname "/MULTIRAM.UTIL/?"
4. Enter for "TO" pathname "/AUTO.BOOT.SYS/?".
5. Insert the ProDOS work copy disk in one drive and , if you have two disk drives, the "AUTO.BOOT.SYS" disk in another. If you have one disk drive, follow the on-screen prompts to insert disks in proper order.
6. Press the **Return** key.



7. Transfer the following files to the "AUTO.BOOT.SYS" disk in exactly the order listed below by answering "Y" when the file name appears on screen. Answer "N" to to all other file names.

PRODOS  
MRAM.SYSTEM  
LOADMRAM.SYSTEM

8. Press **Return** after the files are copied to copy more files.
9. Remove the "AUTO.BOOT.SYS" disk
10. Insert the "AUTO.BOOT.CA" disk.
11. Enter for the "FROM" pathname  
"/MULTIRAM.UTIL/?".
12. Enter for the "TO" pathname  
"/AUTO.BOOT.CA/?".
13. Transfer the following files to the "AUTO.BOOT.CA" disk in exactly the order listed below by answering "Y" to each prompt. Answer "N" to to all other files.

PRODOS  
BASIC.SYSTEM  
MULTIDRIVE.PRO  
COPY.ALL  
COPY.ALL.OBJ

14. Press the **Escape** key once to return to File Commands.

### C. Rename files

1. Choose "R" to rename files.
2. Enter at the "PATHNAME" prompt the name of the file to change: "/AUTO.BOOT.CA/COPY.ALL".
3. Enter at the "NEW PATHNAME" prompt the name to change to: "/AUTO.BOOT.CA/STARTUP".
4. Press **Return** and you should see a message that renaming is complete.
5. Remove the "AUTO.BOOT.CA" disk.
6. Label each disk with their volume names.

Each disk is now ready to use in the examples that follow.

## Using the ProDOS RAM disk manually

You can create the ProDOS RAM disk and copy files to and from it by using the MultiRam Utility menu or by entering keyboard commands.

The following steps show how to use the Utility disk menus. Keyboard commands are shown next.

## The MultiRam Utility disk

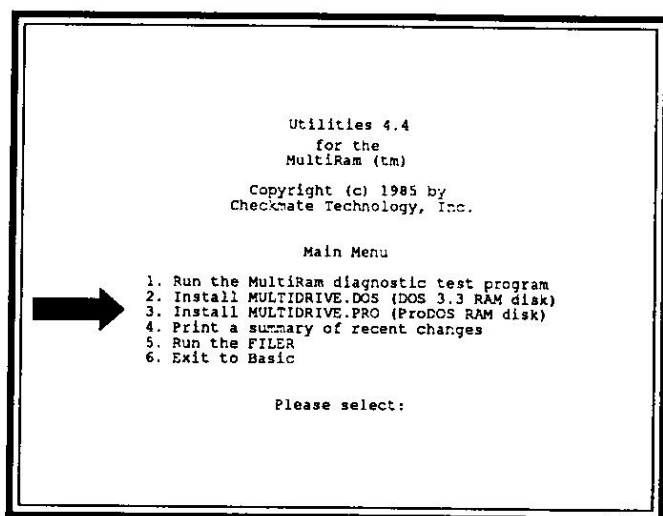
The MultiRam Utility disk lets you create ProDOS RAM disks and copy programs to and from the RAM disks through easy menu selections.

### To create a ProDOS RAM disk

1. Boot the work copy of the MultiRam Utility disk you created in Chapter 1.
2. Choose option number 3, "Install MULTIDRIVE.PRO (ProDOS)" from the main Utility menu.

This loads the MULTIDRIVE.PRO installation program and displays another menu screen entitled "MultiDrive.PRO".

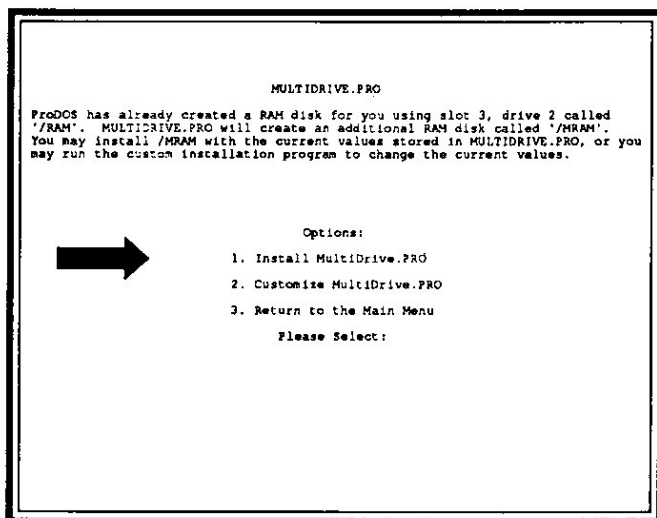
**Figure 6.4**  
**MultiRam**  
**Utility screen**



3. Choose option 1 from the MultiDrive.PRO menu to install MRAM using its default options.

Option 2, "Customize MultiDrive.PRO" is discussed in detail later in this chapter.

**Figure 6.5**  
**ProDOS RAM**  
**disk menu**

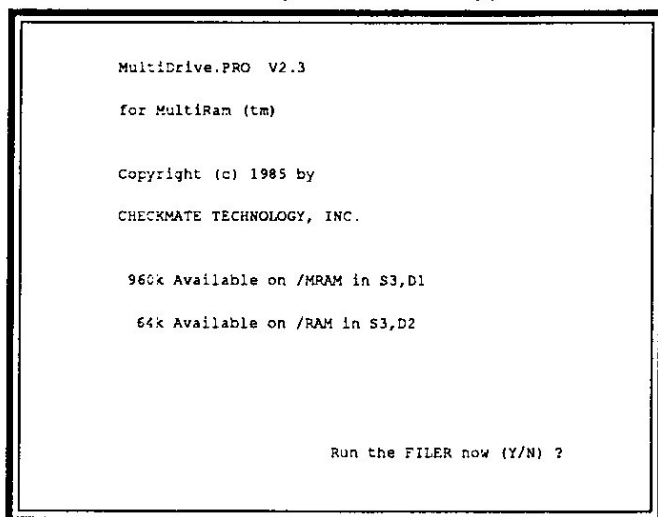


When the installation is completed, you will see a screen showing /RAM and MRAM have been created and you will see MRAM's size.

You will also be asked if you want to run Apple's FILER .

**Figure 6.6**  
**RAM disk**  
**installed**  
**screen**

MRAM's size depends upon the RAM on your MultiRam card.



Do not use the file copy program supplied on the Systems Utility disk with the //c; it cannot copy files to the RAM disk.

You can use the Filer to copy files to MRAM. If you prefer another file copy program or do not want to copy files to MRAM, answer "N", exit the Utility menu, and run another program.

## To use the Filer to copy files

Copying files to MRAM involves three steps:

- A. List the volume name and file names to copy
- B. Copy files to MRAM
- C. Quit and run a program

### A. List volume and file names

If you do not know the pathname leading to files you want copied to MRAM—or you do not know the names of the files to be moved, use the Filer to first find out the volume name of the disk and then the names of files on the disk.

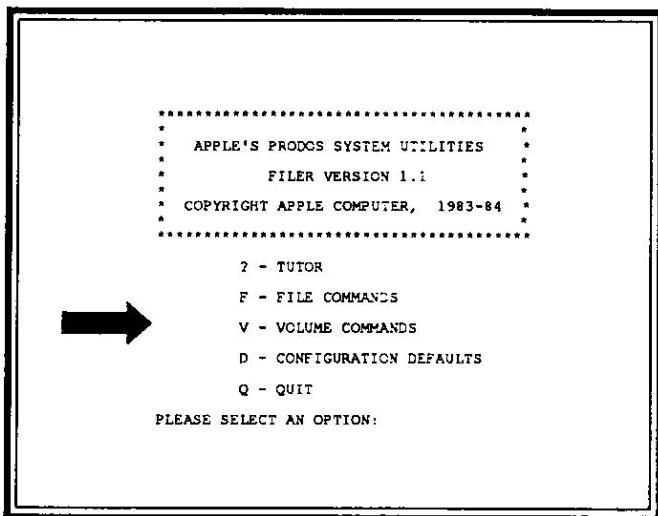
Once you know these facts, begin copying.

1. Press "Y" to run the Filer from the RAM disk installed screen.
2. Press "V" to use the Volume Commands.

## Figure 6.7 Filer main menu

You may get information about the Filer from this menu (and all other menus) by pressing the "? - Tutor" key.

Pressing the Escape key will return you to the last menu you came from anywhere in the Filer.



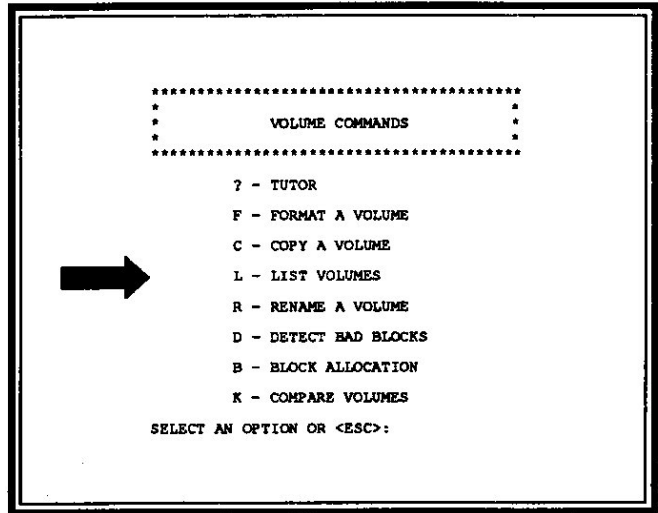
- Press "L" at the Volume Commands menu to get a list of ProDOS volumes presently on line.

**Figure 6.8**  
**Volume**  
**Commands**  
**menu**

DO NOT use "F-FORMAT A VOLUME" on MRAM. This command will damage MRAM.

You cannot use "C-COPY A VOLUME" or "K-COMPARE VOLUMES" with MRAM since RAM disks are structured differently than physical disks.

You can use "D-DETECT BAD BLOCKS", "B-BLOCK ALLOCATION", and "R-RENAME A VOLUME" with MRAM.



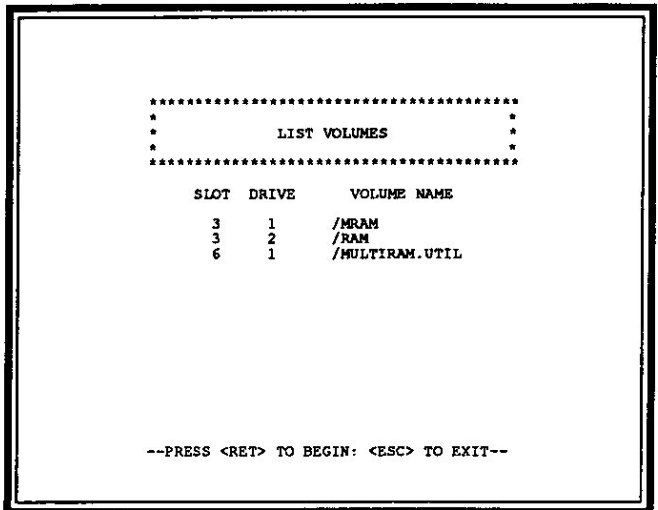
Listing volumes is the most important volume command because it enables you to determine exactly what volume names are in each drive.

Important

In the future when you want to transfer files from a disk whose volume name you do not know, use the volume "LIST" command to find out the disk's volume name.

**Figure 6.9**  
**MULTIRAM.**  
**UTIL volume**  
**listing**

Each volume shows a slot and drive as well as a volume name. Assuming you have not customized MRAM, you should see the information in Figure 6.9. If you have ProDOS volumes in other devices, they will be shown.

