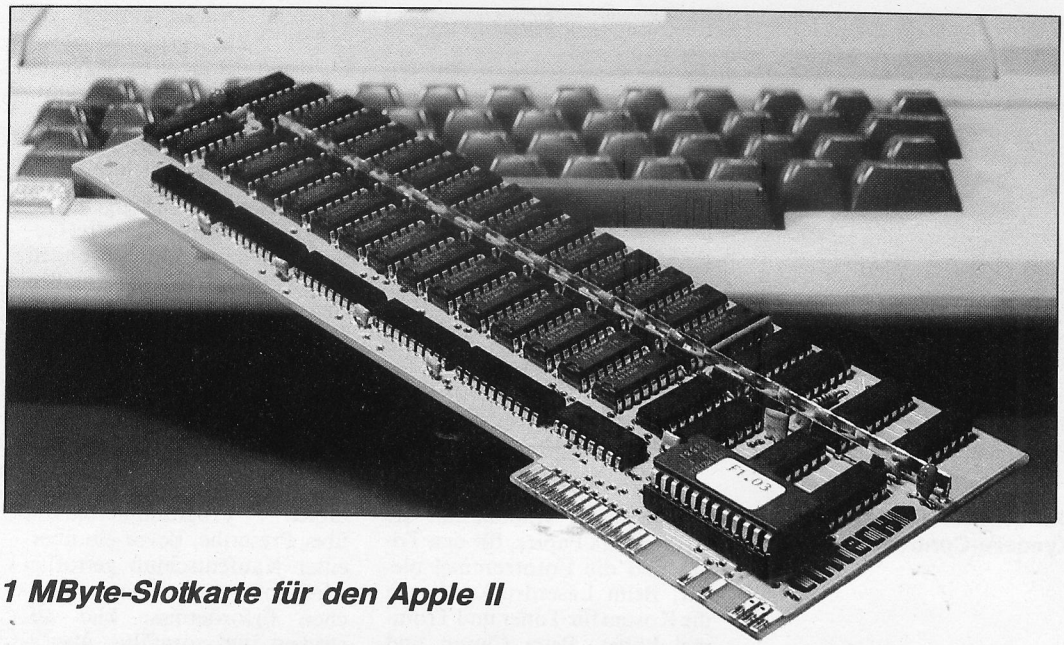


1 MByte-Slotkarte für den Apple II

Vier Betriebssysteme on board

Ilja Klück

Die 'Flipper-Karte' hat mit dem gleichnamigen Delphin wohl nichts weiter gemeinsam außer der Zahl mit sechs Nullen: der Serienheld begeisterte über eine Million Fernsehzuschauer, die Flipper-Karte bietet über eine Million Byte Speicher zum Einstecken in Apple-Computer.

Diese schnelle 1-MByte-Speicher-Karte arbeitet als RAM-Disk und unterstützt die Betriebssysteme ProDOS, DOS 3.3, CP/M und Pascal. Mit dem mitgelieferten 'Flipper-Programm-Manager' kann man den Speicher der Karte in bis zu vier Arbeitsbereiche einteilen, in denen jeweils verschiedene Betriebssysteme arbeiten können. Das Umschalten (flippen), Sichern und Laden der Arbeitsbereiche vollzieht der Programmm-Manager schnell und ohne Datenverlust.

In einer kurzgefaßten Broschüre werden die Installation und der Betrieb der Karte beschrieben. Voraussetzung für den Einsatz der Flipper-Karte ist ein Apple II+ oder ein Apple IIe und ein Diskettenlaufwerk.

Die Karte ist mit 32 × 256 KBit-RAM-Chips (150ns), einem 4-KByte-EPROM und weiteren 14 ICs bestückt, deren Aufdruck jedoch unkenntlich gemacht ist. Die EPROM-Software sorgt für die Initialisierung der RAM-Disks für die Slots eins bis sieben und bildet ein Interface zwischen dem Betriebssystem und der Flipper-Karte. Zusätzlich ist ein Speicher-Testprogramm im EPROM untergebracht.

Installation

Die Karte läßt sich in Slot eins bis sieben installieren; ist jedoch 23 cm lang und kann im Slot 7 an ein Laufwerk stoßen. Die Stromaufnahme hält sich mit etwa 250 mA in Grenzen, und eine übermäßige Wärmeentwicklung war auch nicht feststellbar. Da die Software für die Slots eins bis sieben im EPROM verfügbar ist, lassen sich bis zu sechs Flipper-Karten gleichzeitig im Apple installieren.

