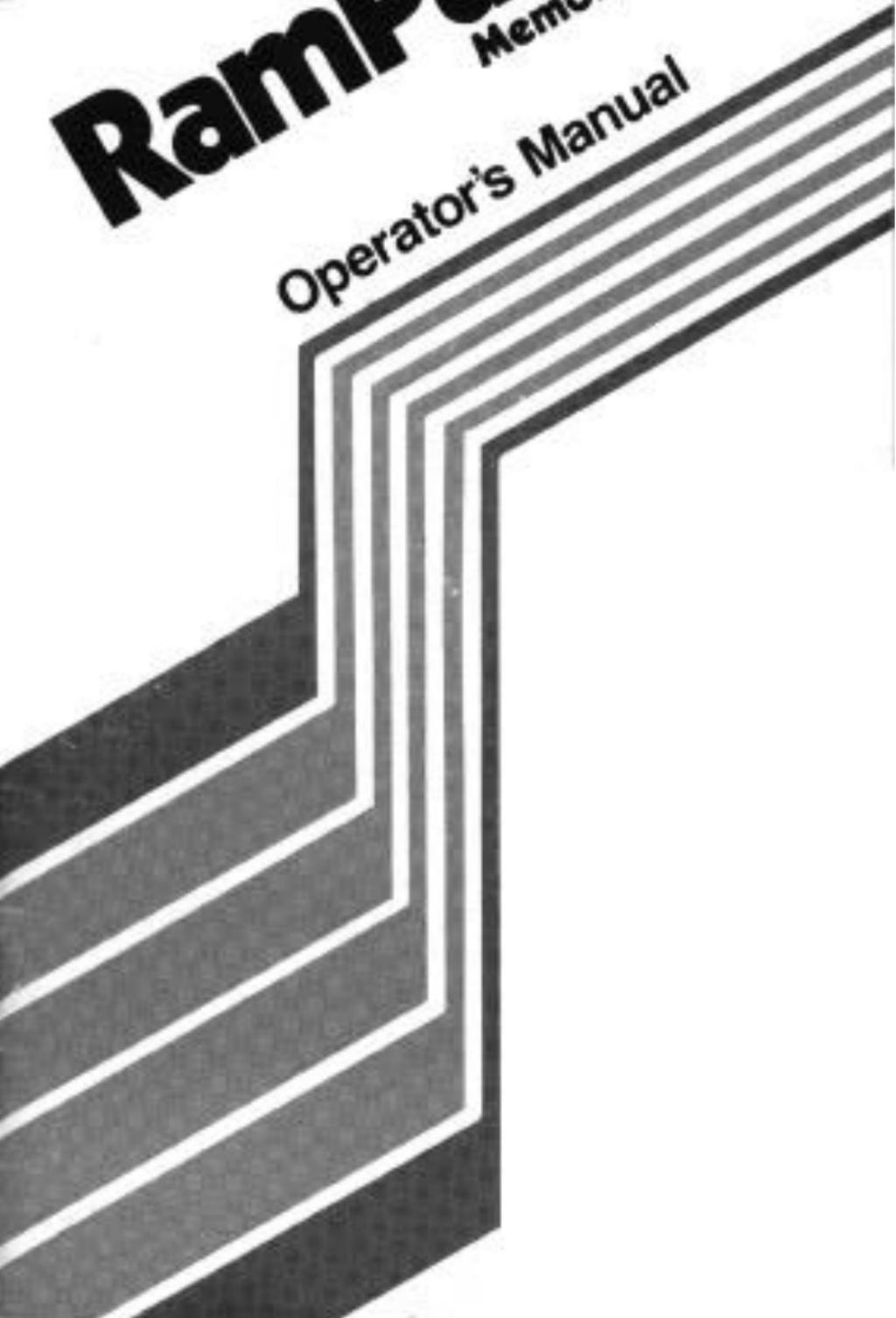


RamPak 4GSTM

Memory Sub-System

Operator's Manual



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RamPak 4GS

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INTRODUCTION

Congratulations! You have purchased one of the most powerful memory sub-systems ever developed for a microcomputer. With a full half-megabyte of memory standard, you will immediately expand your Apple IIGS to three-quarters of a megabyte - more fully addressable memory than ever before available on an Apple II. By adding additional chips, you can expand your RamPak 4GS to 4 megabytes, for computing power previously beyond imagination. The RamPak 4GS is designed to work only with the Apple IIGS, and not the Apple IIe, IIc, or any other microcomputer system.

The RamPak 4GS also includes powerful software memory management utilities to help manage your system. The RamPak utilities disk provides complete memory diagnostics, disk caching, and dynamic cache allocation. These features can be used to multiply your system's performance level many times over.