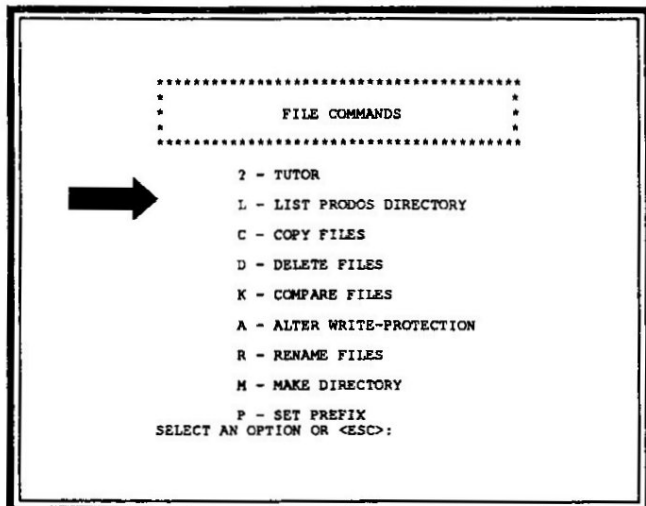


4. Press the **Escape** key once or twice until you return to the Main menu.
5. Press **"F"** to use the File Commands.
6. Press **"L"** to list or catalog a directory.

**Figure 6.10**

**File Commands menu**

You can use ALL file commands with MRAM. Experiment with other commands now if you like. You can use wildcards with these commands as you will see later when you copy files.

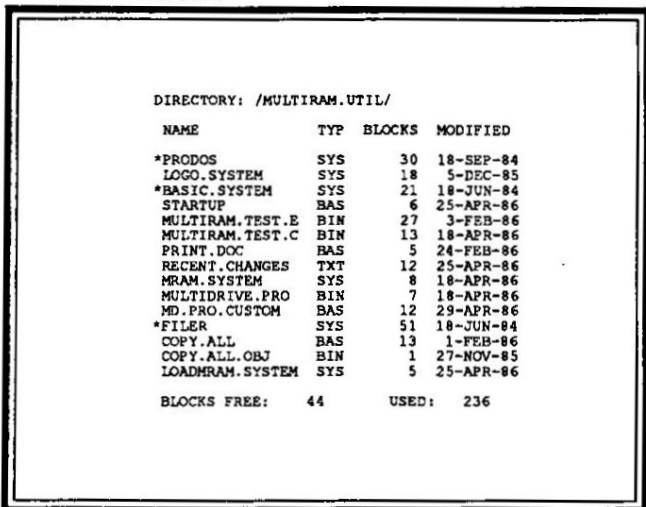


7. Enter **"/MULTIRAM.UTIL"**, then press the **Return** key.

The files on the MultiRam Utilities disk should be listed on screen.

**Figure 6.11**  
**Listing of MULTIRAM .UTIL files**

MULTIRAM.UTIL" appears as the default prefix at the top of the LIST FILES screen. Filer will use this prefix for all commands to save you typing time. You can list the files on the MULTIRAM.UTIL disk by entering a "=" as the first character of the pathname and press **Return**. Try it.



If you see a file that is a "DIR" type when you catalog a volume, you can see what files are in that subdirectory by entering the volume name *plus* the subdirectory name when you specify the pathname to list.

If you pressed the **Escape** key instead and went back to the File Commands menu, just press "L" again to continue.

8. Press the **Return** key again to catalog another volume.
9. Enter `"/MRAM"` as the name of a volume to catalog and press **Return**.

The Filer will find MRAM and display its contents along with the number of blocks empty and used.

Although MRAM is empty, you will see some of its blocks are being used as overhead by the RAM disk. The number of free blocks will depend on the amount of RAM on MultiRam and on the amount of memory partitioned to MRAM during installation (see the customization section later).

## **B. Copy files**

Wildcards are commands that either tell Filer to substitute default characters at the wildcard or cause Filer to ask you further questions.

To learn two of Filer's methods of copying files, you will first copy one file by name and the rest by *wildcards*.

1. Press **Escape** to return to the File Command menu.
2. Choose "C" to copy files to MRAM.
3. To copy one file, enter `"/MULTIRAM.UTIL/FILER"` at the "Copy" pathname prompt.

If you misspell a file's name, Filer will not find it.

4. Enter `"/MRAM/FILER"` at the "To" pathname prompt.

You can change the name of the copied file by entering a different file name at the end of the pathname.

5. Press the **Return** key at the "insert disks" prompt..

The drive will come on and the file will be copied.

**Figure  
6.12**  
**To copy one  
file**

```
*****
*                               *
*             COPY FILES       *
* **PREFIX: /MULTIRAM.UTIL/*****
--COPY--
  PATHNAME: (/MULTIRAM.UTIL/FILER
                )

      TO PATHNAME: /MRAM/FILER

COPY COMPLETE

--ENTER PATHNAME AND PRESS <RET>--
```

6. To copy all the disk's files to MRAM, enter `"/MULTIRAM.UTIL/=` at the "Copy" pathname prompt.
7. Enter `"/MRAM/=` at the "To" pathname prompt.

The "=" wildcard tells Filer to copy all files on MULTIRAM.UTIL to MRAM using the same filename.

Use the "?" wildcard if you want some but not all files to be copied from the "copy from" volume. The files will have the same name on the "copy to" volume as the original.

If you entered a "?" wildcard in place of "=", Filer will show you the name of each file on MULTIRAM.UTIL and ask you if you want to copy it. Press "Y" to copy and "N" to skip a file.

8. Press the Return key at the "insert disks" prompt.

FILER will copy each file in order. At some point, Filer will come to the file named "FILER" and ask you if you want to delete the existing copy on MRAM. This safety measure reminds you that you already have a file by this name on MRAM. Press "Y" or "N"; it makes no difference in this case.



**Figure  
6.13  
Copy all files  
by wildcard**

```
*****
*                                     *
*               COPY FILES           *
* **PREFIX: /MULTIRAM.UTIL/***** *
--COPY--
  PATHNAME:  /MULTIRAM.UTIL/-

      TO PATHNAME:  /MRAM/-

--INSERT DISKS AND PRESS <RET>--
```

9. Press **Escape** to return to the File Commands menu after all files are copied.

Any number of files from different disks can be copied until MRAM is full. You may copy from a 3.5 inch UniDisk or hard disk with the Filer as well as floppy disks.

The most likely problems you will encounter in copying with the Filer will be forgetting the exact name required, spelling the names incorrectly, or leaving off a slash at the pathname's beginning or between parts of pathnames.

### **C. Quitting to a program**

You can exit the Filer and run a program on any volume. To see MRAM in action, you will next run a program on it.

You use the "Q - QUIT" option on Filer's main menu to run another program. But before using the "Q" option, always check the ProDOS prefix.

The prefix is the pathname where FILER expects to find the next program to run.

The Filer normally uses the prefix of the disk last booted. Since you booted MULTIRAM.UTIL before copying, and since you will run a program on MRAM, you must change the prefix name for our example.

1. Choose "P - SET PREFIX" from the File Commands menu.

"/MULTIRAM.UTIL" shows as the current prefix.

2. Enter "/MRAM", the pathname for the program you will run, and press **Return**.

**Figure 6.14**  
**Setting a prefix**

```
.....
.
.          SET PREFIX          .
.
**PREFIX: /MRAM/*****
--SET PREFIX--
NEW PREFIX: (MRAM/
)

SET PREFIX COMPLETE

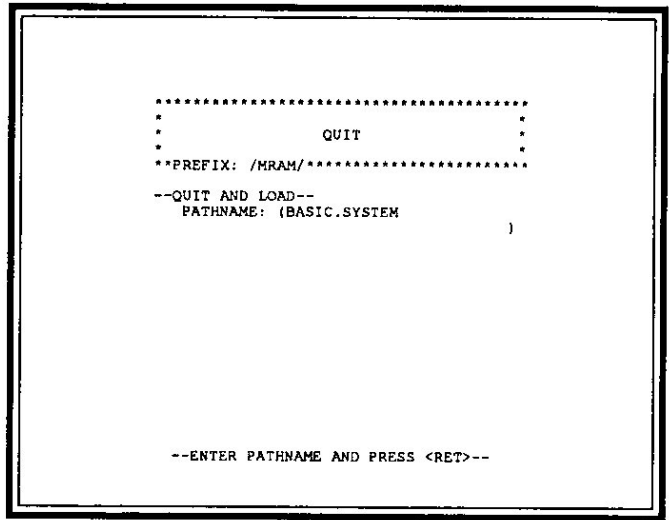
--ENTER PATHNAME AND PRESS <RET>--
```

If you do not know the pathname of the program you would like to run, use the volume list command to see volumes on line; then use the file list command to search for the filename. If the program is on floppy disk, place the disk into a drive before listing volumes.

3. Press the **Escape** key once or twice to return to Filer's main menu.
4. Press "Q" to quit.

You will see the Filer's program selector with the default prefix appear.

**Figure  
6.15  
The Filer's  
quit screen**



5. Enter the name of the file to run.

Refer to "Running ProDOS programs" on page 110 for more information about system programs.

A default system program name, "BASIC.SYSTEM" appears. This is the program you will run.

To replace the default program name, you would enter the name of the desired system program .

6. Press Return.

In our example, you should immediately see the MultiRam Utility menu appear on screen from MRAM.

You will see the same immediate response when you run any program from RAM disk.

## Keyboard commands

You may run the MULTIDRIVE.PRO program from the keyboard by typing

```
"-/<volume name>/MULTIDRIVE.PRO"
```

when the Applesoft "]" prompt is visible.

If you are running the program from the MultiRam Utility disk, the volume name would be "MULTIRAM.UTIL."

MRAM will be set to the last customized slot and drive number and partition. The normal defaults are slot 3, drive 1 and a partitioned size as large as memory will allow. See "Customizing MRAM" for customizing instructions.

To copy files to and from MRAM once you create it, you would enter the run command for the file program after the Applesoft prompt.

For example, to run the Filer from the MultiRam Utility disk you would enter "-/MULTIRAM.UTIL/Filcr".

## Using the ProDOS RAM disk automatically

### MULTIDRIVE.PRO & COPY.ALL

This section will show you how to create MRAM from within a program. It will also show you how to use the COPY.ALL program on your MultiRam Utility disk to auto-run MRAM and auto-copy files to MRAM.

## Creating RAM disks from a program

You may run MULTIDRIVE.PRO from within a program to create the ProDOS RAM disks.

To run the program from an Applesoft program enter:

```
PRINT CHR$(4)"-/<volume name>  
/<subdirectory names>/MULTIDRIVE.PR
```

The "CHR\$(4)" is a Control+D command that tells ProDOS the following information in quotations is meant for it.

For example, to run MULTIDRIVE.PRO from the MultiRam Utility disk you would enter:

```
100 PRINT CHR$(4)"-/MULTIRAM.UTIL  
/MULTIDRIVE.PRO
```

You can also run MULTDRIVE.PRO from within an assembly language program.

You can run MRAM.SYSTEM from an Applesoft or assembly language program. If you do, it will not return to your program but will exit to ProDOS's "QUIT" program; therefore, put it only at the end of your program. It is primarily designed to run as a system file at boot or from the keyboard at the Applesoft prompt.

## COPY.ALL to create and load MRAM

COPY.ALL runs MULTIDRIVE.PRO, copies all or selected files from the disk it was run from to MRAM, displays a listing of files copied to MRAM, and leaves you at the Applesoft prompt. As you will see later, it can be customized to do more.

Boot the "AUTO.BOOT.CA" disk you made earlier and you will see COPY.ALL move all files on the disk to MRAM.

## Creating MRAM

The auto-load process you just saw was made possible by renaming the Applesoft program COPY.ALL to "STARTUP" when you created the AUTO.BOOT.CA disk.

As you read in the earlier ProDOS tutorial, any Applesoft program named "STARTUP" will be run at boot by BASIC.SYSTEM.

When run, COPY.ALL (STARTUP in this case), first runs the MULTIDRIVE.PRO binary program.

If you list the COPY.ALL Applesoft program you will see this line:

```
900 PRINT CHR$(4)"-MULTIDRIVE.PRO"
```

This line causes MULTIDRIVE.PRO to run.

MRAM will be set to the last customized slot and drive number and memory partition. The normal defaults are slot 3, drive 1 and a partitioned size as large as memory will allow. See "Customizing MRAM" for customizing instructions.