Nach der Montage sollte man den Speichertest aufrufen. Er läuft kontinuierlich durch und meldet sich alle 45 Sekunden mit 'OK'. Im Fehlerfall gibt der Test einen sechsstelligen Fehlercode aus, der jedoch nicht im Handbuch erklärt wird.

ProDOS

Unter ProDOS wird die Flipper-Karte automatisch aktiviert. Ein Profile mit dem Volume-Namen RAM5 steht mit 2047 freien Blöcken zur Verfügung. Mit dem File-Kommando lassen sich Programme und Daten auf die Karte kopieren.

Das Booten von der Flipper-Karte ist möglich, wenn man die Profile formatiert und BASIC.SYSTEM sowie PRODOS darauf kopiert hat. Allerdings sollte man dafür ein ProDOS 1.1.1 oder eine neuere Version benutzen – ProDOS 1.0.1 lieferte 4088 freie Blöcke und brach beim Kopieren ab.

Für das Programm Appleworks 1.3 liefert die Firma Cirtech einen Patch. Appleworks verfügt dann über einen Arbeitsbereich von 1012 KByte. Neuere Versionen des Flipper-Programms benötigen nach Anbieterangaben diesen Patch nicht mehr.

DOS 3.3

Nach dem Booten von DOS 3.3 wird die Karte mit IN#5 aktiviert. Zwei Laufwerke mit jeweils 50 Tracks zu je 32 Sektoren werden angelegt, 64 Sektoren sind für das DOS und das Inhaltsverzeichnis reserviert. Es stehen zweimal 1536 Sektoren für Programm und Daten zur Verfügung. DOS kann in der VTOC-SECTOR-SPACEMAP maximal 50 Spuren mit jeweils 32 Sektoren verwalten – das entspricht einem Speicherbereich von 400 KByte. Es werden also 800 KByte der Flipper-Karte vom DOS genutzt. 200 KByte sind frei, aber auf welchen Adressen? Das Handbuch schweigt sich hierüber aus.
Das mitgelieferte Programm FLIP kopiert DOS in die Flipper-Karte. Mit PR#5 läßt sich DOS nun vom RAM-Laufwerk aus booten. Mit dem Programm FID lassen sich Programme und Daten von Disk-Laufwerken in die zwei RAM-Disks kopieren.

Meine FID-Version M meldete nach 768 Sektoren 'Disk Full'. Nachdem ich den Fehler in der FID-Sektor-Allocation-Routine gefunden und behoben hatte, konnte ich jeweils 1536 Sektoren belegen.

CP/M

Cirtechs CP/M Plus, eine CP/M-3-Version für den Apple IIe mit einer 8-MHz-Z80-CPU, erkennt die Flipper-Karte automatisch und aktiviert sie.

Andere CP/M-Versionen aktivieren die Karte mit dem Programm FLIP.COM. Dabei wird die RAM-Disk mit 1016 KByte installiert und CP/M in die Flipper-Karte geladen.

Unter CP/M 2.20b steht Drive F: und unter CP/M 2.23 Drive D: zur Verfügung. Bei einem Warmstart greift CP/M direkt auf die Flipper-Karte zu.

Mit dem Programm PIP.COM lassen sich Daten und Programme auf die RAM-Disk übertragen.

Pascal

Pascal 1.3 erkennt die Karte automatisch als ein 'Block-

Volume' mit dem Namen RAM5. Die Karte muß sich aber in Slot 4, 5 oder 6 befinden.

Nach dem Formatieren und Übertragen der System-Files läßt sich von der Flipper-Karte booten.

Für Pascal 1.1 und 1.2 werden Installationsprogramme mitgeliefert.

Programm-Manager

Beim Laden einer 1-MByte-RAM-Disk mit Hilfe von Kopierprogrammen wie FID oder PIP muß man schon Geduld aufbringen, zehn bis zwanzig Minuten, je nach Größe und Anzahl der Files, muß man schon warten. Wenn man dann auch noch mit verschiedenen Betriebssystemen arbeitet, wird man beim Kopieren zum Diskjockey. Hat man sich mühsam eine große Datenbank auf der RAM-Disk aufgebaut, muß man sie zum Sichern auf Diskette erst wieder in kleinere Files zerlegen.

Abhilfe schafft hier der 'Flipper Programm Manager' (FPM). Nach dem Booten stellt er folgende Funktionen menügesteuert zur Auswahl: Einteilen der Flipper-RAM-Karte in bis zu vier Arbeitsbereiche mit den Größen 1 × 1016 KByte, 2 × 508 KByte, 2 × 340 KByte plus 336 KByte oder 2 × 256 KByte plus 2 × 252 KByte. Die verbleibenden 8 KByte sind jeweils für den FPM reserviert.