Acknowledgements

The RamPak Utilities Disk was written by Dan Hickey. This RamPak 4GS Operator's Manual was composed and produced with **Ragtime** Page Processing Software.

What's in the Box

Before starting the installation procedure, make sure you have everything. Your RamPak 4GS package should contain the following:

- 1 RamPak 4GS board with 512K installed
- 1 RamPak Utilities Disk (3.5')

If anything is missing, contact your dealer immediately. No other hardware is required, except, of course, the Apple IIGS itself.

Two Levels of RAMPAK 4GS Operation

As has already been mentioned, the RamPak 4GS offers both memory expansion and memory management for the Apple IIGS. Memory is expanded

automatically when the RamPak 4GS is properly installed in your Apple. Your computer knows to look for available memory every time you turn it on, so the RamPak's expansion benefits are immediately realized. Memory management is up to you. It is accomplished through use of the RamPak system utilities, which may be implemented at any time once the RamPak 4GS is installed. This manual is structured along these guidelines, beginning with the procedure to install and expand the RamPak card, then continuing with the proper installation and use of the utilities software. This will enable you to experience the advantages of an expanded system immediately, and to take advantage of efficient memory management as you wish.

INSTALLATION OF THE RAMPAK INTO THE APPLE IIGS

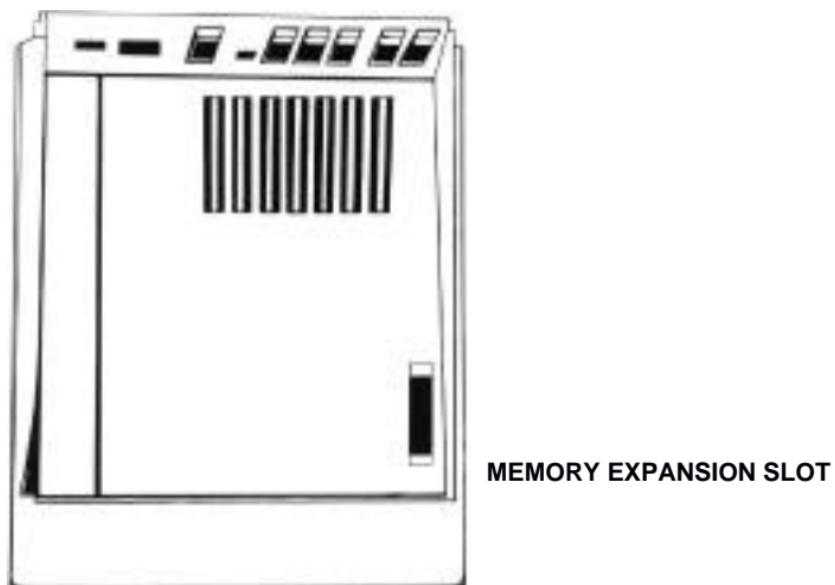
This section will instruct you how to physically install the RamPak 4GS in your Apple IIGS. Once this is completed, your Apple's internal addressable memory will be increased by the amount of RAM present on the RamPak 4GS. As both the Apple IIGS and the RamPak 4GS implement automatic memory configuration, no resetting of switches or jumpers will be required to recognize memory additions. Your system is smart enough to use whatever memory configuration you install.

Installing the RamPak 4GS requires no additional hardware. Simply clear a modest area around your Apple IIGS, and remove the monitor and any other devices from the top of the CPU.

1. TURN OFF ALL POWER TO THE APPLE IIGS SYSTEM AND UNPLUG CORDS. FAILURE TO DO SO MAY RESULT IN SEVERE DAMAGE TO YOUR COMPUTER, THE RAMPAK 4GS, OR BOTH.

2. Remove the cover from the Apple IIGS. Refer to your Apple manual for assistance if necessary. Be careful not to force any parts, as you may break your machine.

3. Touch the power supply of the Apple IIGS before handling the RamPak 4GS. Static charges may damage your RAM or other delicate electronic parts.
4. If you have purchased additional RAM for the Ram Pak, this must be installed before the RamPak is installed in your Apple. Turn ahead to 'Installing RAM Chips in the RamPak 4GS on page 5, follow the instructions, and return to step 5 below.
5. Locate the memory expansion slot. You will notice that the IIGS contains a row of seven expansion slots, with an eighth slot set out-of-line at the far right front of the machine. This eighth slot is the memory expansion slot to be used by the RamPak 4GS.



MEMORY EXPANSION SLOT

6. The Ram Pak 4GS must be installed with the sloped end of the card nearest the front of the IIGS. (The card is designed with a slope for users who have upgraded from an Apple IIe, retaining their original system enclosure). With the card so positioned, place the 'RamPak 4GS directly into the memory expansion slot and press down with a firm rocking motion. Continue until the card is firmly seated.
7. Replace the Apple IIGS cover.
8. Re-attach any disconnected power and peripherals.