From the Applesoft prompt, enter "LIST" and press the Return key. The program will scroll by on screen. Press Control+S to stop the listing and to resume listing. To print the listing to your printer, turn on your printer and enter a "PR#n" before you do the list command, where n is the slot number of your printer.

## Copying files

After creating MRAM, COPY.ALL starts copying files to MRAM.

COPY.ALL calls a machine language routine (COPY.ALL.OBJ) to transfer files.

COPY.ALL is set to copy files from the volume directory it is run from to MRAM. The exceptions are ProDOS, MULTIDRIVE.PRO, COPY.ALL, and COPY.ALL.OBJ.

COPY.ALL will not copy files from subdirectories to MRAM, although it can be modified to do so.

COPY.ALL finishes by showing you a listing of MRAM and returns you to the Applesoft prompt.

## Customizing COPY.ALL

COPY.ALL can be customized to make copying files even easier.

To customize the program, you should be able to write some Basic code; you do not have to be an accomplished programmer to make the easiest modifications to the program.

If you add many lines to COPY.ALL, remove all REM statements. Any additions can cause COPY.ALL and COPY.ALL.OBJ to write over one another.

To keep COPY.ALL code as small as possible, only ProDOS error codes appear when a problem occurs. Table 6.4 on page 157 shows a list of ProDOS error codes and what they mean.

Note that COPY.ALL does not copy files that are stored in subdirectories. To modify it to copy from subdirectories, you must find all the "DIR" or subdirectory files on the disk, and then modify the pathname to include the subdirectory prefix.

COPY.ALL is meant to be flexible. Cut out parts you do not need and add others you do.

COPY.ALL can be easily customized to:

- **Copy from a disk or volume other than the one COPY.ALL ran from.**  
Change SWAP at line 1030 to "YES". This is useful if you do not want to copy any files from the COPY.ALL disk.
- **Switch to another slot and drive to copy.**  
Change SLOT and DRIVE at lines 1050 and 1060 to copy files from any disk.
- **Copy from more than one volume or disk.**  
Change LOOP at line 1020 to "YES". COPY.ALL then copies files from as many disks as you like.
- **Skip selected files.**  
Change ALL at line 1040 to "YES" and enter the program names to skip in the table of data statements starting at line 3000. COPY.ALL will not copy these files but will copy all others.
- **Copy only selected files.**  
Change ALL at line 1040 to "NO" and enter the program names to copy in the table of data statements starting at line 4000. COPY.ALL will copy only these files and no others.

■ **Auto-run a program at the end of COPY.ALL.**

Change TURNKEY at line 1090 to "YES". COPY.ALL then runs the program in the variable TURNKEY\$ at the end of the program. TURNKEY\$ is set to "APLWORKS.SYSTEM." Change it to any pathname at line 1100.

General instructions for customizing COPY.ALL are in REMark statements at the start of COPY.ALL and in REMark statements scattered throughout the program.

**Customization examples**

The following examples will customize COPY.ALL to:

- Auto-load Pinpoint accessories to MRAM and auto-run AppleWorks, and
- Auto-load Pinpoint accessories *and* AppleWorks to MRAM and auto-run AppleWorks from MRAM.

After you try the examples, you may want to make other changes to COPY.ALL to meet your needs.

Pinpoint, as described in Chapter 4, is a desktop accessory program that can be used while AppleWorks is running.

Pinpoint's accessories are stored on disk until they are needed. Copied to the MRAM disk, these accessories are *immediately* available and there is *no* lengthy wait while they load into memory. Using accessories from floppy will seem to take forever once you experience accessories on MRAM.

Just as Pinpoint accessories are faster on MRAM, AppleWorks itself can be very handy to have on MRAM.

With AppleWorks on MRAM, you can *immediately* switch between it and other programs on MRAM or elsewhere. If you use your Apple most of the day and switch between AppleWorks and other programs often, MRAM's speed can save *lots* of time.



Another plus is that AppleWorks overlays are always available at RAM speed so that AppleWorks' response time itself is *very* fast. Loading AppleWorks into MRAM does not take any more time than loading AppleWorks overlays

### **Auto-load Pinpoint accessories [and AppleWorks] to MRAM**

See Chapter 3 for more information on overlays and loading overlays.

The following instructions will show you how to make two different disks to auto-load Pinpoint accessories.

The first disk, the Pinpoint auto-load disk, when booted will auto-copy Pinpoint accessories from the auto boot disk to MRAM, and then allow you to copy more files to MRAM or auto-run expanded AppleWorks from any location.

The second disk, the AppleWorks-plus- Pinpointdisk, when booted will auto-copy Pinpoint accessories and AppleWorks to MRAM, and will auto-run AppleWorks from MRAM.

Use these guides when reading the instructions:

- Where you see **P** in front of an instruction, follow the instruction **ONLY** if you are making a disk to load Pinpoint accessories into memory.
- Where you see **A+P** in front of an instruction or group of instructions, follow the instruction **ONLY** if you are making a disk to load both Pinpoint accessories and AppleWorks to MRAM.

**A. Partition MRAM so expanded AppleWorks will not overwrite it.**

MRAM must be smaller than maximum size to work with expanded AppleWorks (see Chapter 4 "Using expanded AppleWorks with a ProDOS RAM disk).

These instructions will create a properly sized MRAM:

1. Boot your MultiRam Utility work disk.
2. Choose "3. Install MultiDrive.Pro"
3. Choose "2. Customize MultiDrive.Pro."
4. Choose "2" (set MRAM memory).
- P 5. Select a minimum 192K for MRAM, more if you use many Pinpoint accessories. Leave at least 64K free for accessory work files.
- A+P 6. Select a minimum 320K for MRAM, more if you use many Pinpoint accessories. Leave at least 64K free for accessory work files.
7. Press the **Return** key.
8. Remove the MultiRam Utility work disk.
9. Insert the AUTO.BOOT.CA disk or a copy of it.
10. Choose "3" to save custom changes.
11. Answer "N" to the question to save to MRAM.SYSTEM.
12. Answer "N" to the question to run the Filer.
13. Press "6" at the main menu to exit to Basic.

If you are using a 3.5 inch UniDisk with a //c, change MRAM's slot and drive to slot 7, drive 1 before exiting to Basic. Pinpoint will then look to MRAM first for its accessories, not the UniDisk. But if a disk is in the UniDisk, Pinpoint will look there first for accessories.

## **B. Customize STARTUP**

Next modify STARTUP (COPY.ALL renamed) so that it will load files from more than one disk and auto-run AppleWorks. After it has loaded all files, you can press **Escape** at the "INSERT NEXT DISK ..." prompt and STARTUP will quit to AppleWorks. You could press any other key to continue loading files from other disks.

Enter the following lines at the Applesoft prompt and press **Return** at the end of each line:

```
NEW
LOAD STARTUP
1020 LOOP = YES
1070 SKIP = 6
1090 TURNKEY = YES
```

You may have a different pathname and set of subdirectories to enter in place of "APPLEWORKS."

```
P 1100 TURNKEY$ = "/APPLEWORKS/APLWORKS.SYSTEM"
3035 "BASIC.SYSTEM","STARTUP"
SAVE STARTUP
```

## **C. Copy Pinpoint accessories to AUTO.BOOT.CA**

Copy the Pinpoint accessories you use most often to AUTO.BOOT.CA.

If you want to load more accessories into MRAM than can fit on the AUTO.BOOT.CA disk, you can insert another accessory disk into your drive when you see the "INSERT NEXT DISK ...." prompt. Press any key to load the accessories from that disk; press **Escape** when you are ready to run AppleWorks.

1. Insert the MultiRam Utility work disk.
2. Boot the disk.
3. Choose "5. Run the Filer".
4. Press "F" for file commands.
5. Press "C" to copy files.

A+P

6. Insert AUTO.BOOT.CA in one drive and the Pinpoint ACCESSORY disk in the other drive.  
One drive users insert AUTO.BOOT.CA first and swap disks when the Filer prompts.
7. Copy the desired accessories from "/ACCESSORY" to "/AUTO.BOOT.CA."
8. Remove the ACCESSORY disk.
9. Insert the expanded AppleWorks Startup disk with Pinpoint installed on it.
10. Copy "APLWORKS.SYSTEM", "SEG.00", and "SEG.MR" from "/APPLEWORKS" to "/AUTO.BOOT.CA".
11. Remove the Startup disk.
12. Insert the expanded AppleWorks Program disk.
13. Copy "SEG.PR" from "/APPLEWORKS" to "/AUTO.BOOT.CA".
14. Remove AUTO.BOOT.CA.
15. Insert a blank disk.
16. Use volume commands to format the blank disk.  
Name the disk "AW.MRAM".
17. Copy "SEG.M0" and "SEG.M1" from "/APPLEWORKS" to "/AW.MRAM".
18. Exit the Filer when you complete copying.

Refer to Chapter 4  
"Using expanded  
AppleWorks with  
accessory  
programs" for more  
Pinpoint information

#### **D. Reinstall Pinpoint on expanded AppleWorks**

If you have not already installed Pinpoint on your expanded AppleWorks disks, do that now.

If you have already installed Pinpoint, you may want to redo the installation if you did not instruct Pinpoint to look first to MRAM for accessories.

1. Boot the Pinpoint Installation disk.
2. Choose "1" (Pinpoint Installation Menu)
3. Choose "4" (Set standard location of Accessories)
4. Choose "5" (ProDOS Path)
5. Enter "/MRAM" at the "ENTER VALUE" prompt and press the Return key.

6. Enter your Printer and Modem setup data.
7. Choose "3" (Program setup)
8. Choose "1" (AppleWorks). Insert the AppleWorks Startup disk already configured by the MultiRam disk and press the **Return** key.

If you followed **P** instructions, your new auto boot disk is ready to auto-load Pinpoint accessories and then run AppleWorks

If you followed **A+P** instructions, your new auto-boot disk is ready to auto-load Pinpoint accessories and AppleWorks and then auto-run AppleWorks from MRAM.



**Using the  
ProDOS RAM  
disk  
automatically**

#### **MRAM.SYSTEM & LOADMRAM.SYSTEM**

This example will show you how the system file "MRAM.SYSTEM" can make RAM disk creation automatic and how to use another copy program "LOADMRAM."

The "AUTO.BOOT.SYS" disk when booted will create the ProDOS RAM disk and then run the system file LOADMRAM.

Boot the disk. You should see the RAM disks created first and then you will see the "LOADMRAM" screen.

Why the two programs on the disk ran without a program commanding them is explained next.

If you would like to first learn how to use LOADMRAM since it is on screen, turn to "Using LOADMRAM" on page 142. You can return to the next section later.

**MRAM  
.SYSTEM as  
the first  
system file**

ProDOS automatically ran "MRAM.SYSTEM" because it was the first system file in the disk's volume directory.

ProDOS at boot always checks the volume directory of the disk and runs the first "SYS" file in the volume directory with ".SYSTEM" at the end of the name.

MRAM.SYSTEM is written to automatically run the first system file in the directory after it. This is why your example disk automatically creates MRAM and then runs LOADMRAM.SYSTEM. This feature makes MRAM.SYSTEM the perfect system file to appear first on a volume.

You made the "SYS" disk from scratch. If you already have a large volume with files on it, like on a hard disk or a UniDisk, can you place MRAM.SYSTEM as the first system file?

Yes. You will need to do some shuffling of files, however.

The general procedure is to delete the first system file on the volume after duplicating it under another name; then copy the "MRAM.SYSTEM" file over the deleted file. ProDOS always places new files over deleted files starting from the top of the volume directory. You can then rename the original file so it is usable again.

**To copy MRAM.SYSTEM to an existing disk to auto-run:**

1. Boot a file copy program like the Filer.
2. List the files on the volume where you would like to place MRAM.SYSTEM as an auto-run file.
3. Check for the file "ProDOS." If it is not on a floppy volume, MRAM.SYSTEM will not auto-run.

If ProDOS is not on a hard disk's volume directory but you can boot the hard disk, then continue. Some hard disk's boot ProDOS in a special way.

