GS-RAM™

and

GS-RAM Plus™

User's Manual

ÆE APPLIED ENGINEERING™

v2.1

Applied Engineering

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GS-RAM™
and
GS-RAM Plus™

User's Manual

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Table Of Contents

About The GS-RAM

GS-RAM allows you to increase the Random Access Memory (RAM) capacity of your Apple IIGS by a maximum of 1.5 Megabytes, in increments of 256K. With the GS-RAM Plus, you can expand the computer's memory as much as 6 Megabytes, in steps of 1024K (1 Megabyte). If someday you discover that you need even more memory, you can attach an optional 2 Megabyte "piggy-back" expander card to boost the total memory expansion for the GS-RAM up to 3.5 Megabytes and up to 8 Megabytes for the GS-RAM Plus! See Chapter 5, "More Memory" for more information.

DMA Support--The Apple IIGS is limited to expanded system memory of up to 8 Megabytes but only 4 Meg is Direct Memory Access (DMA) compatible. A fully loaded GS-RAM card (Rev C or later) is compatible for all 1.5 Meg. The GS-RAM Plus is DMA compatible for up to 4 Meg and partially compatible above that. However, with the optional DMA Support Card, your GS-RAM Plus (Rev D or later) will make all of your GS-RAM Plus memory DMA compatible. You'll know that you have DMA compatible GS-RAM Plus if it has a 34-pin DMA connector toward the right edge of the front side of the board. (See below.) Most DMA peripherals will tell you that they require DMA.

Front (chip side) of
GS-RAM Plus Board

34-Pin
DMA Connector
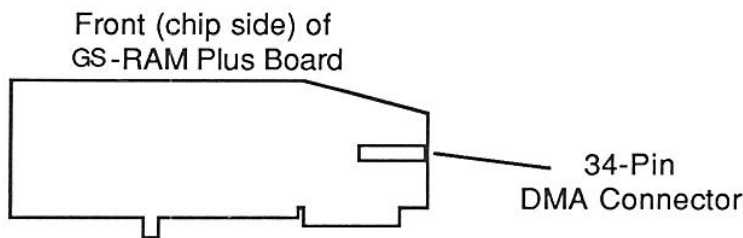
RamKeeper--Connect the GS-RAM or GS-RAM Plus to a RamKeeper to make it an "electronic hard disk." RamKeeper turns the volatile memory of the GS-RAM Disk into a non-volatile ROM Disk. When you turn off your computer, the memory allocated as the ROM Disk remains intact, ready to use the next time you boot. You can even connect two GS-RAM's or a GS-RAM and almost any other GS memory expansion card to RamKeeper and RamKeeper will recognize both cards as one big card.

AW 2 Expansion Software--With your
GS-RAM, you've also received Applied Engineering's AW 2 Expander software. This program will greatly enhance the popular AppleWorks integrated software package adding such features as more Word Processor lines and Data Base records, an expanded clipboard, Multiple Disk Save and more.

Also included on the AW 2 Expander is a graphic test for your GS-RAM that will tell you which, if any, chips are bad and will also check for the proper type of chips.

About This Manual

We have tried to make this manual as informative, understandable, and error-free as possible. If you have any comments or suggestions regarding this manual or any other Æ manual, we would be glad to hear from you.

Please address any comments or suggestions to:

Applied Engineering
P.O. Box 5100
Carrollton, Texas 75011
    Attention: Manager, Technical Publications

Below is a brief description of what is covered in each chapter of this manual.

> **Chapter 1** will take you quickly through the installation and testing of your GS-RAM or GS-RAM Plus card.

> **Chapter 2** tells you how to use some of the expanded memory as a RAM disk. This is a great way to increase the access speed to different applications.

> **Chapter 3** describes the Æ ≣Cache included on your AW 2 Expander disk. The ≣Cache will greatly increase your access speed to most applications. With the Æ ≣Cache installed, you will notice that the time it takes to load a program from an Apple Disk 3.5 drive is greatly decreased-- even on the initial load!

Chapter 4 steps you through the installation and use of the AW 2 Expander program. This software will enable you to greatly enhance your AppleWorks program by using the extended memory that the GS-RAM has given your IIGS.

Chapter 5, as mentioned above, helps you to decide what chips you will need to expand the memory of your GS-RAM card. It also explains how to install the chips yourself as well as how to return the card to Applied Engineering for a memory upgrade with no additional charge for the installation and testing.

Appendices provide useful information such as instructions on how to copy with the Filer program, how to use Bird's Better 'Bye', what to do if you have questions, etc.

Now, turn the page and let the memory begin!

CHAPTER ONE

Getting Started

❖ *Note:* If you're attaching the GS-RAM to a RamKeeper, follow the instructions in the RamKeeper manual.

This chapter tells you how to install and test the GS-RAM and GS-RAM Plus memory expansion cards. Before you install your memory-expansion card, please be sure to read Setting Up Your Apple IIGS and the Apple IIGS Owner's Guide. You'll need to be particularly familiar with the Control Panel functions as this manual makes frequent reference to the Control Panel menu.

Installation

➪ **Turn off the computer.**

Leave the computer plugged in but flip the power switch to the OFF position.

➪ **Remove the Apple IIGS cover.**

Locate the two latches on either side of the backplate. Push in on the latches while pulling up and back on the lid.

➪ **Touch the power supply case.**

The case is shown in the illustration below. This will discharge any static electricity that may be on your body. Do not skip this step. **Static electricity can ruin chips on the board and in the computer.**
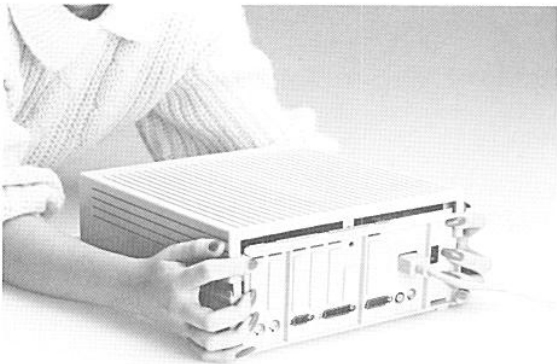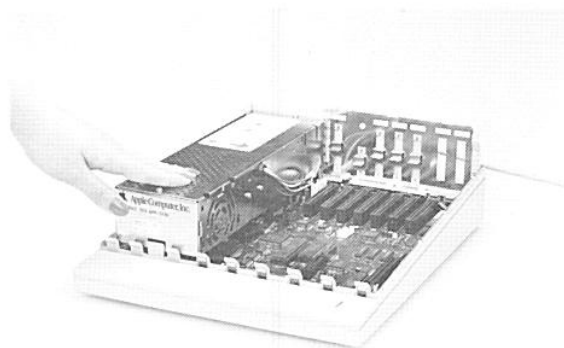
Remove the cover   **Touch the power supply**

⇨ **Remove the memory-expansion card from its anti-static bag.**

Hold the card by the edges, like a photograph. Do not touch the gold fingers of the card.