Den Arbeitsbereichen kann man symbolische Namen zuordnen. Ist noch kein Betriebssystem in einem Bereich installiert, fordert FPM dazu auf. Bei einem installierten System bootet FPM direkt aus dem Arbeitsbereich.

Die Arbeitsbereiche können von FPM einfach und schnell gesichert werden. Das Sicherungsprogramm berücksichtigt die Diskettenkapazität und fordert gegebenenfalls zum Disk-Wechsel auf. Eine Diskettenseite ist in etwa 20 Sekunden beschrieben.

Einen Speicherbereich kann man unter FPM mit den so erstellten Disketten laden.

Man kann einen Arbeitsbereich löschen.

Der FPM wird durch Booten von der Flipper-Karte aktiviert. Unter CP/M gibt das Programm EXIT.COM dem FPM die Kontrolle zurück.

1 MByte RAM

Die EPROM-Software ist zur ProDOS/Pascal-Schreib/Lese-Routine kompatibel. Im Handbuch wird die Parameterliste hierfür erläutert. Zusätzlich ist eine 64-KByte-Schreib/Lese-Routine auf ProDOS-MIL-Basis vorhanden.

Die externe 64-KByte-Speichererweiterung des Apple IIe wird voll unterstützt. Für den direkten Zugriff auf den Flipper-Speicher stehen vier Adressen zur Verfügung: drei Bytes für die RAM-Adressierung und ein Datenbyte.

Die Flipper-Karte besitzt Adreßregister, die nach jedem Zugriff auf das Datenregister automatisch hochgezählt werden. Das heißt, wenn ein zusammenhängender Speicherbereich zu beschreiben oder zu lesen ist, muß man die Anfangsadresse nur einmal setzen. Für einen Apple mit 1,02 MHz Taktfrequenz überträgt die EPROM-Move-Routine die Daten mit mehr als 66 KByte pro Sekunde beim Lesen und mit mehr als 70 KByte pro Sekunde beim Schreiben.

Geschwindigkeit

Die Zugriffszeit bei einem Disk-II-Laufwerk oder einer RAM-Disk hängt in erster Linie vom jeweiligen Betriebssystem ab. Das schon etwas betagte DOS ist nicht gerade schnell. Um die Geschwindigkeit für BLOAD, LOAD, BSAVE und SAVE zu erhöhen, liefert Cirtech einen 'SPEEDOS'-Patch mit, der in bekannter Weise den Filemanager-Puffer im DOS umgeht.

Unter DOS 3.3 und mit 'SPEEDOS' wurde jeweils zehnmal mit BLOAD ein 40 KByte großes File geladen. Mit RWTS wurde ein Laufwerk zehnmal vollständig eingelesen. Dabei ergaben sich folgende Übertragungsraten (in KByte pro Sekunde):

	Disk II	Flipper
DOS 3.3	1,1	4,0
SPEEDOS	5,0	51,0
RWTS	7,0	53,0

Beim direkten Zugriff auf die Flipper-Karte lassen sich je nach Art der Move-Routine Übertragungsraten von 66 KByte bis zu 110 KByte pro Sekunde erreichen. Damit ist die Flipper-Karte auch ohne DMA recht schnell.

Fazit

Die Flipper-Karte ist eine schnelle 1-MByte-Speichererweiterung, die alle gängigen Betriebssysteme unterstützt. Alle Anwendungen, die die Standardschnittstellen des Betriebssystems benutzen, sind voll lauffähig. Das Installieren eigener RAM-Disk-Treiber ist nicht notwendig, kann aber auf einfachste Art geschehen. Der Flipper-Programm-Manager unterstützt schnell und unkompliziert das Laden und Sichern der im RAM der Karte abgelegten Daten und P4rogramme. Gleichzeitig bietet er die Möglichkeit, bis zu vier verschiedene Betriebssysteme im Speicher zu halten und schnell zwischen ihnen hin- und herzuschalten.