4. Find the first system file on the disk. Write down the exact name of this file. Normally this is ProDOS itself but ProDOS can appear anywhere in the volume directory.

If ProDOS is the first file, choose it.

Remember a file name must not be more than 15 characters long.

5. Select the file copy program's copy function.
6. Enter the name of the file you wrote down as the "COPY" file name along with any needed prefix.
7. Enter the same name again adding a ".TEMP" at the end of it for the copy "TO" file name. Use the same prefix you used for the "COPY" file name.
8. Copy the file.

There must be room on the volume for this duplicate file or you will see a "Volume Full" error message. In this case, copy the original file to another volume with free room using the correct prefix for that volume.

9. Delete the original file using the file program's delete function.
10. Copy the "MRAM.SYSTEM" file to the volume where you have just deleted the first system file.
11. Rename the ".TEMP" file back to the original file name.

If the renamed system file is ProDOS, you are done because ProDOS will work from any location on the volume.

If the renamed system file is not ProDOS you may want to move it under MRAM.SYSTEM. Any system file directly after MRAM.SYSTEM will automatically run after MRAM.SYTEM is finished.

If there is a non-system file now under MRAM.SYSTEM, use the same copy-delete-copy-rename process to transfer the system file into the non-system file's location. Normally, non-system files can be located anywhere on the volume.

If the file under MRAM.SYSTEM is a system file, you may need to shuffle it after you put the other system file in its place.

## Important

MRAM.SYSTEM when run will use values for the slot and drive numbers and partitioned size that were last entered into the program with the customization program.

Be sure to configure the MRAM.SYSTEM file correctly before you copy the file to a disk. You can change the values after the file is on a disk, although that does involve more steps and care. See "Customizing MRAM" at the end of this chapter for details.

## Using LOADMRAM

The LOADMRAM program provides an easy way to copy files to the ProDOS RAM disk MRAM. All you have to do is insert the disk(s) in the disk drive whose files you want copied to the RAM disk and press *one* key.

If you copy the same files to MRAM over and over and those files are on separate disks, prepare a disk (or disks) that has on it all the files to be copied.

LOADMRAM is designed to copy files only to MRAM. Using options on the menu, you can copy any number of files from a floppy disk to MRAM. You can copy files from disk after disk after disk.

**Figure  
6.16  
LOADMRAM  
menu**

```

      /MRAM ramdisk loader 1.1
      Copyright 1986 by Sean Nolan

      26-MAY-86  19:41

      -----

      1  Copies files from drive 1
         C=unlocked, ●=locked files only

      2  Copies files from drive 2

      3-7 Change the source slot

      Q  Quits to the program selector

      S  Saves date and time to disk

      -----
```



## ■ Option 1

To copy all files from a floppy or hard disk volume in slot 6 (the default slot), drive 1, press "1".

While files are being copied, the menu is replaced by the names of the files being copied.

If you hold the ⌘ key down the whole time files are copying, only unlocked files will be copied. If you hold down the ⌘ key only locked files will be copied.

To select files for transfer using their lock status, you can lock a file from the Applesoft prompt by entering "LOCK /<volume name>/<subdirectory name>/<program name>." Use "UNLOCK" in place of "LOCK" to unlock files.

You can also use the Filer's file command "A-Alter write-protection" to lock or unlock files.

## ■ Option 2

To copy all files from disk drive 2, select option 2.

The slot used for drive 2 is the same one as used for drive 1.

The ⌘ and ⌘ keys work the same as in option 1

## ■ Option 3 to 7

To change to a slot other than slot 6 to copy files from, press a number key corresponding to the slot you desire.

After you press the number key, using option 1 or 2 will copy from the new slot.

### Important

▮ The new slot will not appear on screen. You must  
▮ remember which slot you picked if you have more than  
▮ one set of drives attached to your Apple.

If in doubt which slot is in use, press a number for the desired slot.

## Option Q

To quit copying files, press "Q."

LOADMRAM places you in ProDOS's "QUIT" program or the custom program selector you are using

See "Running ProDOS programs" and "Other utility programs" for more information on "QUIT" and other program selectors.

### Time stamping without a clock

If you have a clock in your Apple, LOADMRAM will show the date and time in 24 hour format at the top of its menu.

A clock allows ProDOS to time stamp files with a "creation" date and a "last modified" date. You will then know when you last worked on a file.

To time stamp your files if you do not have a clock, LOADMRAM options allows you to manually enter and save a "last modified" date. You will see two options on-screen you do not see with a clock: arrow keys and "H".

- Use the arrow keys and the "H" key to create the current date and
- Press the "S" key to save the current date.

Pressing the right arrow key increases the date, the left decreases. Pressing the "H" key increases the time from 00:00 to 23:59 and then starts over at 00:00.

This feature will let you know when you last worked on a file, just as if you had a clock.

### Limitations

LOADMRAM will not copy files from subdirectories. Files copied must be on the volume directory.

To copy files on subdirectories, recopy the files to a volume directory.

LOADMRAM has minimal error trapping to keep the program compact. All error messages are reported as ProDOS error codes.

Refer to the ProDOS error code Table 6.4 on page 157 in the "Technical" section if you do see an error code. The most likely error you might see is \$27, an I/O error. The disk drive is probably open or the disk is unreadable.

On an unenhanced Apple //e, the ⌘ key will appear as an inverted "A"; the ⌘ key will appear as an inverted "@".

On an unenhanced Apple the left arrow key will appear as an inverted "H"; the right arrow key will appear as an inverted "U".

### Other utility programs

There are a number of commercial programs that can make working with a ProDOS RAM disk easier and quicker.

### File copiers

Several commercial ProDOS file copy programs are available that are both easier to use than Apple's Filer and more flexible than COPY.ALL and LOADMRAM.

Copy II+, Version 6.0 and greater, is a very versatile, relatively inexpensive copy program for *both* ProDOS and DOS files. The program is easy to use as almost all of its file commands can be understood simply by using them.

The Copy II+ program that handles ProDOS files, "UTIL.SYSTEM," is smaller than the Filer and so is a better program to move to MRAM to copy files to and from MRAM.

In addition, UTIL.SYSTEM will directly copy files in subdirectories to MRAM making it a definite must if you use a hard disk or UniDisk with subdirectories.

Just as you did with LOADMRAM, you may want to create a disk with "UTIL.SYSTEM" immediately following "MRAM.SYSTEM" so that Copy II+ will be automatically run right after the RAM disk is created.

When you use any file copy programs with MRAM, remember: do not boot the disk that contains the copy program; use a pathname run command to start the copy program.

## Backup and restore programs

Checkmate Technology plans to offer a backup and restore program along with other helpful utilities. Check with your dealer or Customer Service for more information.

You can copy an entire MRAM disk to floppy disks using a backup and restore program in less than half the time it would take a file copy program. You can restore MRAM in less time also.

A backup and restore program is faster than a file copy program because it does not copy individual files but instead "takes a picture" of the entire RAM disk and saves the "picture" to disk as a whole.

Such programs are also easy to use having only one or two selections you must make to use the program.

Two backup and restore utilities are:

BACKUP// by Apple Computer for backing up and restoring hard disk drives, and

BACKUP & RESTORE by Glen Bredon (author of Merlin -- available directly from the author at 521 State Road, Princeton, N.J. 08540 -- or -- (609)924-5976)

## Program selectors

Checkmate Technology plans to offer a program selector for MRAM along with other helpful utilities. Check with your dealer or Customer Service for more information.

Program selectors eliminate the need to type pathnames to initially start programs or to run programs from ProDOS's "QUIT" routine.

When you use a program selector, you will see a menu of volumes or applications programs. To start a program, simply select it from the menu with a keypress or two.

Program selectors are particularly useful with RAM disks when you quit one program to begin another. To use ProDOS's "QUIT" routine, you must know in advance the pathname of the file you want to use. If you do not know it, you will not be able to run the file.

Program selectors replace or attach to ProDOS's "QUIT" code to allow you to select and run programs from a menu.

A number of program selectors are available. A sample include:

Bird's Better Bye from Beagle Brothers on the MacroWorks disk.

Pro-Sel from Glen Bredon (author of Merlin -- available directly from the author at 521 State Road, Princeton, N.J. 08540 -- or -- (609)924-5976)

The RAM Enhancement Kit from Pinpoint Publishing.

## Desktop programs

Two Macintosh-like desktop programs you can use with MRAM are Catalyst 3.0 by Quark and Mouse Desk by International Solutions. They offer program selection and automatic file copy features.

Both programs display icons, screen pictures, to graphically show you what disk volumes and programs are available. Using a mouse (or the keyboard), simply move an arrow to the icon representing a disk or a program and click the mouse to run the program.

These desktop programs let you select and run programs without having to think about ProDOS's complex pathname rules or disconnecting MRAM.

Exiting programs is just as easy. When you quit a program the desktop icons immediately return and you can again select another program to run.

Both programs also allow you to automatically copy programs to MRAM at bootup and run a selected program. Just follow their auto boot procedure and copying files to MRAM becomes *very* easy.

MRAM may be created before running these desktop programs or after running them.

To start the desktop program if MRAM is already in memory, use a pathname run command. For example, `"-/MOUSE.DESK/MD.SYSTEM"` would run Mouse Desk on its floppy disk. MRAM will then appear as a desktop icon.

To create MRAM if the desktop program is already in memory, select the "MRAM.SYSTEM" icon and click on it. MRAM will then appear as a desktop icon.

If this does not work, click on "BASIC.SYSTEM" on the MultiRam Utility work disk, install the RAM disk from the menu, exit to Basic, enter "BYE" at the Applesoft prompt and press the **Return** key. Now MRAM should appear as a disk icon.

If you leave your computer on most of the day, switch between programs more than once, and have a mouse either of these desktop programs together with MRAM can greatly increase your productivity.

## Customizing MRAM

You can customize MRAM with the Applesoft program "MD.PRO.CUSTOM" so that it better fits your needs.

### To run MD.PRO.CUSTOM

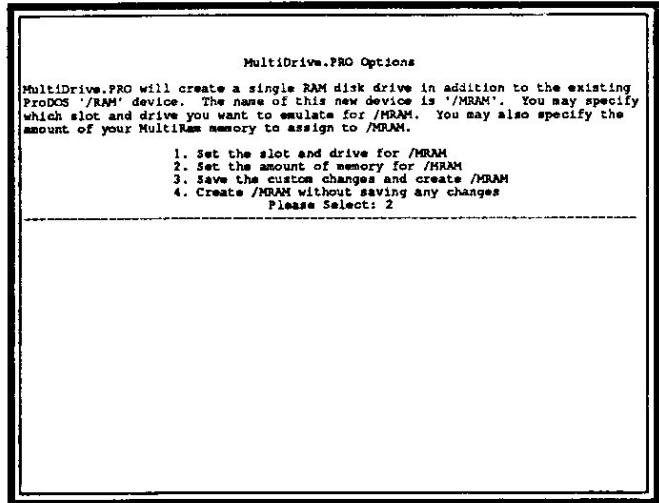
You can also run the Applesoft program with a "RUN MD.PRO.CUSTOM" command.

Boot the "ProDOS RAM Disk & Utilities" work copy you made in Chapter 1.

At the Utilities main menu screen, choose "3. Install MultiDrive.Pro" to move to the "MultiDrive.Pro" menu. Choose "2. Customize MultiDrive.Pro" to enter the customization menu.

Figure 6.17 shows the four options offered by the "MultiDrive.Pro Options" menu. Following are explanations of each option. Try each option as you read about it.

**Figure  
6.17  
MultiDrive.  
Pro Options  
screen**



## **1** Set the slot and drive for MRAM

The MRAM volume must be assigned a slot/drive location.

The 64K /RAM volume is permanently assigned to slot 3, drive 2.

The default or standard location for MRAM is slot 3, drive 1. Any MRAM slot/drive combination is valid except slot 0 which is reserved by ProDOS.

Some software does not work correctly with certain slot and drive assignments. Some known peculiarities are:

- AppleWorks will be unable to find your printer if you install MRAM in slot 1 (assuming that is where your printer card is installed).
- Some 128K programs that do not follow standard Apple protocol (such as Applewriter //e) can disconnect MRAM if MRAM is installed in slot 3.