❖ *Note:* If you're connecting the DMA Support Card option to your GS-RAM Plus, follow the instructions included with the DMA card.

⇨ **Position the memory expansion card over the Memory Expansion Slot.**

The Memory expansion slot is located in the front right corner of the computer. Hold the card so that the long end of the card is toward the rear of the computer.

⇨ **Insert the card.**

Insert the gold edge-connector into the Memory Expansion Slot until it is completely seated. You can wiggle the card gently, back to front, to insure a firm connection.
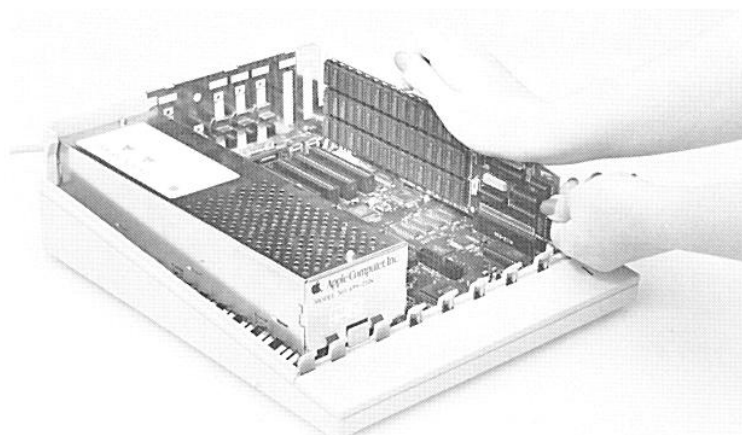
Insert GS-RAM into the Memory Expansion Slot

⇨ **Replace the Apple IIGS cover.**

Slid the front of the lid in first, then press on the back edge until it snaps into place.

⇨ **Installation is complete!**

⇨ **Check the RAM Disk setting to verify correct installation.**

You can verify that the computer recognizes the additional memory by checking the RAM Disk option in the Control Panel menu.

First, turn on the computer then access the Classic Desk Accessories menu by holding down the Open-Apple and Control keys while pressing ESC (⌘-Control then Esc).

Use the up and down arrow keys to select the Control Panel menu and press "return".

Select the RAM Disk option and press "return".

The number next to the Largest Selectable listing tells you the amount of memory that the system now has available.

⇨ **Make a copy of the AW 2 Expander disk.**

It is very important to make backup copies of your master disks when possible. The AW 2 Expander disk is not copy protected. You can copy it using the IIGS's Finder™. Simply drag the AW 2 icon to the icon of the destination disk.

If you don't use the Finder, you can use the "Copy Files" option of your GS utility disk or the "Filer" program included on the AW 2 Expander disk.

❖ *Note:* Instructions for copying with Filer are included in the Appendix of this manual. Instructions for copying with System Utilities are included in, Apple IIGS System Disk User's Guide.

After you copy the disk, store the master in a safe place.

⇨ **Test the card.**

Use the GS-RAM Test program from the main menu of your COPY of the AW 2 Expander disk. The test program will run automatically when selected (See warning below). You can stop the test at any time by turning the computer off.

❖ *WARNING:* The GS-RAM test program will erase anything stored in extended memory.

CHAPTER TWO

The GS-RAM as a RAM Disk

Many of the newer application programs take advantage
of the extended memory automatically. However, you
may want to use part of the extended memory to emulate
a RAM disk. Creating a temporary RAM disk will give
you much faster access to some applications (programs
which do not automatically take advantage of the
increased memory). The following section explains how
to create a temporary RAM disk.

Setting Up a RAM Disk

If you want to set up the GS-RAM as a RAM Disk, run the
Control Panel program from the IIGS Desk Accessories
Menu (control-Ö-esc). Then select the RAM Disk option.

You must first tell the computer how much of the card's
memory you want to set aside for use as a RAM disk. The
minimum setting limits the amount of memory that
applications can use. The maximum limits how much
memory the RAM disk can use. You'll want to leave
enough memory open to support the programs that
automatically take advantage of the extra memory.

❖   *Note:* If working with an application that uses a
     version of ProDOS before 1.2, the minimum and
     maximum RAM disk settings must be equal.

If an application needs more memory than you have
allotted, a message to that effect will come up on the
screen. You can adjust accordingly by selecting "RAM
Disk" from the Control Panel program and <u>decreasing</u> the
maximum RAM disk size.

Changing the Control Panel setting will not change the
currently established RAM disk. You will have to turn off
the power to establish a RAM Disk of a different size. The
new settings will take affect upon startup.

❖ *Remember:* Powering down will in turn erase what is currently in the temporary RAM disk you have created. Save any data from the RAM Disk that you do not want to erase before powering down.

Addressing the GS-RAM Disk

Some applications may ask you to identify your RAM disk by slot and drive number.

> **SLOT:** The GS identifies your mock RAM disk in slot 5 just as it recognizes a 3.5" drive as being in slot 5.

> **DRIVE:** The drive number will depend on what you decide to use as your startup device. Drive 1 can be either the RAM disk or a 3.5" drive. Choose one or the other using the "Slots" heading under the Control Panel Program.

-- First, make sure slot 5 is set to "Smart Port."

-- If you want the computer to boot your RAM disk at startup, select "RAM Disk" next to the "Startup Slot" heading. The GS will recognize the RAM disk at, S5,D1 and the 3.5" drive will be S5,D2.

-- If you want the computer to boot your 3.5" drive at startup, enter "5" (or "Scan") under the "Startup Slot" heading. The GS will recognize the 3.5" drive at S5,D1 and the RAM disk will be S5,D2.