By following this procedure you will have properly installed the RamPak 4GS, and any software designed to use higher RAM levels will now automatically take advantage of your powerful new system.

Installation Test

To be sure the RamPak 4GS is functioning properly, run the following short test:

1. With all drives empty, turn on the Apple IIGS. Press CTRL-RESET after the start-up cycle to generate a cursor.
2. When the cursor appears press CTRL- -ESC (pressing all three keys together and releasing CTRL last) to open the IIGS Desk Accessory menu. Select Control Panel with the up and down arrow keys and press RETURN.
3. Select RAM DISK with the up and down arrow keys and press return. The screen will now display the available system memory and the amount available for the RAM disk. Your IIGS will not use its 256K internal RAM for the RAM disk, thus the difference. If installation has been successful and no other software is currently loaded, the number shown as available for the RAM disk should be that of your RamPak 4GS memory level.
4. Exit from Desk Accessories by selecting QUIT from any visible menu and pressing RETURN.

INSTALLING RAM CHIPS IN THE RAMPAK 4GS

Your RamPak 4GS comes standard with 512K of system memory installed at Orange Micro. While this is more than enough power to run most applications, you may have a requirement for larger amounts of RAM, or for performance reasons you may wish to load several programs or large spreadsheets into memory at the same time. Additionally, many innovative new applications implementing integrated graphics are available or under

development which require large amounts of memory to load and run. For these situations, the RamPak 4GS provides expansion capability to 4Mb.

Your RamPak 4GS has been specifically designed for use with 256K x 4 DRAM chips. This allows you to expand at a rate of 2 chips (or 256K) at a time, as opposed to the 8 chip minimum expansion required by other available products. When purchasing your expansion chips, specify: **256K x 4, one megabit DRAMS, 150 nanosecond (or faster)**, or purchase your RAM expansion kits directly from Orange Micro. If it seems odd that 8 one meg' chips are needed to add one meg' of RAM to the system, refer to APPENDIX C, which offers a brief discussion of bits and bytes. Precise specifications of the RAM chips needed to expand the memory of your RamPak are found in APPENDIX D.

To expand your RamPak, you must first remove it from the Apple IIGS.

Be sure to disconnect the power from the Apple IIGS, since removing boards with power on can severely damage your equipment. Be sure to touch the power supply to discharge any accumulated static electricity.

Next, remove the cover from the IIGS. Locate the RamPak 4GS at the far right of the machine. Lifting upward with a gentle rocking motion, remove the RamPak 4GS from the Apple.

The RamPak expands in segments called BANKS. Each bank holds up to 1 megabyte when completed, so your first bank is already half full. If you examine the board you will see that the individual BANKS are clearly identified, zero through 3, along the right edge of the socket field. Each individual ROW of sockets is identified, A through G, along the left edge of the sockets. Each socket is also clearly marked in ascending order, U1 through U4, along the top of the socket field.

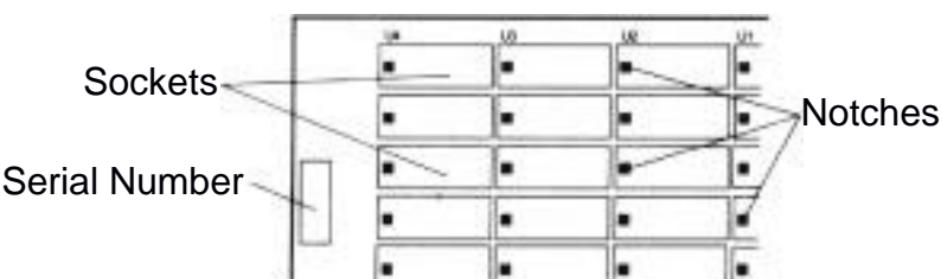
Memory expansion must take place in the order specified by the markings on the board. You must first complete BANK 0, beginning with sockets 1 & 2 and

ending with sockets 3 & 4, all of which are located in row A. You may then continue to BANK 1, row B, where the first chips will be installed in sockets 1 and 2. This right-to-left, top-to-bottom format is consistent throughout the expansion of the RamPak 4GS. Expanding in this way is necessary to allow RAM expansion without resetting switches or jumpers on the board or the computer.

Once you have identified the locations in which your new chips will be installed, note the notches (or dimples) molded into one end of each chip. These indicate the location of pin 1, which must be inserted into the proper location on the socket. You will also notice that each socket has a notch at one end. Your new chips should be installed such that all the above-mentioned notches line up, with the chip notches located nearest the serial number end of the RamPak 4GS board.