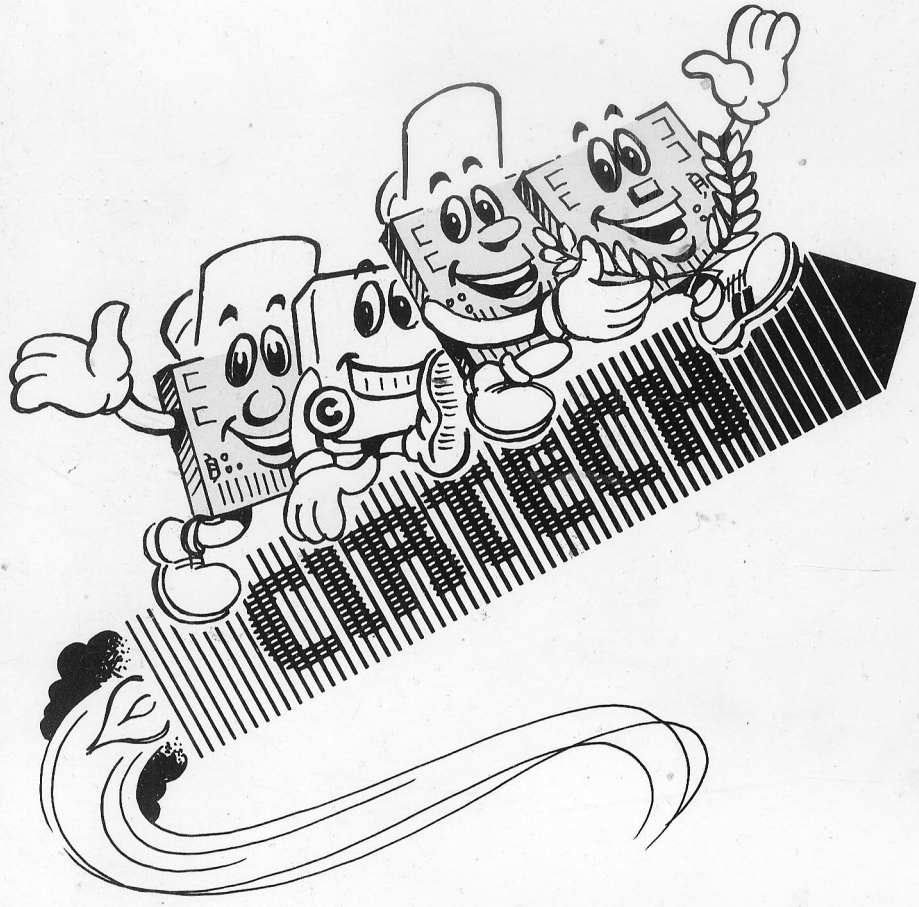
Die Flipper-Karte ist für 1148 DM bei der Firma Semjan-Computer, Postfach 90 01 64, 6000 Frankfurt/M 90 erhältlich.

Ergebnisse auf einen Blick

- ⊕ problemlose Handhabung
- ⊕ die Karte wird durch mitgelieferte Programme gut unterstützt
- ⊖ Dokumentation nicht sehr ausführlich

ct

User's Manual



plusRAM


plusRAM

CONTENTS

When you open the sealed box in which your PlusRAM is supplied you must make sure that all the items listed below are present. If you find that any items are missing then you must return the entire package *to your dealer* so that it can be exchanged for a complete one.

The contents of the PlusRAM box are:

- One *PlusRAM 256K* memory expansion card (or a *PlusRAM-XTRA* memory expansion card).

IMPORTANT

Some of the components on your PlusRAM card are especially sensitive to static electricity, which can cause severe damage. For this reason you should not handle your PlusRAM card at the moment. Please leave it in its protective packing until later.

- One 5.25-inch *PlusRAM support disk* (you must read and accept the licence and warranty conditions before you open the seal around this disk).
- One *PRODUCT REGISTRATION CARD* (this is sealed together with your *PlusRAM support disk*; please fill in this card and send it to us, see below for details).
- One *PlusRAM User's Manual*.
- One *PlusRAM-XTRA RAMDESK MANAGER SUPPLEMENT* (only supplied with *PlusRAM-XTRA*).

When you are sure that all the items above are present you should fill in your *PRODUCT REGISTRATION CARD*, affix the correct postage, then return it to us. This will officially register your purchase with us and entitle you to receive the following:

- First class technical support.
- Opportunities to obtain any applicable future upgrades.
- News of exciting new products from CIRTECH.

Returning your *PRODUCT REGISTRATION CARD* will help us to provide you with the most prompt and efficient service possible.

This manual shows you how to install and use the PlusRAM memory expansion card, designed and manufactured by CIRTECH.