-- A second 3.5" drive will be S2,D1. The following chart may help you to understand:

Boot "Slot 5"	Boot "RAM Disk"
S5,D1 ---- 3.5" drive S5,D2 ---- RAM disk S2,D1 ---- 3.5" drive	S5,D1 ---- RAM disk S5,D2 ---- 3.5" drive S2,D1 ---- 3.5" drive

❖ *Note:* If using ProDOS® 1.1.1, your second 3.5" drive (S2,D1) will not be recognized. This early ProDOS version allows only two devices per slot. See your authorized Apple dealer to upgrade your applications which use ProDOS 1.1.1.

Using the GS-RAM Disk

Now you are ready to use the RAM disk you have created. Think of it as a regular disk. You can format it then save or copy documents or applications onto it.

❖ *Remember:* **The RAM disk is only a disk as long as the power is on. The information it contains is lost when the power is turned off (unless you have saved that information to a disk or disks).**

FORMATTING

You need to format the RAM disk only if you plan to use it as your startup device. The disk will be automatically formatted at startup for saving and copying. So, if you plan only to save to and copy to the disk, you don't need to worry about formatting. If, however, you plan to use the RAM disk as a startup device, format the disk just as you would a regular disk. Format for either ProDOS, Pascal or Applied Engineering's CP/AM (5.1.1 or later) depending upon the operating system of the application(s) you intend to store on the RAM disk. Here are a few ways to format for the different systems:

● Format for Apple Pascal 1.3 by X-ecuting the "Formatter" program on your Pascal disk. (Refer to Apple Pascal documentation for more information on formatting for Pascal.)

● Format for ProDOS using the "Format" option on your IIGS System disk or IIGS System Utilities. Or, you may find it easier to use the Finder's "Format Disk" option under the "Special" menu.

● To format for CP/AM versions 5.1.1 and following, refer to the formatting instructions in the CP/AM manual.

❖ *Note:* **Do not** try to format the disk for DOS 3.3. The 3.3 applications were designed for use with 5.25" disks and will not work with the IIGS RAM disk.

You can give the RAM disk any name that the operating system will allow.

COPYING

You can copy programs to the RAM disk with the "Copy Files" option on your System Utility Disk. You may prefer to use the Finder to make direct copies of ProDOS applications by dragging the application's icon to your RAM disk's icon.

SAVING

You can save documents onto the RAM disk just as you do on a regular disk. But be sure to *save the contents of your RAM disk on a regular formatted disk before you turn off the power.* You will most likely want to save to a regular disk *during* use to keep documents from being lost due to power surges, power loses and other frustrating occurrences.

CHAPTER THREE

Æ ≡Cache

Those of you who want to know what the Æ ≡Cache™ is and does, read, "About the ≡Cache" at the end of this chapter. Those of you who want to install it right away, here's how...

Requirements

To use the Æ ≡Cache, you must have the following:

❑ A GS-RAM™ card installed in the IIGS's Memory Expansion Slot.

or

A RamKeeper card with any compatible memory card attached.

❑ An Apple 3.5 Drive.

❖ *Note:* The ≡Cache supports only the Apple Disk 3.5™ Drives (platinum). It will not cache the Apple II Uni-Disk™ 3.5 drives (white) nor will it cache 5.25" drives or hard disks.

Important: You must set Slot 5 in the Control Panel menu to the Smart Port setting.

❑ A COPY of the AW 2 Expander disk.

Installing the ≡Cache

You may have noticed that there are two AECACHE files on the AW2 Expander disk. One is for use with ProDOS 8 only while the other is for use with both ProDOS 8 and 16. First, decide if you'll be using ProDOS 8 only or ProDOS 16 only or if you'll be switching between the two, then follow the appropriate directions below.

ProDOS 8 Only

If you plan to use only ProDOS 8:

1.) **Boot your COPY of the AW 2 Expander disk**

2.) **Select AE Cache from the AW 2 Expander main menu or execute the file, AECACHE.SYSTEM.**

While executing, the program will display the Æ startup screen accompanied by the message:

```
INSTALLING....
```
at the bottom of the screen.

If the ≡Cache program does not find a properly installed RamKeeper or GS-RAM card it will print the following message to the monitor:

```
          REQUIRES GS-RAM
     OR RAMKEEPER W/ MEMORY CARD
     IN IIGS MEMORY EXPANSION SLOT
```

❖ *Important:* Switching from ProDOS 8 to ProDOS 16 with AECACHE.SYSTEM operating will cause unpredictable results. If you want to switch between operating systems, follow the directions for ProDOS 8 and ProDOS 16 following.

ProDOS 16 and ProDOS 8 or ProDOS 16 Only

If you'll only be using ProDOS 16, or if you'll be switching between 16 and 8, use the IIGS Finder or System Utilities to copy the Aecache.Setup file (from the AW 2 Expander disk) into the System.Setup folder located within the ProDOS 16 System folder on your boot disk(s) (see below).
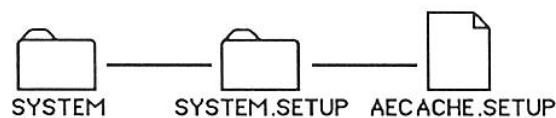
SYSTEM   SYSTEM.SETUP   AECACHE.SETUP
Where the file goes

Booting these modified disks will load the AE Cache option into your Classic Desk Accessories menu.

❖ *Note:* You must cold boot into ProDOS 16 to enable the AECACHE.SETUP file to work under both systems. You can then switch between ProDOS 8 and ProDOS 16 without deinstalling or reinstalling the ≡Cache
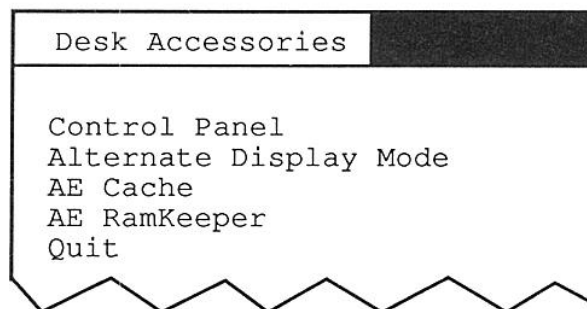
If the ≡Cache program does not find a properly installed RamKeeper or GS-RAM card, the AE Cache option won't appear in the Desk Accessories menu.