Before handling chips, touch any metal part of your Apple's back panel to discharge static electricity. To insert a RAM chip, first set the chip in the intended socket. If all the pins are resting properly in the socket, insert by pressing directly and evenly down on the chip until it is fully inserted. If the pins do not line up, you may have to bend them slightly before insertion. Very gently hold the chip by the pins between your thumb and forefinger and apply short squeezes until the pins are in the proper positions for socket insertion.

Once all of the chips are inserted, double check for bent or broken pins, and make adjustments or replacements as necessary. Then reinstall the RamPak 4GS using the installation instructions found on page 3, beginning with step 5.



RAMPAK MEMORY MANAGEMENT UTILITIES OVERVIEW

Included with the RamPak 4GS is a disk labeled Memory Management Utilities. This powerful software package will enable you to substantially increase your systems speed and performance through the use of disk caching and Dynamic or Manual Cache Allocation. The RamPak Memory Management Utilities also provide RAM Diagnostics and Memory Status reporting, helping to detect problems before they lead to data loss or damage.

If you wish, the RamPak utilities can be ‘transparent.’ The Dynamic Cache Allocation will automatically work for you, making your RamPak function at optimal levels without any extra work on your part. Using Dynamic Cache Allocation is recommended for most purposes. If, on the other hand, you wish to manually control the use of your RAM, then you may utilize the advanced power of the RamPak’s Manual Cache Allocation features.

All of the RamPak utilities are driven through easy-to-follow pull-down menus, which can be manipulated by using the mouse. This chapter will provide step-by-step instructions on installation and use of each RamPak utility. Instructions on RAM disk use can be found in your Apple IIGS owner’s manual.

INSTALLATION OF THE RAMPAK MEMORY MANAGEMENT UTILITIES

The following is an overview of the procedures for installing the RamPak Utilities on your Apple IIGS system disks. The RamPak Utilities may be installed on as many startup disks as you choose, since it is not copy-protected. It is highly advised that you immediately make a back-up disk of the RamPak Utilities disk, and regularly use the back-up disk to install the Utilities onto other disks. Retain the original RamPak Utilities Disk in case your back-up disk is damaged in any way. Please refer to your Apple IIGS owner’s manual if you are not familiar with the the Apple IIGS or the procedures for installing files on Apple IIGS disks.

VERY IMPORTANT: PLEASE READ CAREFULLY:

The RamPak Utilities work with ProDOS 16 or ProDOS 8, but they will **not** remain resident when your Apple IIGS switches between ProDOS 16 and ProDOS 8. Separate RamPak utilities for both ProDOS 16 and ProDOS 8 are provided on the Utilities disk. The ProDOS 8 version of the RamPak Utilities is named "**Cache.System**" and the ProDOS 16 version of the utilities is named "**Cache**." You must install the appropriate Rampak utility file on each startup disk, depending on whether your program is a ProDOS 16 or ProDOS 8 application. You should check the owner's manual of the application if you are not certain whether the program operates under ProDOS 8 or ProDOS 16. If you wish to continue to use your cache after switching operating systems, you will be required to reboot the Apple IIGS using the disk on which you have installed the appropriate RamPak Utilities.

Orange Micro will release an updated version of the ProDOS 16 utilities when ProDOS 16 2.0 becomes available. Please contact your dealer to obtain an update at that time.

Installing the Utilities on a ProDos 16 System Disk:

The RamPak Utilities can be installed on any ProDos 16 system disk. Using the Apple IIGS Desktop or your own copy utility, copy the file "**Cache**" from the RamPak Utilities disk to the "**System.Setup**" directory of any ProDos 16 system disk. The path to the "System.Setup" directory is "**/Name-of-your Disk/system/system.setup**". (Insert the actual name of your disk in place of "Name-of-your disk.")

Installing the Utilities on a ProDOS 8 System Disk:

To install the RamPak Utilities on any ProDOS 8 System Disk, use the Apple IIGS Desktop or your own copy utility to copy the file “**Cache.System**” from the RamPak Utilities disk as the first ‘system’ file on your ProDOS 8 system disk. The “**Cache. System**” file **must** be the first “system” file on your ProDOS 8 system disk.

STARTUP PROCEDURES USING SYSTEM DISKS WITH RAMPAK UTILITIES INSTALLED

To use your RamPak Utilities after you have installed them on either a ProDOS 8 or ProDOS 16 system disk, just reboot your Apple IIGS with the appropriate system disk and run your application.

NOTE: If you are using the Pro DOS 8 version of the utilities, you will be asked to enter the path name of the next application after the cache utility has loaded. At this time press the carriage return key, then enter the name of your application.