- All 128K programs will disconnect MRAM if it is installed in slot 3, drive 2. These programs use the 64K of memory that is normally set up as a RAM drive in slot 3, drive 2, and thus disconnect *any* RAM drive that occupies that location.

Some other considerations:

- If you choose a slot and drive combination that actually contains a floppy or hard disk drive, MRAM will replace the drive and you will not be able to use it until you reboot ProDOS. A warning is always issued prior to disconnecting the original device.

Avoid complications by picking an empty slot or use the default slot 3.

This happens because MD.PRO.CUSTOM does not remove any device numbers from the ProDOS device list; it only appends or replaces device numbers.

- If MRAM is re-installed in the same slot and drive without rebooting ProDOS, you may get a warning that you are about to replace an existing volume. Do not worry; re-formatting will not occur.
- If you install MRAM in one location and later install it in another location, you may confuse ProDOS, will probably confuse yourself and will certainly confuse any file copy program.

Reboot ProDOS to recover from such a problem.

## **2 Set the amount of memory for MRAM**

The original default values in MULTIDRIVE.PRO and MRAM.SYSTEM use all RAM for RAM drives.

The first 64K is set up as /RAM and the rest set up as MRAM. This configuration is ideal when using most 128K programs as it allows maximum space for your MRAM drive.

In some cases, however, a program will use more than 128K of memory and will write over MRAM. Fortunately, option 2 will allow you to partition RAM reserving space for both MRAM and the large program.



Choose option 2 to partition memory. You will see a box at the bottom of the screen that shows how much total memory is available for partitioning and how much memory is in each partition.

**Figure  
6.18  
Partitioning  
box**

Memory available to programs (AppleWorks Desktop = 283K)	Total 512K 384K	Memory available to /MRAM 128K
---	--------------------	-----------------------------------

A minimum of 192K of RAM must be installed on the MultiRam RGB or //e card before partitioning is possible. This is because the first 64K is always used by the /RAM with the remainder divided between MRAM and other programs.

The center of the partitioning box displays the total memory on the MultiRam card. Memory available to programs is shown at the left; memory available to MRAM is shown at the right.

Use right and left arrow keys to adjust the partition between MRAM and large programs. Try it and watch the numbers change on screen.

The trick is to find out how much space the large program uses beyond 128K or to possibly set the memory it uses from within the program.

Two popular programs that support this sharing are MultiRam expanded AppleWorks and SuperCalc3a, a spreadsheet program from Computer Associates.

Expanded AppleWorks uses the space left by MRAM to create its expanded Desktop. Simply set MRAM to any size at least 64K less than maximum and expanded AppleWorks will use the remaining space.

Supercalc 3a and most other large programs instead use a fixed amount of memory. You must know exactly how much memory they use to set the MRAM to a correct size.

## AppleWorks considerations

The figure in the left of the partition box shows the Desktop space that AppleWorks will use for any particular memory partitioning. Use this figure and the MRAM size figure when adjusting the partition.

Keep in mind the following points when partitioning for AppleWorks:

- AppleWorks program space is not the same as Desktop size when partitioning. Be sure you look at the correct figure on the left when determining how large an MRAM to create.
- If MRAM has been set to maximum size (the default condition) and expanded AppleWorks is run, AppleWorks will delete MRAM and take all memory for itself. At least 64K must be set aside for MRAM.

If you are using a MultiRam RGB or MultiRam //e card, remember that expanded AppleWorks requires at least 128K of RAM on the MultiRam card to work. To partition a minimum 64K for MRAM, MultiRam must therefore have at least 192K of RAM.

- If you are working with AppleWorks files that are growing rapidly, partition to give AppleWorks more space than MRAM. Large AppleWorks files need large Desktop space.
- Expanded AppleWorks allows you to load all AppleWorks overlays into memory (see Chapter 3). Remember that this action loads the overlays into the partition allocated to AppleWorks, NOT the partition for MRAM.

If you frequently move back and forth between AppleWorks and other programs, copy the other program and both sides of the expanded AppleWorks disks into MRAM instead of loading overlays.

With AppleWorks on MRAM, go straight into AppleWorks at the MultiRam Options menu. You will not need to load overlays because any overlays needed are loaded into memory from MRAM at RAM speed.

You will benefit from the same increase in AppleWorks speed as you would with loading overlays and, because the AppleWorks stays in MRAM, you do not have to reload overlays every time you return to AppleWorks from MRAM.

### **SuperCalc 3a**

The current release of SuperCalc3a, version 1.2, uses only the first 512K of memory it finds on a MultiRam card. If MRAM is in this first 512K, SuperCalc3a will delete MRAM.

To partition memory to share space between MRAM and SuperCalc3a, you must set the partition to allow 512K memory for the program and the remainder (if any) for MRAM.

Like AppleWorks, SuperCalc3a benefits from being loaded completely into MRAM. Because SuperCalc3a and its supporting programs are spread over 3 disks, loading the entire set of files into MRAM will eliminate disk swapping and program performance will be greatly enhanced.

### **3 Save the custom changes and create MRAM**

You may want to save MRAM changes so you will not need to go to the options menu when you next use MRAM.

Choose option 3 to save any changes that you made to disk.

If you see "BREAK IN 3020" or something like it, you are probable working from the original MultiRam disk or a disk with a write protect tab on it. Save the changes to a disk without the write protect tab.

If MRAM.SYSTEM is placed between the ProDOS file and the next system file in the volume directory, it will automatically run and then run the next system program in the volume.

Just after the changes are saved, you are asked, "Save the custom changes to MRAM.SYSTEM also (Y/N)?" Your response should normally be "Y" because MRAM.SYSTEM performs the same function as MULTIDRIVE.PRO.

You may insert any ProDOS formatted disk into disk drive 1 and save either of the customized RAM disk files to a disk other than the MultiRam work disk.

**Important**

||||| If you have only MRAM.SYSTEM on a disk and do not want to save MULTIDRIVE.PRO to the same disk, then (1) insert any disk to save MULTIDRIVE.PRO and (2) insert the MRAM.SYSTEM disk at the "Save ... MRAM.SYSTEM" question.

**4 Create MRAM without saving any changes**

Choose this option if you are trying out a new configuration or using a temporary configuration.



**Programming tips and technical data**

MRAM may be used like a normal drive from within ProDOS-based programs. All disk-related commands are supported and no special steps are necessary to access MRAM.

Files on MRAM may be manipulated directly from machine language using a ProDOS MLI (Machine Language Interface) callable subroutine in the ProDOS Kernal, or by passing commands using the BASIC interpreter's command handler. Block reading and writing are supported, as are device driver direct calls. All blocks may be read, but some blocks (those that map into zero page, stack and driver) will return a successful write when, in fact, no write has taken place.

The ID Type assigned to MRAM is "E". This is the low nibble of the slot/drive/type byte in the device list in the ProDOS global page. The ID Type assigned to /RAM is "F".

For technical reasons, the /RAM volume is not the same as the original ProDOS RAM. One additional directory block is available, allowing 25 file names instead of 13.

Also, the double HIRES pages are protected differently. The first file saved will be mapped at \$1000 (instead of \$2000). One method to protect HIRES page one from being overwritten would be to save a dummy "place-saver" file 8 blocks long, then save a dummy "page one" file 16 blocks long (page two would require an additional 16-block dummy file). The first "place saver" file could then be deleted to free up that space for use.

For example:

```
BSAVE FILLER,A$1000,L$DFF (2 pages for key block)
BSAVE HIRES1,A$2000,L$1DFF (protect page one)
BSAVE HIRES2,A$4000,L$1DFF (protect page two)
DELETE FILLER (free up 8 blocks)
```

The device driver entry point for /RAM is \$FF00, as established by Apple for all versions of ProDOS. The device driver entry point for MRAM is \$FF05. These entry points will be maintained as far as practical, but are subject to change as required by future ProDOS revisions.

### Important

||||| MRAM will not function correctly if ProDOS is moved to the auxiliary bank of memory. Some ProDOS commercial programs do move ProDOS to the auxiliary memory bank.

The optional parameters the MULTIDRIVE.PRO and MRAM.SYSTEM programs use to determine the slot and drive for MRAM and the amount of memory to be used for MRAM are located within the MULTIDRIVE.PRO and MRAM.SYSTEM programs. These optional parameters are modified by the MD.PRO.CUSTOMIZE program. The locations for these optional parameters within the RAM programs are shown in Table 6.3.

**Table 6.3**  
**MULTIDRIVE**  
**.PRO and**  
**MRAM.**  
**SYSTEM**  
**optional**  
**parameters**

Decimal	Hex	Option	Initial Value	Range
8195	\$2003	BACKUP	\$31 <sup>1</sup>	
8196	\$2004	SLOT/DRIVE	\$31	\$00-\$71 <sup>2</sup>
8197	\$2005	ALLOCATE	\$00	\$00-\$3F <sup>3</sup>

Notes:

1. If user-defined slot/drive combination is out of bounds this value, representing slot 3, drive 1, is used.
2. Upper nibble is slot (range 0-7) and lower nibble is drive (range 0-1).
3. Number of 64K banks MultiRam™ will use, starting with the highest and counting down to the lowest..

With a value of \$0, MRAM uses all banks found less one (one used to create /RAM).

With a number larger than zero but less than the total banks on the card, MRAM is created first using the highest bank on the card and then builds down in banks until the number of banks in "ALLOCATE" are used.

If the value in "ALLOCATE" is larger than the total banks on the card less one, then MRAM is not created.

## COPY.ALL

COPY.ALL uses a binary program, COPY.ALL.OBJ, to transfer files. This binary program uses ProDOS MLI calls to copy a file from the source to the destination volume.

The address called determines whether or not files can be overwritten on the RAM disk:

<u>start address</u>	<u>function</u>
load address (13568)	do not overwrite existing file
load address +3 (13571)	do overwrite existing file

Two parameters are expected to be passed to COPY.ALL.OBJ from COPY.ALL. The first parameter is the source pathname. The second parameter is the destination pathname.

An example of a call to the routine would be: CALL 13571, SOURCE\$, DESTINATION\$.

If you add many lines to the Applesoft program COPY.ALL, then you should remove all REM statements. Any Applesoft additions beyond a few lines can cause COPY.ALL.OBJ to crash as the Applesoft program overwrites needed buffer space.

**Error messages**

Both COPY.ALL and LOADMRAM do not show detailed error messages to keep the files as small as possible.

Use the following table to interpret the exact meaning of the numeric error code these programs display.

**Table 6.4**  
**ProDOS MLI**  
**Error Codes:**

dec-	hex	description
0	00	No error
1	01	Bad system call number
4	04	Bad system call parameter count
37	25	Interrupt table full
39	27	I/O error
40	28	No device connected
43	2B	Disk write protected
46	2E	Disk switched
64	40	Invalid pathname
66	42	Maximum number of files open
67	43	Invalid reference number
68	44	Directory not found
69	45	Volume not found
70	46	File not found
71	47	Duplicate filename
72	48	Volume full
73	49	Volume directory full
74	4A	Incompatible file format, also a ProDOS directory
75	4B	Unsupported storage type
76	4C	End of file encountered
77	4D	Position out of range
78	4E	File access error, also file locked
80	50	File is open
81	51	Directory structure damage
82	52	Not a ProDOS volume
83	53	Invalid system call parameter
85	55	Volume Control Block table full
86	56	Bad buffer address
87	57	Duplicate volume
90	5A	File structure damaged





## Chapter 7



# The DOS 3.3 RAM disk

The DOS 3.3 RAM disk programs on your MultiRam disk convert your MultiRam card's memory into fast electronic disks, copy programs to and from the RAM disks, and customize the DOS 3.3 RAM disks.

### About this chapter

In this chapter you will learn what each of the DOS 3.3 RAM disk programs do, how they work, how to use them, and how to customize them.

Two examples are given to (1) create RAM disks, (2) copy programs to the RAM disks, and (3) run programs from the RAM disk.

The first example shows how to do these steps manually. The second shows how to make a disk that will automatically create a DOS 3.3 RAM disk, copy files to it, and run a program from the RAM disk when booted.