Setting the ≡Cache Size

Once the Æ ≡Cache is installed, it will automatically increase your productivity. All you need to do is decide how large you want the ≡Cache to be.
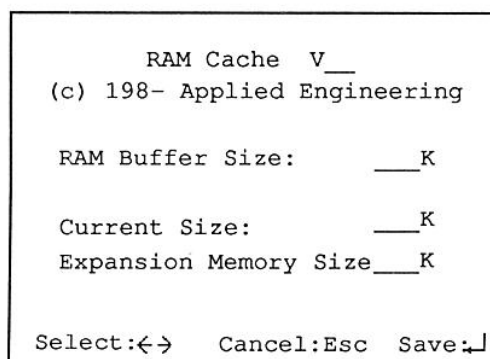
1.) **Access the IIGS Classic Desk Accessories Menu.** (🍎-Control then Esc). You should see a menu much like the one below. (Yours may be slightly different according to the Classic Desk Accessories you have loaded.) Notice the new option -- AE Cache.

```
┌─────────────────────────┬───────────┐
│  Desk Accessories       │███████████│
├─────────────────────────┴───────────┤
│                                      │
│  Control Panel                       │
│  Alternate Display Mode              │
│  AE Cache                            │
│  AE RamKeeper                        │
│  Quit                                │
│                                      │
└──╲────╱────╲────╱────╲────╱────╲─────┘
```

Classic Desk Accessories Menu

2.) **Select the new option** using the arrow keys and return. You'll see the RAM Cache menu. (See illustration.)

3.) **Change the size of the RAM buffer** to the size you want by pressing the right and left arrow keys to increase and decrease. You don't have to power your computer down and back up to change the size of the cache. Simply select the size you want then press return. If you access the AE Cache option again, you will see that your new setting has taken affect.

```
┌──────────────────────────────────────┐
│          RAM Cache   V__             │
│     (c) 198- Applied Engineering     │
│                                      │
│     RAM Buffer Size:        ___K     │
│                                      │
│     Current Size:           ___K     │
│     Expansion Memory Size___K        │
│                                      │
│                                      │
│    Select:←→   Cancel:Esc  Save:↵    │
└──────────────────────────────────────┘
```

RAM Cache Menu

4.) **Change the size of the RAM buffer** to the size you want.

Press the right and left arrow keys to increase and decrease the RAM buffer size. You don't have to power your computer down and back up to change the size of the cache like you do when you change the size of a regular RAM Disk. Simply select the size you want then press return. If you access the AE CACHE option again, you'll see that your new setting has taken effect.

Setting the RAM Buffer Size

The Expansion RAM Size: heading displays the entire amount of memory on the memory expansion card. If another program or utility is using some of the extended memory, the RAM Buffer will not be able to use all of the memory indicated by the Expansion RAM Size:. But it can use the free memory available at that time for a RAM Buffer. If you request more memory than is free at the time, the *Cache* will use as much free memory as is available. The *Cache* won't automatically fulfill your size request once the memory becomes free. If a program frees any memory, you can use that memory as a RAM Buffer by resetting the RAM Buffer Size in the AE Cache option in the Desk Accessories menu.

Removing the *Cache*

To remove the *Cache* from the system:

ProDOS 8

Cold boot your computer by doing either of the following:

⇨ Press and hold down the control and open-apple keys (🍎 - Control)while pressing and releasing the reset key.

⇨ Power down--turn off the computer, then power up--turn it back on.

After you cold boot, access the Desk Accessories menu and note that the AE Cache option is gone.

ProDOS 16

Remove the AECACHE.SETUP file from the System.Setup file and reboot or cold boot from a boot disk that doesn't have the AECACHE.SETUP file installed.

About the ≣Cache

Part of the reason the Æ ≣Cache is so incredibly fast at retrieving information is that it allows ProDOS to read a whole track every time it accesses the disk drive instead of reading individual blocks. This method, called, "track caching," makes even the initial read much faster--up to twice as fast as a system without a cache. All subsequent calls are sped up even more because the system does not have to access the disk drive every time you request information. In fact, subsequent accesses are often faster than accesses from a RAM Disk!

The ≣Cache installs itself onto the Smart Port and will operate with ProDOS 8, ProDOS 16, Apple Pascal 1.3, and Æ's PC program for CP/AM. It uses some of the expanded memory for itself plus the amount of memory you allocate to it.

When the cache program reads a track, it stores the entire track in the Track Buffer and stores the block(s) containing the requested information in another buffer, the Cache Buffer. You can set the Cache Buffer to the size you want, depending upon the memory size of your GS-RAM card and how much of that memory you have allotted for use as a RAM Disk. When the Cache Buffer becomes full, it will make room for the most recently requested data by replacing the blocks that have been stored in the buffer the longest without being accessed. The Track Buffer is not variable; it is large enough to hold one track (6K) and cannot be changed.

When you call for information, the system first looks in the Cache Buffer. If the information is there, it reads it with speed comparable to (often even faster than) reads from RAM Disks and internal hard disks. If it doesn't find the information in the Cache Buffer, it checks the Track Buffer. This takes very little more time than reading from the Cache Buffer because the system is still not required to read the disk drive.

If the information is not in the Track Buffer, the system will then go back out to the disk drive, find the information and read the entire track to the Track Buffer. This new track replaces the track currently held in the Track Buffer.

While this method actually goes through more steps than a non-cached system to get information that is not stored in the buffer, the actual time it takes the system to check the Cache Buffer and Track Buffer is insignificant.

Copy Protected Programs

Some copy protected programs have a disk accessing function of their own and cannot use the ≡Cache. However, most programs will use the cache with no problem.

2) put files within subdirectories like putting documents in folders

3) put subdirectories within subdirectories like putting folders within folders.