The RamPak Utilities are now installed as an Apple IIGS Classic Desk Accessory, accessible virtually any time you are computing. To access the RamPak utilities, type CONTROL-—ESC. This is done by first pressing the CONTROL key, holding it down, and pressing the  and ESC keys at the same time. This is the standard procedure for entering the Apple IIGS Desk Accessory Menu. You will note that “RamPak Utilities” is listed as one of the selections. Using the UP and DOWN arrow keys, you will see a highlight bar moving within the menu. Highlight (or select) “RamPak Utilities” and hit RETURN. You will soon be presented with the RamPak Memory Management Utilities menu screen, from which you can utilize the full power of the RamPak 4GS.

You may view the settings and statistics on the RamPak utilities at any time within the Desk Accessory

menu, but the disk containing the RamPak Utilities file must be in the drive in order to change settings.

How to Use Pull-down Menus

When you first enter the menu screen, you will see a bar across the top of the screen with several titles. These are your **menu titles**. Under each of these is a menu, which contains one or more **selections**. Some selections will open a **dialog box**, which will provide additional selections or allow the entry of data.

1. OPENING A MENU

Use the mouse to point at the desired menu. Then press the mouse button (click) and hold. You will now see the available menu selections. You may now make your selection, as explained below.

2. MAKING SELECTIONS FROM A MENU

Still holding down the mouse button, "drag" the arrow to the desired menu selection. Then release the button. This procedure, combined with 1 above, is called "clicking and dragging". Either a selection has been made, or a dialog box has been opened.

3. SETTINGS WITHIN A DIALOG BOX

For ON/OFF or YES/NO settings, point and click on the box in front of the selection. For settings where data must be entered, press the tab key and then use the keyboard to enter the data.

4. CLOSING THE DIALOG BOX

Point and click on the "CLOSE" box or the "OK" box. This will return you to the menu screen.

5. CLOSING THE MENU

Menu is automatically closed except when dragging to a menu selection.

6. EXITING TO ProDOS

Use above procedure to select either Done--Install Changes or Undo All Changes menu.

The Apple Menu

The Apple menu contains only two selections: 'About This Disk' and 'Troubleshooting.' Both of these are informational screens, requiring no other user interaction than clicking on the Close box when viewing is complete. Where applicable, use the scroll bars to advance to the next screen.

About this Disk

Displays information on the RamPak Memory Management Utilities, including revision number and copyright date.

Troubleshooting

Displays information on possible problems in the operation of memory products, and suggested solutions or information regarding these problems. This RamPak Operator's Manual also contains a troubleshooting guide, which may be found on page 19.

The File Menu

The FILE menu allows you to check status on RamPak settings, and to save or disregard newly made settings.

Show Settings

Displays current memory configuration. Shows whether allocation is manual or dynamic, amount of main memory, how memory is allocated to caches, RAM Disk cache pool and free program memory. Also shows the slot and drive number of all drives currently being cached. These memory options are discussed under the SETTINGS menu.

Show Statistics

Displays results of statistical monitoring of all disk Caches. Gives percentages of HITS over TOTAL READS, and shows current cache size. If this percentage is low, an increase in that cache's size is recommended. Statistics are enabled under the SETTINGS menu, and are discussed in detail under

The Concept of Statistics," on page 16 of this Operator's Manual.

Undo All Changes

Removes all settings made since last "DONE--INSTALL CHANGES. Returns you to the Desk Accessory menu.

Done--Install Changes

Exits from the RamPak utilities and returns to ProDOS, while installing all of your memory settings in your IIGS RAM. Your RamPak Memory Management Utilities disk MUST be in the drive to install.

This Menu will open a Dialog Box entitled 'Save Changes to Disk" which will allow you to select a memory-only installation or a Save-To-Disk. Save-to-Disk installs the changes on the disk so that they will be remembered at the next time you run your program. You will be prompted for the path name of the disk to which you wish to save the current changes. (Refer to the ProDOS manual for instructions on how to do this.)

The Diagnostics Menu

Like any electronic component, RAM chips do have a potential to fail or to develop problems. If such occurrences go undetected, you may lose or corrupt your data. To help detect RAM problems before they cause damage, the RamPak Memory Management Utilities include two levels of testing, which can be executed either at the start of every session or on an "as-requested" basis.

Quick Memory Test

Selects a superficial READ-WRITE test of all installed RAM. Any errors will be detected and reported by address location. The QUICK MEMORY TEST is good for general use, as it takes considerably less time than the EXTENDED MEMORY TEST, yet is highly reliable in detecting the existence of a problem.

Extended Memory Test

Selects a complete RAM test, including READ-WRITE test, test for proper RAM refresh, and a check for addressing errors. Bad chips are indicated by socket and row location (i.e. U4,D). In addition, all memory errors are reported by memory location. Bad chips generally require replacement. Remove the problem chip using a small screwdriver or other appropriate tool to pry the chip up, little by little, each end a little at a time. Refer to INSTALLING RAM CHIPS IN THE RAMPAK 4GS on page 5 for further instructions. The EXTENDED MEMORY TEST is recommended only when you suspect there is a memory problem, but the QUICK MEMORY TEST doesn't reveal a problem. The EXTENDED MEMORY TEST takes substantially more time to execute than the QUICK MEMORY TEST. The length of the test is dependent on the amount of RAM installed on the RamPak. Roughly 20 minutes is required to test a full 4 megabytes.