Programming tips and technical information about the DOS 3.3 RAM disk are given at the end of this chapter.

## The DOS 3.3 RAM disk programs

Three DOS 3.3 RAM disk programs are on the front of the original MultiRam disk, the AppleWorks expansion side. These programs are used to create, modify, or copy files to and from the DOS 3.3 RAM disk. These programs are on special DOS 3.3 formatted tracks of the ProDOS disk.

These programs are described in Table 7.1.

How these programs work and how to use them are the subjects of the next sections.

**Table 7.1**  
**MULTIDRIVE**  
**.DOS RAM**  
**Disk**  
**Programs**

### **MULTIDRIVE.DOS**

A binary program that when BRUN creates and formats up to nine separate 384K DOS 3.3 RAM disks according to current parameters stored within the program.

### **MULTIDRIVE.DOS CUSTOMIZE**

An Applesoft program that when RUN allows you to make changes in current parameters stored in MULTIDRIVE.DOS.

### **MR.FID**

A binary program which when BRUN can copy files into and out of the RAM disk. This modified version of Apple's FID program will access all of the sectors and drives available in the RAM disk system.

## How the DOS 3.3 RAM disk program works

RAM on your MultiRam card is used by the MULTIDRIVE.DOS program to provide from one 64K DOS 3.3 RAM disk to nine 384K RAM disks.

The MULTIDRIVE.DOS program builds a RAM disk in 64K increments.

The program first checks to see how many 64K banks of memory are on your MultiRam card.

The program then starts building a RAM disk from the first 64K bank of memory on the MultiRam card, auxiliary bank zero.

The RAM disk can start from the second 64K bank. How and why you would want to do this are explained in the customization section.

The program continues to add consecutive 64K blocks of memory to the RAM disk until it reaches 384K or reaches the last 64K bank of memory less than 384K.

If the MultiRam card has less than 384K, the program creates a partial disk with the memory it found.

You can change the default to another slot using the customize program.

The first disk created is used as slot 3, drive 1.

If there is more than 384K of RAM on the card, the program starts to build another disk in 64K increments. Again, a complete 384K disk is created if there is enough memory; otherwise a partial disk is created.

The second RAM disk is used as slot 3, drive 2.

The program continues building RAM disks in the same way until it runs out of memory or has build nine drives, the maximum number of drives.

Table 7.4 on page 163 shows the drives that are possible with different MultiRam card memory combinations.

The program then displays on screen the drives it has built and returns control of the Apple to you or the program that ran it (see Figure 7.2 on page 168). The RAM disks are then ready for use.

### **DOS 3.3 RAM disk specifications**

DOS 3.3 RAM disk specifications are summarized in Tables 7.2 and 7.3 on page 162.

DOS 3.3 RAM disks are limited to 384K because an unmodified DOS 3.3 operating system has a 400K disk size limit. Building a RAM disk in whole 64K increments, 384K is the largest RAM disk possible.

At the 384K maximum, a DOS 3.3 RAM disk is the equivalent of three standard Apple 5-1/4 inch floppy disks.

**Table 7.2**  
**DOS 3.3**  
**RAM Disk**  
**General**  
**Specificat-**  
**ions**

Maximum RAM disk capacity ...	384K
RAM disk sizes possible:	
MultiRam RGB & //e .....	64K, 128K, 192K 256K, 320K, 384K
MultiRam CX .....	192K, 320K, 384K
Maximum number of drives:	
MultiRam RGB - 1024K .....	3
MultiRam //e - 768K .....	2
MultiRam CX - 512K .....	2
MultiRam RGB & //e combined - 1792K .....	5
MultiRam RGB & Plus combined - 5120K .....	9
Sectors per track .....	32
Tracks per 64K .....	8
Tracks per 384K drive .....	48
Slot assignment .....	user definable, default = 3
Volume assignment .....	user definable, default 1-9

**Table 7.3**  
**RAM Disk**  
**Sizes and**  
**Useable**  
**Memory**

RAM Disk Size	Useable RAM	Useable Sectors
64K	48.0K	192
128K	111.5K	446
192K	175.0K	700
256K	238.5K	954
384K	365.5K	1,462

**Table 7.4**  
**DOS 3.3**  
**RAM disk**  
**sizes and**  
**drive**  
**distribution**

MultiRam Size (K)		RAM Disk Numbers and sizes (K)								
RGB or //e	CX	1	2	3	4	5	6	7	8	9
64		64								
128		128								
192		192								
256		256								
320	256 <sup>4</sup>	320								
384	320 <sup>4</sup>	384								
448 <sup>1</sup>		384	64							
576	512 <sup>4</sup>	384	192							
640 <sup>1</sup>		384	256							
768		384	384							
832 <sup>1</sup>		384	384	64						
1024 <sup>1</sup>		384	384	256						
1792 <sup>2</sup>		384	384	384	384	256				
5120 <sup>3</sup>		384	384	384	384	384	384	384	384	384

Notes:

1. Available only with the MultiRam™ RGB card.
2. A 1024K MultiRam™ RGB card combined with a 768K MultiRam™ //e card. Other sizes possible in 64K increments from 1024K to the 1792K maximum.
3. A 1024K MultiRam™ RGB card combined with a MultiRam™ Plus card.
4. The //c's auxiliary 64K bank is also used by the RAM disk.

DOS 3.3 limits the size of storage devices to 400K. Because MultiRam cards can have RAM far in excess of 400K, DOS RAM disks are divided into multiple RAM disks with a 384K maximum per disk.

## Important

||||| The RAM disk size is not the only determining factor on how many files can be put on a DOS 3.3 RAM disk.

If you copy many, many small files to a RAM disk, you may find there is still room left on the RAM disk but you cannot copy any more files to it. If this happens, you are experiencing a DOS 3.3 limitation.

DOS 3.3 allows a maximum of 105 files per disk. The DOS 3.3 RAM disk can hold only as many files as DOS allows no matter how large the RAM disk.

If you run into this limitation, you should copy files to other RAM disks in logical groups.

### **How to use the DOS 3.3 RAM disk**

To use the DOS 3.3 RAM disk, follow the three steps mentioned earlier in this chapter: (1) create the RAM disk, (2) copy files to the RAM disk, and (3) run programs from the RAM disk.

You can create and copy files to a RAM disk either manually (from the keyboard) or automatically (from program control).

The following instructions will show you how to use the DOS 3.3 RAM disk in both ways.

### **Create a master disk**

Unlike the ProDOS RAM disk, the DOS 3.3 programs that create the DOS 3.3 RAM disk cannot be run directly from the "MultiRam AppleWorks Expansion & DOS RAM Disk" work disk you created in Chapter 1.

The work disk is a ProDOS disk containing specially formatted DOS 3.3 tracks to hold the DOS RAM disk files. The DOS RAM disk programs will not be recognized by the ProDOS operating system that loads into memory when you boot the disk.

To run the DOS 3.3 RAM disk program:

1. Boot a disk with the DOS 3.3 operating system on it, insert the work disk and then run the RAM disk files as you would any other DOS program, or
2. Transfer the DOS RAM disk files to a DOS formatted disk and run the programs from the new, bootable disk.

If you are going to use the DOS RAM disk more than once, you should move the DOS RAM disk files to a DOS formatted disk to save time and confusion in the future.

The following instructions will show you how to move the DOS RAM disk programs to a DOS disk that you will use as your "MultiRam DOS RAM Disk Master".

### What you will need

DOS 3.3 System Masters can be obtained at an Apple dealer. If you do not have an unprotected DOS disk or a System Master, then you probably do not need to use a DOS RAM disk.

#### ■ The "MultiRam AppleWorks Expansion & DOS RAM disk."

This is the work disk you created in Chapter 1.

#### ■ A DOS 3.3 System Master

If you do not have a System Master, the DOS operating system is usually found on all unprotected DOS disks.

#### ■ 2 blank disks.

One disk will become your DOS RAM disk master, the other disk will become an auto boot disk.

### To create the DOS 3.3 RAM disk master

The program name used after the "INIT" is the program that DOS automatically runs when the disk is booted. This "HELLO" will run the RAM disk program and create the RAM disk at bootup.

1. Boot the DOS 3.3 System Master disk.
2. Remove the System Master and insert a blank disk.
3. Enter "NEW" and press the Return key.
4. Enter "10 PRINT CHR\$(4)"BRUN MULTIDRIVE.DOS" and press the Return key.
5. Enter "INIT HELLO" and press the Return key. This will initialize the blank disk and save the one line program you entered in step 4 as "HELLO."
6. Remove the newly initialized disk, insert the other blank disk, and repeat step 5.

7. Remove the newly initialized disk and insert the MultiRam work disk
8. Enter "BRUN MR.FID" and press the Return key.
9. Choose "1. Copy Files" from MR.FID's main menu.

**Figure 7.1**  
**MR.FID main menu**

```

\*****
*          APPLE II FILE DEVELOPER          *
*                                          *
*          MULTIRAM FID VERSION 1.1        *
*                                          *
*          COPYRIGHT 1979 APPLE COMPUTER INC.*
*****

CHOOSE ONE OF THE FOLLOWING OPTIONS

      <1> COPY FILES
      <2> CATALOG
      <3> SPACE ON DISK
      <4> UNLOCK FILES
      <5> LOCK FILES
      <6> DELETE FILES
      <7> RESET SLOT 4 DRIVE
      <8> VERIFY FILES
      <9> QUIT

WHICH WOULD YOU LIKE?

```

10. Enter the slot and drive for the source and destination disk. If you have a one disk drive Apple, enter the same slot and drive number for both.
11. Enter an "=" for the file name to copy. An "=" is a wildcard that tells the program you want to copy all files.
12. Enter a "N" for the question about prompting. You want to copy all three MultiRam files from the disk and by entering "N" along with the "=" wildcard, MR.FID will copy all DOS programs from the MultiRam work disk to your newly initialized disk.
13. Press any key to begin. Follow all screen prompts until all the MultiRam files are copied.
14. Press the **Escape** key to return to MR.FID's main menu.

If you were to answer "Y", MR.FID would show you the name of each file on the disk and you would have to enter a "Y" to copy each file after MR.FID showed the file name or a "N" to skip over the file.



15. Remove the disks, insert the other newly formatted disk and repeat steps 9 to 14.
16. Press "9" at the main menu to exit MR.FID and return to the Applesoft prompt.
17. Remove the new disk and label it "MultiRam DOS 3.3 RAM Disk Master." Label the other disk "MultiRam DOS 3.3 RAM Disk Auto Boot."

Your DOS RAM disk master is ready to use. Insert it into the boot disk drive to continue with the following instructions.

## Using the DOS RAM disk manually

Anytime you have the Applesoft prompt on screen, you can create a DOS RAM disk by running MULTIDRIVE.DOS from a keyboard **BRUN** command, copy files to the RAM disk by BRUNing MR.FID, and then work with files on the RAM disk.

### 1 Create the RAM disk

BRUN is the DOS command used to run a binary program. The RAM disk program MULTIDRIVE.DOS is a binary program.

If you do not have an Applesoft prompt on screen, boot a DOS disk that will place you into Applesoft with the Applesoft prompt "]" on screen.

Insert your DOS 3.3 RAM DISK MASTER into a disk drive and enter at the keyboard:

```
BRUN MULTIDRIVE.DOS, Ss,Dd"
```

where *s* is the slot and *d* is the drive where you placed the RAM master disk. Do this now.

The DOS 3.3 RAM disk will be installed using default values contained within the program. You may change the default values for the DOS 3.3 RAM disk using procedures described later.

A screen message appears which tells you the number, size and location of drives installed.

**Figure 7.2**  
**DOS 3.3**  
**RAM disk**  
**screen**

```
MultiDrive.DOS V1.5
for MultiRam (tm)

Copyright (c) 1985 by
CHECKMATE TECHNOLOGY, INC.

SLOT 3 DRIVE 1 384K
SLOT 3 DRIVE 2 384K
SLOT 3 DRIVE 3 256K

]
```

## **2 Copy files to the DOS RAM disk**

After you install a DOS 3.3 RAM disk, you will need to copy files to and from the RAM disk.