Pathname

The name of the directory combined with the names of one or more subdirectories is called a pathname. Volume names and subdirectory names are preceded by a slash, "/". (Note that some applications add the slash for you.) For example, you could have a volume named /MY.DISK and have a file, called /MY.FILE on the root directory of that disk. To access that file, you would use the pathname /MY.DISK/MY.FILE. You could also have a file, /JUL.AUG in a subdirectory (folder) called, /PHONE on a disk called /BILLS. To access that file, you would use the pathname, /BILLS/PHONE/JUL.DEC. Refer to the diagram below.
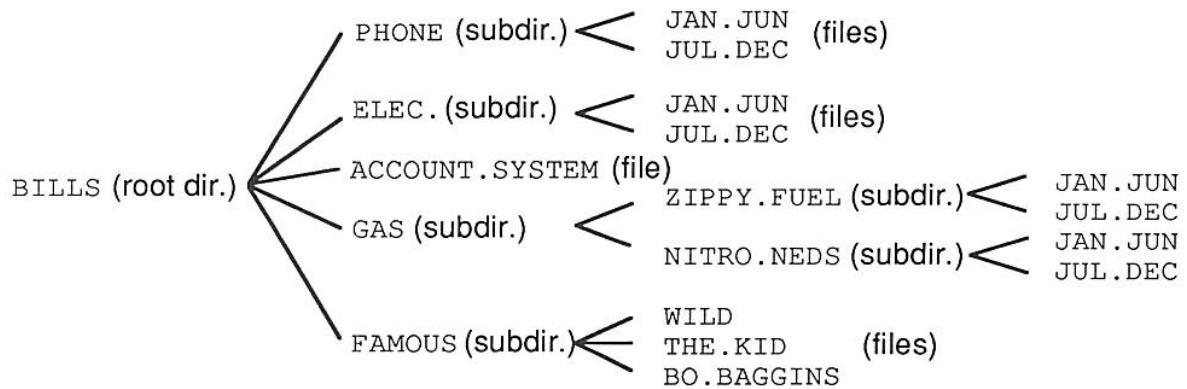
ProDOS Directory Structure

Now when an application asks you for the pathname of a file, you'll have a basic understanding of what it expects.

System Files

A system file is a ProDOS file that starts an application. Typically, these files have the suffix, .SYSTEM (e.g. /APLWORKS.SYSTEM, /ACCOUNT.SYSTEM [see above], etc.). When you boot ProDOS, it runs the first system file listed in its directory. So, if BASIC.SYSTEM is the first system file on your ProDOS boot disk, ProDOS will boot then put you in BASIC.

Additional Resources

The following books are available through most Apple dealers:

Apple II Owner's Manual (Apple Computer, Inc.) Supplied with your Apple Computer. Take the time to read it.

Basic Programming with ProDOS (Addison-Wesley Publishing) Gives a detailed explanation of how to use ProDOS from AppleSoft Basic.

Beneath Apple ProDOS (Quality Software) Provides information about ProDOS for both the novice Apple user and the advanced programmer.

ProDOS Inside and Out (TAB Books) Vary good book for both the beginning and advanced BASIC Programmer.

ProDOS User's Manual (Apple Computer, Inc.) Provides an overview of ProDOS and explains how to use the ProDOS User's Disk.

APPENDIX B

Copying Disks with Filer

We have included Filer, a utility program, on the AW 2 Expander disk to enable you to make backup copies of your disks that are not copy protected. The instruction below tell you how to use Filer to copy from disk to disk. See Chapter 2 for instructions on using Filer to copy AppleWorks to your RamFactor.

1. Load Filer.

2. Select "Volume Commands" (V).

3. Select "Copy a Volume" (C). The settings default to a two drive set up with your master in Slot 6 Drive 1 and your copy disk in Slot 6, Drive 1. Adjust to your set up. (If you only have one drive you can copy from S6, D1 to S6, D1.)

4. Press return to accept the default settings or enter your own.

5. Insert the <u>master</u> disk in your drive that you have set the program to copy from. Insert a <u>blank</u> disk (it does not need to be formatted) in the drive you have set the program to copy to. The blank disk must have the write protect tabs removed.

6. Press the Return key.

7. Name your volume. It will default to the name of the master disk (ex: When copying AppleWorks, the volume name will default to "/APPLEWORKS"). Hit return or give it a different name.

8. When you press return, the copy program will begin formatting the copy disk. Then the words "READING" and "WRITING" will flash on and off the screen to entertain you while you wait.

9. When the program is finished copying AppleWorks, it sends the message, "COPY COMPLETE" to the screen.

10. Remove both disks. Put your master disk in a safe place and label your copy disk. You will make your modifications to the copy disk.

For additional help with the Filer program, contact your Apple dealer.

Appendix C

Bird's Better 'Bye'

Several of the Applied Engineering distribution disks contain a modified version of ProDOS 8. It incorporates a program selector, Bird's Better 'Bye' (created by Alan Bird), that lets you exit one system file and easily run another system file (e.g. APLWORKS.SYSTEM, BASIC.SYSTEM, FILER) from a menu.

To use this 'BYE' command, boot your copy of the Æ disk or copy the 'PRODOS' file from the Æ disk to your boot disks. Then, anytime you quit a system program (such as AppleWorks), a menu of all the executable System files on that disk will be displayed on the screen. This menu can also be called from the Applesoft BASIC prompt by entering the 'BYE' command.

```
                ESC: CHANGE VOLUME
                RETURN: SELECT FILE


     /AW2.EXP
           PRODOS
           AE.AW.SYSTEM
           FILER
           GSTEST.SYSTEM
           RWTEST.SYSTEM
           RFTEST.SYSTEM
           AECACHE.SYSTEM
```

Sample screen display

The sample screen above shows the AW 2 Expander disk on-line and lists its executable System files.

Use the up and down arrow keys to highlight the selection you want to run. The ESC key will change the volume (disk) selection to the next on-line volume. The Return key selects the currently highlighted file or subdirectory name.

Subdirectory names on the disk will be indicated by a '/' as the first character of the file name.

APPENDIX D

Getting Help

If you have a technical question relating to your RamKeeper card <u>that is not covered in the manual</u>, please contact the dealer from whom you purchased the card. If you are experiencing difficulties with one particular program, contact the program's author or publisher.

In the event that the dealer or the publisher's support personnel cannot answer your question, call Applied Engineering Technical Support. The support representatives are experienced in the applications and uses of Applied Engineering products, but in order to provide a quick and effective answer to your question, they will need to know as much as possible about the hardware and software specifically related to your question. Please provide the technical support representative with the following information:

◊   The Applied Engineering product related to your question and its revision number.

◊   The original and current memory configuration of the card (if applicable).

◊   The model and revision of your computer.

◊   What peripherals are being used and what cards are in each slot.

◊   The name, version, and revision level of the software that you are experiencing problems with.

◊   The results of any test programs, diagnostics, or troubleshooting done by you, your dealer or your software publisher's support department.