Execute Test Now

Performs test immediately, without exiting the program or installing any other settings. This is valuable when seeking a specific problem. For running a test as part of your routine memory set-up, simply select the desired test before using the DONE--INSTALL CHANGES selection under the FILE menu.

Selecting Execute Test Now opens the Memory Test dialog box. You will have the option of running the requested test one time, a user specified number of times, or loop forever. The user can exit Diagnostics at any time by pressing the "ESC" key.

The Settings Menu

Under this menu, you are able to configure the caching and statistical parameters of the RamPak, as well as allocate RAM among the various caching functions. But before setting up caches and using statistics, it is important to understand what they offer:

The Concept of Caching

Often, users confuse caching with RAM disks,

spooling or other memory functions. Other times, no effort is even put forth to understand caching, since the idea of altering the way your system handles memory really doesn't sound too "safe" anyway. Once understood and used effectively, disk caching will become a very powerful system enhancement for virtually any user. Your RamPak 4GS utility may be the most powerful, easy to use caching tool ever written for a microcomputer.

A cache is actually a disk drive enhancement. A cache is established and assigned to a specific system drive, to which it is then dedicated. Your Apple IIGS can access up to 16 drives in a single configuration, and the RamPak Memory Management Utilities has the ability to maintain caches for all of these drives.

"Cache" is a French word which means "hiding place." A disk cache is, in effect, a hiding place for important data. Once a cache is established, it serves as an intelligent storage area for that drive, holding as much of your "often used" data from that drive as possible in the system RAM you have specified. It achieves this by keeping track of what data you use most when you use that drive. As data is requested, the cache will load that data into RAM and keep it there as long as you are accessing it often. Once the cache is full, the least-used data will be removed from the cache. Since data held in RAM loads in an instant, without the physical spinning of drives, this leads to maximum speed and efficiency in running applications and accessing files.

The RamPak utilities offer you a choice of either "dynamic" or "manual" caching. Dynamic caching will automatically take over all caching functions for you, letting your memory operate at optimal levels with a minimum of interaction on your part. Dynamic cache allocation is recommended for most caching purposes. Manual cache allocation allows you to manually allocate the amount of RAM to be used for caching in each disk drive.

Caching is strictly a READ utility. Any data saved to disk is immediately written to the physical drive, so accidental loss of a cache will not result in lost work.

The Concept of Statistics

The RamPak 4GS Statistics Utility offers the user the ability to view the efficiency of the current cache set-up at any time. It will allow the user to view such items as the number of reads, reads to cached blocks (also called a HIT), the percentage of reads to hits (the cache efficiency), the number of buffers allocated to any drive, and how many writes to disk have occurred. And by using the RESET STATISTICS COUNTER TO ZERO feature under the SETTINGS menu along with MANUAL CACHE ALLOCATION, the user can fine-tune the operation of the system.

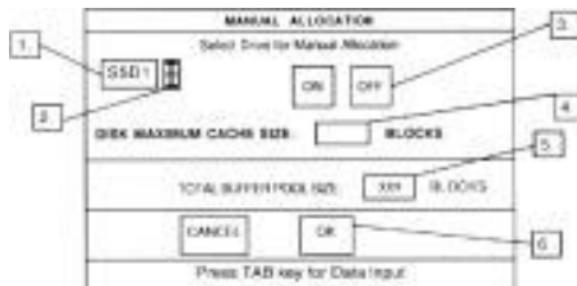
To use the Statistics Utility, the user should simply boot the system, then go to the SETTINGS menu and select STATISTICS. Then reset the statistic counters to zero, run the application for a period of time, and return to the SHOW STATISTICS dialog box under the FILE menu to view the accumulated statistics. If the percentage of reads to hits is low, then the cache size should probably be increased. If the percentage of hits to reads is close to 100%, you may wish to decrease the cache size, especially if program memory is in short supply. It is recommended that a minimum of 8 blocks and a maximum of 64 blocks be allocated for each drive to be cached. These selections can be made from the MANUAL CACHE ALLOCATION dialog box, also in the SETTINGS menu.