Any non-copy protected software can be copied to the RAM disk and most will operate without problem.

**Full-disk copy programs like COPYA will not copy to the RAM disk; files must be copied to the RAM disk file-by-file with MR.FID.**

Apple supplies a file-copying program called "FID" on the DOS 3.3 System Master which will copy files to the DOS RAM disk.

However, FID only recognizes two drives per slot and is designed to copy files to a standard DOS floppy disk containing 16 sectors. The DOS 3.3 RAM disks created with MultiRam contain 32 sectors and can number as many nine drives in a slot.

## MR.FID for MultiRam

MR.FID is FID modified for the MultiRam DOS RAM disk. It will properly access all of the drives and sectors that MULTIDRIVE.DOS creates.

MR.FID is easy to use. If you have never used FID before, refer to FID documentation from Apple if you have any questions about using MR.FID.

You used MR.FID earlier when you created your DOS RAM disk master earlier. To copy files to the RAM disks, repeat earlier steps 7 to 14 with one exception: enter slot 3, drive 1 as the copy destination. These are the default values for the DOS 3.3 RAM disk.

You will see the same on screen messages as before and the files will be copied to the RAM disk.

### Important

Remember all data saved on a RAM disk is lost when the power is turned off. Copy all files you want to permanently save from the RAM disk to a floppy or hard disk with MR.FID.

## 3 Using files on the RAM disk

You now have copied all MultiRam DOS RAM disk files to the RAM disk.

You can use MR.FID's other main menu choices to catalog files on the RAM disk or do any of the other main menu functions. Try some of these choices to see the RAM disk's quick response.

Exit MR.FID with main menu selection 9. You should be back to the Applesoft prompt.

Enter "CATALOG,S3,D1" and press the Return key. You will see a listing of the RAM disk files immediately appear. All other DOS commands work quickly as well.

Next try running one of the programs on the RAM disk. Again you will see immediate response.

### Important

Use only run commands to start programs on the RAM disk or any floppy or hard disk after you have installed the RAM disk. Booting a program disk to start a program will unhook the RAM disk.

DOS run commands for DOS files are:

**RUN** for Applesoft and Integer Basic programs, identified by the letter "A" or "I" to the extreme left of a file name when cataloged.

**BRUN** for binary programs, identified by the letter "B."  
**EXEC** for EXEC text files, identified by the letter "T."

## Important

Some application programs ask you for the slot, drive and volume number to store data when you first prepare the program. Enter the correct values for the RAM disk or the program will give you "I/O" errors when you try to use the RAM disk.

Remember the default values are slot 3, drive 1, volume 1 for the first RAM disk; drive 2, volume 2 for the second RAM disk; etc. If you change these values with the customization program, be sure to also change the application program's values.

## **Using the DOS RAM disk automatically**

You are now ready to create a disk that will automatically install the RAM disk, transfer desired files to the RAM disk, and then run a selected program from the RAM disk.

You have already made a disk that will do part of the job.

Boot the DOS 3.3 disk you created earlier labeled "Auto Boot" and watch the RAM disk automatically appear and leave you at the Applesoft prompt.

You may enter the BRUN command "PRINT CHR\$(4)" "BRUN MULTIDRIVE.DOS, Ss,Dd" in any Applesoft program, not just a "HELLO" program and have your program create the RAM disk. The MULTIDRIVE.DOS file must be on the disk you indicate with the *s* and *d* designation.

**The key to an auto boot disk is to automatically run the MULTIDRIVE.DOS program.**

The one line "HELLO" program you entered when you initialized the disk, "10 PRINT CHR\$(4) "BRUN MULTIDRIVE.DOS," will always run the RAM disk program when you boot the disk.

The next step is to automatically copy files to the RAM disk.

## An EXEC file for complete automation

To make a disk that will create the RAM disk and also run MR.FID to automatically copy files to the RAM disk requires a different "HELLO" program and the addition of a new file to your "Auto Boot" disk called an "EXEC" file.

An EXEC file is a text file that contains commands that the Apple "thinks" you are entering directly from the keyboard.

The EXEC file is necessary because MR.FID is designed to accept commands only from the keyboard and you need to give commands to MR.FID to automatically copy files. You cannot run an Applesoft or a binary program to give such keyboard commands.

You will create an EXEC file that first BRUN's the MULTIDRIVE.DOS program, then BRUN's the "MR.FID" program, gives MR.FID the required key presses to transfer files, then finally RUN's an application program that was copied to the RAM disk.

## To create the Auto Boot disk

1. Boot the "Auto Boot" disk you created earlier.
2. Enter "NEW" at the Applesoft prompt and press the **Return** key.
3. Enter "10 PRINT CHR\$(4)"EXEC AUTO-BOOT" : END" and press the **Return** key. This will run the EXEC program.
4. Enter "SAVE HELLO" and press the **Return** key. This new "HELLO" program will execute the auto-boot program at boot time.
5. Enter a program that will create the EXEC text file when it is run.

Enter the following program lines (the lines starting with numbers) exactly as written. Press the **Return** key at the end of each line. Do not type in the comments on the right. Substitute the name of the program you want to automatically run after copying files to the RAM disk (if any) in line 160.

<u>EXEC File Maker</u>	<u>Comments</u>
10 D\$ =CHR\$ (4)	assign DOS command prefix
20PRINT D\$"OPEN AUTO-BOOT"	create a text file
30PRINT D\$"WRITE AUTO-BOOT"	
31 :	
32 : REM EXEC FILE CONTENTS	
33 :	
40PRINT "BRUN MULTIDRIVE.DOS"	creates the RAM disk
50PRINT "BRUN MR.FID"	runs MR.FID program
60PRINT "1"	select "Copy Files"
70PRINT "6"	select source slot
80PRINT "1"	select source drive
90PRINT "3"	select destination slot
100PRINT "1"	select destination drive
110PRINT "="	copy all of the files
120PRINT "N"	no prompt needed
130PRINT "B"	begin copying
140PRINT "B"	done, return to menu
150PRINT "9"	select "Quit"
160PRINT "RUN <program name>"	run the desired program
161 :	
170PRINT D\$"CLOSE AUTO BOOT"	instructions complete, save the finished text file

EXEC text files may also be created with any DOS 3.3 word processor. Enter into a word processor file the characters within quotation marks in lines 40 to 160. Press the **Return** key at the end of each line. Save the text file under the name "AUTO BOOT."

6. Enter "SAVE EXEC FILE MAKER" and press the **Return** key to save the program. You will not need this program again unless you want to use a different set of commands to MR.FID in lines 60-160.
7. Enter "RUN" and press the **Return** key. The EXEC FILE MAKER program will create an EXEC file named "AUTO BOOT" which will appear on your disk.
8. Using MR.FID, copy any files to the auto boot disk you want to automatically copy to the RAM disk on boot.

## Using the Auto Boot disk

Now try using your new auto boot disk. Turn off the Apple, insert the auto boot disk, and turn on the Apple.

You will see a DOS 3.3 RAM disk created, MR.FID appear, and all files on the auto boot disk copied to the RAM disk, and the file name you entered in line 160 run.

You can create many different auto boot disks by simply copying the "HELLO", "AUTO BOOT", "MULTIDRIVE.DOS" and "MR.FID" files to a disk. Add the files you want copied to the RAM disk, enter the name of the program you want to automatically run at boot in the EXEC text file, and the new disk will be ready.

You can enter any values for slot and drive in the EXEC text file so that MR.FID can copy files from disks that are not on the auto boot disk but are in another slot or drive.

You can also create an EXEC file that will copy files from the RAM disk back to a floppy disk. This will make backup of your RAM disk files automatic.

## Customizing the DOS RAM disk

You can make changes to the DOS 3.3 RAM disk with the Applesoft program, "MULTIDRIVE.DOS CUSTOMIZE".

You may want to customize the RAM disk to better use a DOS program or to protect the RAM disk from damage by a DOS program.

### To run MULTIDRIVE.DOS.CUSTOMIZE

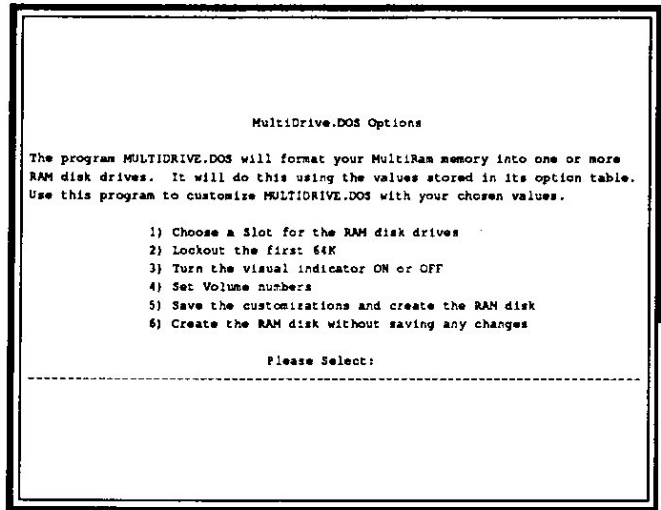
Boot the "DOS 3.3 RAM Disk Master" you created earlier.

At the Applesoft prompt enter, "RUN MULTIDRIVE.DOS CUSTOMIZE" and press the **Return** key.

You will see a menu screen entitled, "MULTIDRIVE.DOS Options" with 6 options available.

Following are explanations of each option. Try each option as you read about it.

**Figure 7.3**  
**MULTIDRIVE**  
**.DOS**  
**Options**  
**screen**



### **1** Choose a Slot for the RAM disk drives

When the DOS 3.3 RAM disks are created, they are assigned to one specific slot. The standard or default location is slot 3.

You can reassign the RAM disk to any slot from 1 to 7. Since MULTIDRIVE.DOS automatically sets up and numbers the RAM disks, no option is available to number the drives.

You can assign the RAM disk to any slot, even one that that physically contains a peripheral card. For example, your RAM disk may emulate slot 1 when you really have a printer card installed in that slot.

**The disk  
drive  
controller  
card problem**

The one peripheral card that can be affected if you assign the RAM disk to its slot is a disk controller card.

MULTIDRIVE.DOS does not check to see if the slot you choose actually contains a disk controller card.

**If you install the RAM disk in a slot containing a disk drive controller card, the RAM disk will replace the disk drive controller card!**



Any file you try to save to a floppy or hard disk drive in a slot where a RAM disk was installed will be saved to the RAM disk. Any files on that floppy or hard drive cannot be loaded into memory.

For example, if you have a hard disk controller installed in slot 7, and if you have selected slot 7 as the location for the RAM disk, it will be impossible to either save or read files to the hard disk until you reboot DOS.

You **MUST** reboot DOS to regain access to your floppy or hard disk if you place a RAM disk in a slot with a disk drive controller card.

### **The slot 6 exception**

There is one exception to this disk drive rule.

Because slot 6 is the standard location for disk drives, a RAM disk can be assigned to this slot without disconnecting drive 1. When slot 6 is selected, the drive numbering starts with 2, rather than 1; this allows a physical drive in slot 6, drive 1 to be accessed normally.

Note that **only** drive 1 is "protected" – your RAM drives will begin numbering in drive 2, effectively "disconnecting" any other physical drive which is installed in slot 6.

MULTIDRIVE.DOS works this way to take advantage of programs which use slot 6, drive 2 as a data disk. Some programs will not allow you to specify the slot/drive location of the data disk, expecting it to be found only in slot 6, drive 2.

Always check documentation for applications programs with heavy disk access for the ability to specify locations of data disks.

## **2 Lockout the first 64K**

Many current programs use double hi-res graphics or 128K of memory or both. These programs use auxiliary bank zero to create double hi-res displays and use 128K of memory.

Because the DOS RAM disk normally uses auxiliary bank zero for file storage and the RAM disk's catalog, this bank must be locked out of RAM disk duty when using such programs. Failure to lockout block zero with such programs eliminates the RAM disk by overwriting it.

Option 2's default value is "N", or, "do not protect bank 0".