Applied Engineering
Technical Support
(214) 241-6069
9 AM to 12:30 PM & 1:35 PM to 5 PM(CST)
Monday Through Friday

(Please call only the number above for technical support. Our sales office cannot transfer calls to the support lines.)

Returning a Product

Include

If your product needs to be returned, the technical support representative will give you a Return Material Authorization (RMA) number.

❑ Record the RMA number for your own records.

❑ Write the RMA number on the outside of the package you send to us.

❑ Write the RMA number at the top of the return form included with your product package.

Fill out the Return Form on back of the yellow sheet marked, "Attention!" A correctly completed form will greatly reduce the time it takes to process and return your product.

Attach a copy of your original invoice to the return form.

❖ *Warning:* If you don't include an invoice products will be treated as out of warranty products and will be returned to you C.O.D. for the amount of the service charge.

A completed form should look something like the one below.

When You Ship

If you don't have the original packing material, wrap the board in anti-static material (preferably the anti-static bag in which the card was originally shipped, however, aluminum foil will work fine). Pack it in a sturdy box cushioned with wadded papers (i.e. used computer paper or newspaper).

❖ *Warning:* If your product is damaged due to inadequate packing, your warranty will be void.

Include the return form and invoice.

Send the package, shipping prepaid, to:

RMA#__?__
Applied Engineering
Technical Support
3210 Belt Line Road, Suite 154
Dallas TX 75234

You should insure your package. Æ will not assume any responsibility for inadequate packing or loss or damage during shipping.

When We Receive

Our service department will use your completed form in an attempt to duplicate the problem.

If it is determined that your product is defective due to a manufacturing defect, your card will be repaired or replaced at Æ's option.

Any misuse, abuse, or non-Æ authorized alteration, modification and/or repair to the Applied Engineering product will void the warranty. This warranty will also be void if you use the Æ product for any purpose other than its intended use.

Your product will be fully tested before it is shipped back to you, transportation prepaid, via UPS regular delivery.

Once your product is received by Technical Support, it will be processed and delivered to our shipping department within 7 to 10 working days.

NOTES

NOTES

CHAPTER FOUR

AW 2 Expander

The AW 2 Expander is an accessory program designed to compliment Applied Engineering memory expansion products. It modifies the AppleWorks™ program to recognize and use the additional memory provided by these products.

The AW 2 Expander program will enhance AppleWorks USA version 2.0, German 1.4, and French 1.4.

Before You Even Think of Modifying AppleWorks...

If you are familiar with AppleWorks, you'll probably be tempted to use the AW 2 Expander without reading these instructions. Resist the temptation. Or at least read the following.

*   AW 2 Expander does not support AppleWorks versions 1.0 through 1.3.

*   These instructions assume that you already know how to use AppleWorks. The AW 2 Expander program uses the same screen displays and keyboard input routines ("user interface") as the AppleWorks program. If you need a quick review, read Throughout AppleWorks in your Using AppleWorks manual.

*   There's an AppleWorks Word-Processor file on the AW 2 Expander disk entitled "READ.ME." Please do so. This document contains information about any recent changes to the software or updates to the documentation.

*   Apply the AW 2 Expander modifications only to **unmodified BACKUP copies** of your AppleWorks startup and program disks. Modifications required by other programs should be done after executing the AW 2 Expander enhancements.

AppleWorks Modification Instructions

This is how to use the AW 2 Expander to modify the AppleWorks disks:

1. First, make copies of your original AppleWorks disks. "Filer ," provided on the AW 2 Expander disk, or the copy program on your System Utilities disk should be used for this purpose.

2. Boot the AW 2 Expander disk in your startup drive.

3. Select option 1 - "Execute AppleWorks Enhancements."

4. The Applied Engineering AW 2 Expander copyright screen will then appear. After reading each of the screens, press the space bar to continue.

5. You will now be prompted to remove the AW 2 Expander disk and insert a COPY of the AppleWorks STARTUP disk in drive one. Be sure the WRITE PROTECT tab has been removed from the disk. As prompted at the bottom of the display screen, press the space bar to continue or the escape key to go back to the main menu.

The AW 2 Expander program expects to find the AppleWorks STARTUP file, "APLWORKS.SYSTEM," on the disk in drive one. If, at this point, the program displays the following message:

```
Cannot find correct file
Please enter the prefix of the AppleWorks program
?
```

Enter the complete ProDOS prefix of the AppleWorks STARTUP disk. Be sure to include any (/) slashes for subdirectories.

An example ProDOS prefix of an AppleWorks subdirectory on a Apple 20 SCSI hard disk (with a volume directory name of /HARD) might be:

```
/HARD/APPLEWORKS
```

6. The program will then give you a list of the modifications that it will make to your AppleWorks disk(s) and ask you if you want to continue. If you want to go ahead and make these modifications to your AppleWorks disk(s), hit the "Y" key. If you do not want to make these modifications, hit the "N" key to return to the main menu.

7. After the STARTUP disk has been successfully modified, you may be prompted to remove it from the disk drive and insert a COPY (write enabled) of the AppleWorks PROGRAM Disk. The volume directory name of this disk must be the same as the STARTUP disk. Press the space bar to continue.

8. When the modification to the AppleWorks PROGRAM Disk has been completed, the program will prompt for a key press to quit. Press the space bar and the modified AppleWorks can then be booted in the normal manner.

Setting the AppleWorks Enhancement Options

Boot the AppleWorks startup disk just like you normally would. (Notice that the AppleWorks version number near the lower right corner of the startup screen now has an "A" tagged onto its end (Ex: 2.0A). If it does not have an "A: appended to the version number, it has not been modified correctly.

When the startup disk has finished loading, remove the startup disk and insert the program disk, but DO NOT press return. Press [ESC] instead. If you're booting AppleWorks from a UniDisk 3.5 or a hard disk, press [ESC] when you are prompted with: "Press the Space Bar to continue."

❖ *Note:* It's not necessary to access the Getting Started options menu each time you boot AppleWorks. The Getting Started menu is only used to set the enhanced AppleWorks options.