Manual Cache Allocation

This will open the Manual Cache Allocation dialog box, from which you control the use of your installed RAM. The upper portion of the box allows the setting of up to sixteen disk caches, one for each of the possible disk drives serving your Apple IIGS system. A box in the upper left indicates the drive for which a cache is currently being set (see  in the diagram below). This box should be displaying a value between SØD1 and 57D2. This indicates the slot and drive numbers of the drive to be cached, as your Apple IIGS has eight logical slot locations, each of which can address two drives. To the immediate right of this box are up and down arrows

Using the mouse to click on these arrows enables you to change the drive selection. Further to the right is

the ON/OFF selection , indicating whether or not a cache will be active on the specified drive. Again, pointing and clicking with the mouse will make the selection. After ON is selected, a cursor will appear in the DISK MAXIMUM CACHE SIZE box at the bottom of the cache section of the screen . Use the keyboard to enter the desired size of the cache. Click on the ON box a second time if you need to change the cache size to a different number. (“Blocks” are the recognized measure of disk storage. One block equals 512 bytes of RAM. A maximum size of 64 blocks is recommended, with a minimum of 8 blocks). In the TOTAL BUFFER POOL SIZE section of the screen you will notice that the amount of memory allocated to caching is updated as you designate disk cache sizes . Please note that the Total Buffer Pool Size defaults to automatically show the size of the current buffer pool, created via Dynamic Cache Allocation. When the desired settings have been made, click on the “OK’ box to return to the menu bar.



NOTE: The Total Buffer Pool Size is limited to 3.5 megabytes, or 65,535 buffers. During manual cache allocation, the Total Buffer Pool Size equals the sum of all the buffers allocated for all active drives. If this total exceeds 65,535, the display will show only the **difference** between the total number of buffers allocated and 65,535. In addition, the utility will only allocate this difference as the Total Buffer Pool Size. As a result, if the Total Buffer Pool Size displays fewer buffers than you have allocated, you should begin decreasing the number of buffers on each active drive until the Total Buffer Pool Size displays the sum of the buffers in all active drives.

Dynamic Cache Allocation

This selection will take over all the caching functions of the manual allocation menu for you, dynamically updating the allocations as appropriate for your

application. Dynamic Cache Allocation is recommended for most caching purposes. All that you manually need to allocate is the amount of RAM you wish to set aside for total system caching. A dialog box will appear asking for the number of **blocks** you wish to set aside as a total buffer pool size. One block equals 512 bytes of RAM. For example, 128 blocks equals 64K bytes of RAM. This memory will be unavailable to programs or other utilities. The default setting is 256 blocks, equaling 128K of RAM for caching. While the RamPak utilities default to specify that all drives will be dynamically allocated, the user may enable or disable the cache on specific disk drives, doing this by using the Dynamic Cache Allocation menu in the same manner as the Manual Cache Allocation menu.

As an example of Dynamic Cache Allocation, if you are running an application in which a large RAM cache would be beneficial on drive 2 and you currently have no cache specified there, the RamPak utility will automatically take RAM from other caches or from unused cache memory, and add it where it is needed. All Dynamic Cache Allocation is performed around your RAM disk. **All manual settings within the RamPak Utilities program are lost when Dynamic Cache Allocation is implemented.**

Statistics

RESET STATISTICS COUNTER TO ZERO

This selection resets statistic counters to zero. Sets Reads, Hits, % and Writes to Ø. This is useful for picking a starting point from which you can gather statistics about your cache.

DISABLE STATISTICS DISPLAY

Prevents you from viewing the Statistics' dialog box.

ENABLE STATISTICS DISPLAY

Enables you to view the Statistics" dialog box.

Abort Caches

Disables caching on all disk drives

APPENDIX A: TROUBLESHOOTING

If you have just completed installation of the RamPak 4GS and are experiencing problems, **turn off all system power** and remove the board from the Apple. Restart the Apple and repeat whatever steps led to the initial failure to verify that the problem is in the RamPak card. Reinspect all the RAM pins for full and proper insertion. If everything appears to be in order, contact your dealer immediately.

If you are encountering difficulties that you believe are RAM related, and your RamPak has been functioning properly since installation, begin by running the RAM Diagnostic utilities software provided with the RamPak. Details on running this application can be found on page 13. This procedure will tell you the status of all installed RAM and the location of any problem chips.

If the Diagnostics do not reveal problem hardware, this may indicate an incompatibility with some part of your RAM management utilities. While most software is expected to work in the Apple IIGS environment, even if it was developed solely for the Apple IIe, there is a possibility that this will not always be the case. If you are using your disk cache, RAM disk or any other RAM utility, like spooling, remove these utilities from operation and restart. If this solves your problem, it is probable that your software cannot run concurrently with one of the utilities in question. Re-install the utilities one at a time until the error reappears. This will isolate the problem product combination. Contact the manufacturers of the utility and software for further instructions.

If this does not provide an answer, but you still believe your problem is in RAM, **turn all system power OFF** and remove the RamPak from the Apple. Restart the Apple and repeat the procedure that lead to the problem to verify that the problem is in the RamPak. If it is, call your dealer or Orange Micro for assistance. If your Apple still exhibits the problem without the RamPak installed, contact your Apple dealer for service.