If you choose "Y", the driver code, VTOC, catalog and some files will locate in bank 1, and the highest numbered RAM disk will contain 64K less disk space.

### **3 Turn the visual indicator ON or OFF**

A floppy disk drive has an LED (Light Emitting Diode) "in use" indicator that lights up when the disk drive is being read or written to.

An equivalent "in use" indicator appears as an inverse "R" or "W" in the lower right-hand corner of your monitor screen when using the DOS 3.3 RAM disk (you have to look fast).

The default value is indicator ON. If this feature is distracting to you, turn it off by selecting "3" and answering "N".

The inverse "R" or "W" is POKE'd to the text page, so if an external video card is being used, you will not see this feature. Any character in that text page location is saved, then restored after the read/write operation.

### **4 Set Volume numbers**

The DOS 3.3 RAM disks supports volume numbering. Each drive is capable of responding to volume numbering commands and the volume number is displayed whenever the disk is cataloged.

Default values are drive 1 = vol 001, drive 2 = vol 002, drive 3 = vol 003, drive 4 = vol 004 ... drive 9 = vol 009. Assigned values may range from 0-254; each drive may have different volume numbers, or they may all be the same.

To set volume numbers, first select the drive after choosing option 4 from the main menu:

**Which drive (1-9) ?**  
**Enter 0 when finished**

After you have selected the drive, enter a number from 0 to 254 for the volume number when the program requests it and press **Return**:

**Enter Volume number for Drive 1 :**

Once you have finished, enter 0 (zero) and press **Return** to return to the customization menu.

### Important

Since DOS 3.3 programs rely on slot/drive and volume numbers for disk access, make note of the slot/drive and volume customizations you have made. Enter this information into programs if they ask you for the location of data files. An incorrectly entered volume number can cause an error message to appear.

## **5 Save the customizations and create the RAM disk**

When MULTIDRIVE.DOS is loaded, it contains the last values which were assigned to it.

If, during the save procedure, you receive an error message like "BREAK IN 3020", you are probably working with a write protected disk. Start again with an unprotected disk.

When you customize RAM disk values, you may want to save those new values for future use. Choosing this option will save the new values to disk in the MULTIDRIVE.DOS file and will then create the RAM disk.

If you have several applications requiring different custom values, you may want to create a special MULTIDRIVE.DOS for each application, and run it prior to that application. This will eliminate the need to re-run the customize program for each different application.

## **6 Create the RAM disk without saving any changes**

Choose this option if you want to experiment with various values or create a special configuration for a one-time use without affecting the values saved to the MULTIDRIVE.DOS program on the floppy disk.

### **Programming tips and technical data**

The DOS 3.3 RAM disk may be used like a normal drive from within DOS 3.3 programs. All disk-related commands are supported and no special steps are necessary to access the RAM disk.

DOS 3.3's RWTS (Read/Write Track & Sector) routine can be used to directly read or write to the RAM disk. If you wish to use RWTS with the RAM disk, follow all standard protocols and do not call into the middle of the RWTS routine; enter RWTS from the top of the routine.

The standard or custom RWTS IOB (Input/Output Block) and its sector buffer must lie in the \$200 to \$BFFF area of main motherboard memory.

**The DOS RAM disk will not work with DOS relocated to the language card.**

Auxiliary 64K bank zero is always in place. The only time other 64K banks are activated is when RWTS calls them.

The optional parameters the MULTIDRIVE.DOS program uses to determine the slot for the RAM disk, whether or not auxiliary bank zero is used, the volume numbers of the RAM disk, and whether or not a "disk in use" indicator is shown are located within the MULTIDRIVE.DOS program.

These optional parameters are modified by the CUSTOMIZE program.

The locations for these optional parameters within the MULTIDRIVE.DOS program are shown in Table 7.5 on the next page.

**Table 7.5**  
**MULTIDRIVE**  
**.DOS**  
**Optional**  
**Parameters**

Decimal Location	Hex Location	Option	Range
8195	\$2003	R/W FLAG	\$00-\$FF <sup>1</sup>
8196	\$2004	SLOT	\$10-\$70 <sup>2</sup>
8197	\$2005	OFFSET	0-1    3
8198	\$2006	LOWBANK	0-1    4
8199	\$2007	VOL-D1	\$00-\$FE <sup>5</sup>
8200	\$2008	VOL-D2	\$00-\$FE <sup>5</sup>
8201	\$2009	VOL-D3	\$00-\$FE <sup>5</sup>
8202	\$200A	VOL-D4	\$00-\$FE <sup>5</sup>
8203	\$200B	VOL-D5	\$00-\$FE <sup>5</sup>
8204	\$200C	VOL-D6	\$00-\$FE <sup>5</sup>
8205	\$200D	VOL-D7	\$00-\$FE <sup>5</sup>
8206	\$200E	VOL-D8	\$00-\$FE <sup>5</sup>
8207	\$200F	VOL-D9	\$00-\$FE <sup>5</sup>

Notes:

1. \$00-\$7F (positive) = OFF, \$80-\$FF (negative) = ON.
2. Upper nibble = slot number (lower nibble not used).
3. Added to all drive numbers (used only for slot 6).
4. Lowest MultiRam bank used (VTOC and catalog located here).
5. The volume number assigned to the drive.



## Chapter 8

# Help

If you have a question about MultiRam software or if you are having a problem, please call or write Customer Service for help.

### But first ...

Many conditions that might give rise to questions or cause you trouble are described in this manual.

- To save yourself time, first check the appropriate area of the manual for help before you contact Customer Service.
- If you are new to AppleWorks, be sure you read your AppleWorks' manual thoroughly. Many questions you have may not be MultiRam questions but may actually be AppleWorks questions.

AppleWorks has its peculiarities ... and problems as well. You may want to refer to one of the advanced reference sources at the end of Chapter 3 for help if you are experiencing an AppleWorks problem.

If you are using another program along with AppleWorks, such as Pinpoint or MacroWorks, please check that software's manual. All programs that modify AppleWorks, including MultiRam, require correct installation and proper useage to work right.

## How to get help

You can call or write Customer Service for help.

- The telephone number and hours are:



**Customer Service**  
**(602) 966-5802**

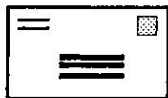
Monday to Friday  
9am to 5pm (Mountain Standard time)

So that technical help will be available to more people, please have the following information available to save time when you call:

- Exact nature of the problem.
- Version number of the MultiRam software.  
(the version number on the disk label, e.g. 4.4)
- Other software in use and its version number.  
(e.g., AppleWorks v. 1.2 used with Pinpoint v. 1.2E)
- MultiRam card model, amount of RAM on the card, and serial number.
- Type of Apple used.
- Peripherals and peripheral cards in use.
- Any other information you think may be important.

If Customer Service is busy when you call, please leave your name and a telephone number where you can be reached during our business hours. A service representative will return your call as soon as possible.


- If you prefer to write or send an example of a program or data disk giving you a problem, address all letters to:



**Checkmate Technology**  
**Customer Service Department**  
**509 South Rockford Drive**  
**Tempe, AZ 85281**

If you send a program or data disk to Customer Service for help, please put the disk in a sturdy disk mailer or put it between two pieces of cardboard to prevent damage.



  
**Disk replacements**

Checkmate Technology will replace all faulty disks for FREE for 90 days after purchase. After 90 days, or for a physically damaged disk, replacements are \$10. Outside the United States, replacements are \$15 in U.S. funds to cover air mail costs.

You may also receive a FREE replacement at any time directly from your dealer. Simply take two blank disks to the dealer to copy the latest MultiRam software. All dealers receive a master disk from Checkmate to update their customer's software.

  
**Disk updates**

MultiRam software has been improved several times a year in the past and will continue to be improved.

Contact your dealer or Customer Service if you would like to know the latest software version number.

FREE updates are available from your dealer and are also available from Checkmate Technology at a nominal charge.



# Index

- |                                    |                             |
|------------------------------------|-----------------------------|
| AE Pro                             | 71                          |
| Apple user groups                  | 66                          |
| <b>AppleWorks</b>                  |                             |
| compatible versions                | 13                          |
| data base limits                   | 27,46                       |
| Desktop space                      | 12,23,24,28,29,32,39,73,152 |
| expanding AppleWorks               | 11-20                       |
| expansion problems                 | 17-20                       |
| large files                        | 37-62                       |
| load and save times                | 38                          |
| loading overlays                   | 30,31,40                    |
| RAM disks & accessories            | 69-85,97,152,153            |
| references                         | 65                          |
| segmenting files                   | 50-62                       |
| using expanded AW                  | 21-66                       |
| <b>Backup and restore programs</b> |                             |
| Backup//                           | 146                         |
| Backup & Restore                   | 146                         |
| BusinessWorks                      | 92                          |
| boot                               | 5,95,96                     |
| Catalyst 3.0                       | 147                         |
| <b>Clocks</b>                      |                             |
| 12/24 hour mode                    | 33                          |
| cautions                           | 35,36                       |
| clock preparation                  | 34                          |
| MacroWorks                         | 35                          |
| time and date in database          | 34                          |
| time display                       | 15,32,33,35,36,63-65        |
| turning off                        | 33,36,63-65                 |
| turning on                         | 33                          |

Copy II+	4,101,145
CP/M RAM disk	90
Customer Service	182
David-DOS	102
Diversi-Copy	4,98
Diversi-DOS	102
<b>DOS 3.3 RAM disk</b>	
double hi-res	155
EXEC text files	170-173
FID	94,101
general	159-179
MR.FID	160,166-173
MULTIDRIVE.DOS	160,165,170-175,177,178
MULTIDRIVE.DOS	
CUSTOMIZE	160,173
RWTS	178
sizes & useable memory	162
volume numbers	176
VTOC	176
<b>Filer</b>	
Copying disks	4-7
Copying files	118,119,122-127
Formatting disks	117,118
general	17,19,94,101,106,122,125, 126,128-130,137
Listing files	124
Listing volumes	123
Set prefix	128
Fingertips	15
Flashcalc	97
Fontrix	92
GraphWorks	84
hard disk	14,15,62,64,114,127
help	181
Jeeves	12,36,63,77,83-85
<b>Large AppleWorks files</b>	
data base	46-50
file size differences	41-43
MultiRam size	39-41
problems saving or loading	61,62
saving and loading	50-57
spreadsheet	44-46
time	37-39, 51
word processor	43,44

Locksmith 6.0	4,98
MacroWorks	12,14,15,22,35,63,76,82,83
manual updates	2
<b>memory in use indicator</b>	
general	25,31,32,38
turning off	63-65
merging data base files	46-50
MouseDesk	147
Mouse Paint	114
ORCAM	92
overwriting overlays	39-41
Pascal RAM disk	90
Pinpoint	12,15,22,63,77- 81,108,134,135,138
<b>ProDOS</b>	
error codes	157
identification	96
Kernal	154
MLI subroutines	154
pathnames	112-114
prefix	115
"QUIT" program	116
system programs	78,110-112
tutorial	110-113
<b>ProDOS RAM disk</b>	
COPY.ALL	106,119,131- 134,137,145,156,157
LOADMRAM.SYSTEM	106,108,139,142,144, 145,157
MD.PRO.CUSTOMIZE	106,107,148,156
MRAM	69,7278,107,108,121,122, 124-128,134,138,142,146, 148-153,155
MRAM.SYSTEM	106-108,112,115,119,139- 142,145,148,150,154,156
MULTIDRIVE.PRO	75,106,108-121,130- 132,150,154,156
/RAM	121
sizes & useable memory	109
<b>program selectors</b>	
Bird's Better Bye	147
Pro-Sel	147

"QUIT" program	116
ProntoDOS	102
<b>RAM disks</b>	
benefits	92,93
cautions	97-104
defined	90,91
general	31,94,105-158
rules	97-104
using	94,95
RanaDOS	102
ReportWorks	84
Sensible Speller	84
<b>Small AppleWorks files</b>	
general	58-60
problems with saving	59-61
software updates	1,67,183
Supercalc 3a	97,151,153
ThinkWorks	84
UniDisk 3.5	14,15,62,64,76,83,85,93, 104,114,127
virtual memory	92
Word Perfect	92