The current enhancement-options configuration will be read from the parameter file (SEG.PR) on the AppleWorks program disk and displayed in the Getting Started option menu. The configuration shown contains the default settings. These default settings remain in effect until you change them and save the new configuration back to the AppleWorks program disk.

```
File: None                    GETTING STARTED
================================================================================

    ┌─────────────────┐
    │ Getting Started │
    ├─────────────────┘
    │
    │   1. Maximum Records/Lines(RW)         12,000
    │   2. Preload AppleWorks onto Memory        On
    │   3. Printer Buffer(RW)                   Off
    │   4. Buffer Size(GS)                      0 K
    │   5. Reserved RamFactor Size (RF)         0 K
    │   6. Time Display                         Off
    │
    │   7. Save Configuration
    │   8. Continue with AppleWorks
    │
    │
    │
    └──────────────────────────────────────────────
```

```
Type number, or use arrows, then press Return     1113K Avail.
```

The Getting Started options menu

❖   *Note:* The options followed by (RW) are for RamWorks and Z-RAM products only. Those followed by (RF) apply only to the RamFactor. (GS) applies to the IIGS only.

Use the up and down arrow keys (⬆ ⬇) to highlight the option you want. Use ⌐Return⌐ to select a highlighted option. For more information on the options, refer to the section entitled *About the New Features*. When you have made the desired changes, save the new configuration back to the AppleWorks program disk by selecting the menu option Save Configuration.

Choose the option, Continue with AppleWorks. If you didn't save your new configuration, the new one will be in effect only until you quit the AppleWorks program. The next time you boot AppleWorks, the previous (saved) configuration will be used.

About the New Features

The following paragraphs describe the new features of the enhanced AppleWorks and the instructions for using them. Please read this section very thoroughly.

More Word-Processor Lines and Database Records

With sufficient memory, the maximum number of Word Processor lines available with the unenhanced AppleWorks 2.0 is limited to 7,250; the maximum number of data base records is 6,350. The enhanced version expands the maximum number to just over 22,600 apiece.

The enhanced AppleWorks, when RamKeeper with a GS memory card is installed, automatically sets the number of lines and records to the maximum (22,600).

Clipboard Expansion

The standard AppleWorks clipboard (2.0) is limited to only 255 lines of information. The enhanced AppleWorks clipboard expansion increases the clipboard size for the Word Processor and Database functions to 2,042 lines. Only clipboard activities within and originating from the Spreadsheet function remain limited to 250 lines.

Printer Buffer Option

The Apple IIGS has a built-in print buffer which can be activated from the Apple IIGS Control-Panel menu. You may select the "On" setting from the `Printer Buffer` option but the buffer will be functional only if you have selected it from the `Control Panel` option. If you'd like to know more about the internal printer buffer, please refer to your <u>Apple IIGS Owner's Guide</u>.

Buffer Size Option

The `Buffer-Size` option of the `Getting Started` options menu affects the size of only the Apple IIGS' internal printer buffer.

❖   *Important:* If any amount of memory is allocated to the `Buffer Size` option, the printer buffer setting is shown to be "On." However, it will not actually be on if not selected from the `Control Panel` menu.

The `Buffer-Size` option of the enhanced AppleWorks `Getting Started` menu lets you allocate the amount of Apple IIGS memory space (up to 64K) to be used for the print buffer. With the Apple IIGS print buffer ON and the `Getting Started Buffer Size` option set to 0 K, the actual buffer size will be determined by the amount of memory (2K or less) that the Apple IIGS memory manager can allocate.

Time Display/Database Time-Stamp Option

This option will read the output of the Apple IIGS internal clock and replace the "Open-Apple-? for Help" message in the bottom line of the AppleWorks screen with a current date and time display. This option also allows the AppleWorks user to enter the current date or time into a database category by typing the @ character as the only entry in that category. The category name must contain either the word DATE or the word TIME but should not contain both. For example, you should not use this feature in a category named, "Date and Time."

❖ *Note:* To use the internal clock of the Apple IIGS, the enhanced AppleWorks must be run under ProDOS 8 or 16, not ProDOS 1.1.1. (See your Apple dealer for ProDOS upgrades.)

The Getting Started options menu allows 12 hour or 24 hour time and date display. How the date is displayed on the screen is affected by the time display option selected.

The 12-hour (USA format) option displays the date as Month/Day/Year.

The 24-hour (French, German, and military format) option displays the date as Day/Month/Year.

Multiple-Disk Save

Data storage problems arise when the size of a file on the Desktop exceeds the amount of storage space on the data disk. A standard floppy disk can store only 135K of AppleWorks data. Using the modified AppleWorks, Desktop files larger than the available disk space will be segmented, or "split" and saved in sections to two or more disks. The following paragraphs explain how to use this feature to save and load segmented Desktop files.

This seems to be a good time to remind you of Murphy's
Law:

Whatever can go wrong will go wrong.

Back up your Desktop files! A power failure will wipe out
anything currently on the Desktop! It's always a good idea
to have backup copies of your working data disks,
especially if you have large amounts of data stored on
them.

Saving Multiple Files to Disk

When saving a Desktop file which is larger than the data
disk space available, the enhanced AppleWorks will
prompt the user with the following message:

```
Segmented Desktop File...
Please insert NEXT disk with SAME
VOLUME NAME
```

❖   *Note:* If a previous version of the file already
      exists on the disk, AppleWorks will first ask you
      if you wish to delete the old file.

Remove the data disk from the current disk drive and
replace it with the next data disk. All segments of a given
segmented Desktop file MUST be saved on data disks
having the same volume (disk) name as the primary
(first) data disk. On subsequent data disks, each appended
file segment (sequential) will be automatically deleted
before saving a new segment.

If you discover that you don't have enough formatted
blank disks with the same volume name, don't panic!
Press *esc* then space to continue. Just use the AppleWorks
Disk Formatter utility under the "Other Activities" menu
before you begin to save your file.

Adding Multiple Disk Files to the Desktop

When adding multiple-disk or segmented files to the
Desktop, the file MUST be loaded from the data disks in
the same sequence as it was saved. AppleWorks will
prompt the user to insert the NEXT data disk(s) until the
file is completely loaded.

If you list the files on disks that contain segmented files
you'll notice that the first segment has the filename that
you gave it. The next segment (on the NEXT disk) will
have a ".2" appended to the end of your filename. The
next disk in the sequence will have a ".3" appended to the
filename and so on. In this way, AppleWorks helps the
user keep track of the segmented Desktop file sequence.
You'll probably want to label your data disks in such a way
that you too can keep track of the proper sequence. You
may segment up to 9 disks (".9) in this manner.