APPENDIX B: RAMPAK 4GS POWER CONSUMPTION

Independent of memory configuration:

<u>Power Supply Voltage</u>	<u>Current</u>
5 Volts	500 MA (Maximum)

APPENDIX C: BITS AND BYTES

This is not intended to provide anything more than a superficial understanding of bits and bytes and how they relate to RAM chips and memory expansion.

All computer data is made up of zeros and ones, or yesses and nos. This type of data is called **BINARY** by people who define such things, as the data can come in only two forms. When a computer deals with a single zero or one, this is called a **BIT**. Of course, a system had to be developed to allow computers to deal with diverse forms of information, so that zeros and ones could be translated into the letters, numbers and symbols required to deal with real problems. Most microcomputers, including your Apple II GS, read eight **BITS** together as a single piece of data. This unit of binary data is called a **BYTE**. In general, you can think of a **BYTE** as a character and a **BIT** as a building block.

Chips are generally measured by the number of **BITS** they can hold. For this reason, the chips on your RamPak are called 1-Meg Chips, even though you need eight of them to add a Mega^{BYTE} to your system. Since we now know that there are eight **BITS** in a **BYTE**, it is easy to see that you need eight mega^{BITS} to make one mega^{BYTE}.

If you are interested in learning more about RAM, Bits, Bytes and the science behind the computer, there are many good books and magazines available on the subject. Consult your dealer or visit your local library for more information.

APPENDIX D: SPECIFICATIONS OF RAM EXPANSION CHIPS

The technical specifications of the RAM chips used to expand the memory of the RamPak are as follows:
256K x 4, one megabit, 150 nanosecond (or faster), "CAS before RAS" refresh mode DRAMs.

APPENDIX E: GLOSSARY

BANK: 64K Bytes of memory.

BLOCK: A portion of data 512 bytes in length, as viewed from ProDos.

BUFFER: A designated area in RAM where a single ProDos block is stored if caching is active.

BUFFER POOL: A collection of contiguous buffers used by the cache program to store ProDos blocks.

CACHE: A storage area in RAM to eliminate disk access time for data.

CELL INTEGRITY: The ability of a RAM cell to accept and retain data, regardless of the data pattern or cell location. Also see DATA RETENTION.

DATA RETENTION: The ability of a RAM cell to retain data, without errors, when no memory accesses occur over a period of time.

DRAM: Dynamic Random Access Memory.

DYNAMIC CACHE ALLOCATION: Allows the program to allocate buffers from the buffer pool as required by the system. Additional buffers are automatically allocated to more frequently used drives.

HIT: An attempt to read a block from disk that has already been cached, thus finding the data in cache memory.

INTER-BANK ADDRESSING: Memory addressing that crosses a 64K byte boundary.

INTRA - SEGMENT ADDRESSING: Memory addressing that is within a 256K byte segment.

MANUAL CACHE ALLOCATION: Allows the user to specify exactly how much memory is used for each active drive used for caching. Only the number of buffers specified is used, and the cache pool size is set to the sum of all the buffers requested for each drive.

PATH NAME: A file name which includes all directory and sub-directory names separated by a "/" character, starting with the root directory and ending with the file name.

RAM: Random Access Memory.

LIMITED WARRANTY

Every RamPak board and disk is fully tested and checked for quality prior to shipment. The RamPak board is warranted to be free from defects in materials and workmanship for a period of **one (1)** year from the date of purchase. The original RamPak Utilities Disk is warranted to be free from defects in materials and workmanship for a period of **ninety (90) days** from the date of purchase. During these time periods, Orange Micro Inc. will, at no charge to the purchaser of record, repair or replace any defective unit returned to its Service Department in accordance with the following instructions:

NOTE: Do NOT return the RamPak to Orange Micro Inc. until you have received a Return Materials Authorization (RMA) number. Contact Orange Micro Technical Support at 714/779-2772.

1. Provide Orange Micro Inc. with: Model, Serial Number, Proof of Purchase with Date, Return Address, and preferred return shipping method. Enclose a clear description of the problem experienced and any sample printouts showing the problem, if possible.
2. Ship in the original carton or securely packed in a cardboard carton with at least two inches of cushioned packing material on all sides. Mark the package "FRAGILE" and clearly mark the RMA number on the box. Ship via UPS, Parcel Post, or Air Freight, insured and prepaid.

NOTE: Do not send COLLECT--collect shipments will be refused and returned to sender.

Orange Micro Inc. disclaims any liability to users of the RamPak for consequential damages of any kind arising from or connected with the use of the RamPak board.

This warranty is void in cases of misuse, abuse, abnormal conditions of operations or attempts to alter or modify the function of a part or assembly.

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