Print-File Cache

One small file (SEG.PR) on the AppleWorks program disk
contains special configuration information about such
things as your printer information, standard location of
your data disk, and enhancement options. The
unmodified version of AppleWorks leaves this
information on the program disk and is not preloaded
along with the program overlays.

When AppleWorks needs information from this file it
prompts you to reinsert the AppleWorks program disk.
The enhanced version of AppleWorks loads this file into
memory at startup and eliminates the need for the
program disk (until overlays are bumped from memory).
Only when you change the contents of this file does the
enhanced AppleWorks prompt you to insert the program
disk.

CHAPTER FIVE

Adding More Memory

Choices

Your GS-RAM can contain up to 1.5 megabytes using 256K RAM chips; GS-RAM Plus, up to 6 megabytes using 1 Meg RAM chips. Memory on both cards is organized into six blocks, designated blocks A, B, C, D, E, and F, shown in the illustration at the top of the next page. Each block consists of <u>eight</u> memory chips. You must add these chips in groups of eight, filling the blocks in order, A-F.

Selection of the proper memory chips for the GS-RAM and GS-RAM Plus can be a little tricky. There are several chip manufacturers and many different types and specifications of RAM chips available. GS-RAM requires 256K x 1 Dynamic Random Access Memory (DRAM) chips. GS-RAM Plus uses 1024K x 1 DRAM chips. For the 256K chips we recommend a speed specification of 150 nanoseconds or less (for example, -15, -12) and for the 1 megabyte chips, we recommend a speed specification of 120 nanoseconds or less (-12, -10). Both 256K and 1 Meg chips must support the "CAS before RAS" method of memory refresh. We have included a list below to help you decide which chips you should use.

You may be able to find memory chips with the proper specifications at some computer or electronics-parts stores. But we recommend that you purchase them from Applied Engineering. Applied Engineering receives bulk-quantity discounts on purchases of memory chips and can often offer them for less. Applied Engineering uses only the highest-quality memory chips and warrants them for a full 5 years. (Most electronics-parts vendors sell their chips "as-is.") We will not warrant chips purchased from other vendors. When you get ready for more memory, give Applied Engineering a call. You'll be assured of getting the right chips at the right price.

The chips listed below are the chips that we have tested
and know will work with the GS-RAM cards.

GS-RAM   GS-RAM Plus

Samsung   KM41256-15   Hitachi   HM511000-12
Hitachi   HM50256-15   HM511001-12
Intel   P21256-15   Toshiba   TC511000-12
Mitsubishi   M5M4256P-15   TC511001-12
Fujitsu   MB81256-15   OKI   MSM411000RS-12
OKI   MSM41256A-15AS/RS   MSM411001RS-12
               M41256A-15   NEC   D421000C-12
Micron Tech.   MT1259-15   D421001C-12
Toshiba   TMM21457-15
Texas Instr.   TMS4256-15NL
Motorola   MCM6256BP15
NEC   D41256-15 (if date code 87 or later)

DO NOT use the chips below on the GS-RAM:

AT&T   M41256PP15B
Toshiba   TMM41256-15
Siemens   HYB41256/7-15
OKI   M41256-15
NEC   D41256C-15 (if date code 86 or earlier)

Installing the Chips

There is nothing complicated about installing RAM chips
onto the memory expansion cards. Just follow these basic
guidelines:

- Fill the memory blocks in alphabetical order (i.e.
  fill block A, then block B, then block C...). Refer to
  the illustration below.
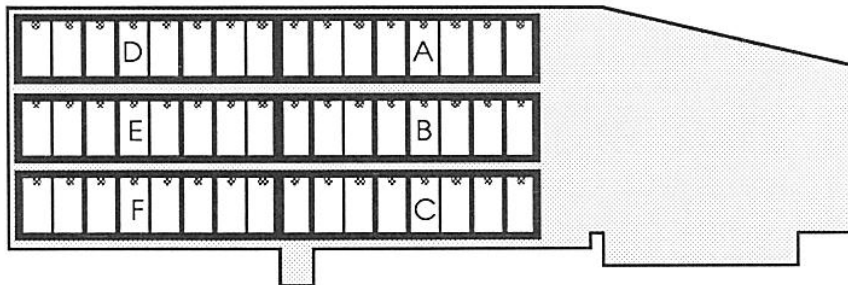
GS-RAM and GS-RAM Plus configuration:

- Handle the RAM chips carefully. Avoid bending
  the pins excessively. (Some bending may be
  necessary.)

- Make sure the notch (or dot, on some chips) is pointing UP, away from the gold edge-connector on the bottom of the card. See illustration below.

- Press down firmly on each chip to ensure that it is fully seated in its socket. Check closely for bent pins.

- ❖ *Warning:* Applying power to a chip that has been installed incorrectly can ruin the chip. Be sure to double check the orientation notch.

- ❖ *Reminder:* You may return your GS-RAM or GS-RAM Plus card to Applied Engineering for a memory upgrade with no additional charge for the installation or testing. Call the Applied Engineering sales office for the latest memory-chip prices and shipping instructions. The sales office telephone number is (214) 241-6060.

Appendix A

A Brief ProDOS Tutorial

This is a brief explanation of the <u>Pro</u>fessional <u>D</u>isk <u>O</u>perating <u>S</u>ystem, <u>ProDOS</u>, for those who are completely new to it. All of this information and more is included in your Apple Owner's Guide but we have provided it here for your convenience.

Operating System

ProDOS is one of several operating systems for the Apple. Others include DOS 3.3 and Pascal. Operating systems, as defined in the Apple Owner's Guides, are programs that control how information is loaded into memory, how the computer handles the information, how the information is stored on a disk and how the computer communicates with the printer and other peripherals.

Naming Volumes

ProDOS must have a way to locate which disk (often called "volume") you want to access. Instead of typing in the location of the disk as in DOS 3.3 (ex: S6,D1), you simply type in the name of the disk (the volume name). Some rules for volume names are:

1) Name can include letters, numbers or periods but not spaces
2) Name must begin with a letter
3) Name can be up to 15 characters long

These rules also hold true for subdirectory names.

Root Directory and Subdirectory

The main directory of the volume is called the root directory. The root directory uses the same name as your disk. Sub-directories are ProDOS' way of organizing information on a disk.

Think of the root directory as a file drawer and the subdirectories as folders within the drawer. You can:

1) put files directly into the root directory like putting documents straight into the file drawer