Please make sure that you have received all the items that are supplied with PlusRAM (refer to "FIRST THINGS FIRST - UNPACKING YOUR PlusRAM" for details). In addition, please don't forget to fill in and return your *PRODUCT REGISTRATION CARD.*

PlusRAM is designed primarily as a *RAM disk*, which is a very fast, electronic, storage device that stores information in Random Access Memory instead of on a magnetic disk. As a RAM disk PlusRAM is automatically supported by ProDOS, Pascal 1.3 and CIRTECH CP/M Plus. PlusRAM also has *built-in* support for DOS 3.3.

The special 'multi-system' PlusRAM support disk contains unique support software which allows the following operating systems to use PlusRAM:

- Microsoft SoftCard CP/M, versions 2.20B (56K) and 2.23 (60K),
- Apple II Pascal, versions 1.1 and 1.2.

PlusRAM can also be used with advanced programs which access its memory directly (for example, programs like AppleWorks).

With *AppleWorks* PlusRAM automatically provides an increased Desktop of 244K. When you expand PlusRAM this can be increased to 1012K!

You can enhance and improve AppleWorks by using software on the special PlusRAM support disk to add the *new features* shown below:

- Full cursor control using the Apple Mouse.
- *RAMCalc*, a memory-resident pop-up calculator.
- A 42K printer buffer, which can be assigned to any printer.
- An on-screen time and date display.
- Automatic saving of large Desktop files on multiple disks.
- A variable size of Desktop.
- Expand the maximum number of database records to 6350 and word processor lines to 7250 (except AppleWorks 1.3).
- Use of AppleWorks 1.3 on the Apple II Plus.

PlusRAM contains a unique, custom manufactured, CMOS integrated circuit specially designed by CIRTECH to replace virtually all the components required by other, less efficient, RAMcards. Thanks to our advanced design a fully expanded PlusRAM uses only *75mA*! This extremely low power consumption helps to make PlusRAM *much more reliable* than other RAMcards.

From the moment you install PlusRAM it will greatly enhance the power and performance of your Apple computer. In addition, because PlusRAM is *fully compatible* with the Apple II memory expansion card, compatibility with future software is assured.

This section provides step-by-step instructions on how to install PlusRAM. You should read all of the instructions first, *before* you remove any protective packing from PlusRAM, so that you'll be completely familiar with the installation procedure.

>>> WARNING >>>

Always make sure that the power is turned OFF before you remove or install anything inside your computer. With the Apple //e check that the red power-on light at the rear left side of the main circuit board is not lit. With the Apple II Plus and Apple IIGS check that the power-on light at the front of the computer is not lit. When you switch off the Apple IIGS you should not connect or disconnect anything inside the computer for at least thirty seconds.

IMPORTANT

Before handling PlusRAM, or any part inside the Apple, you must 'discharge' any static you may be carrying by touching an 'earthed' surface (such as the metal case of the computer power supply). You should 'discharge' yourself regularly throughou the installation procedure. While installing PlusRAM you should hold the card only by its edges and avoid touching the gold edge connector or any components on the card.

What You Need to Use PlusRAM

- An Apple II, II Plus, //e, enhanced //e or IIGS.
- At least one disk drive.
- A System Master disk, or System Utilities Disk, for the operating system(s) you want to use (for example ProDOS).

Choosing a Slot for PlusRAM

The slot you choose to install PlusRAM in will depend on the programs you wish to run and which model of Apple you have.

If you intend using Pascal 1.3 you *must* install PlusRAM in slot 4, 5 or 6 because Pascal 1.3 will not recognise PlusRAM (or any other RAMcard) in any slots other than these. With Pascal 1.1 or 1.2 you may install PlusRAM in any slot, from slot 1 to slot 7.

If you have an enhanced (65C02) Apple //e the best slot to install PlusRAM in is slot 7. If you do this you can make PlusRAM a startup disk, then you can start up ProDOS, CIRTECH CP/M Plus or DOS 3.3 just by pressing Control-Open Apple-Reset.

With the Apple IIGS you can use the built-in Control Panel Program to select PlusRAM's slot as the "Startup Slot" (see your *Apple IIGS Owner's Guide* for full instructions on using the Control Panel Program). This means that you can install PlusRAM in any slot in the IIGS and still start up from PlusRAM just by pressing Control-Open Apple-Reset. You must use the Control Panel Program to activate PlusRAM's slot as "Your Card", otherwise PlusRAM will be ignored by the IIGS.

IMPORTANT | *You can't install PlusRAM in slot 0 of the Apple II Plus, in slot 3 of the Apple //e (if you also want to use 80 column text or boot DOS 3.3), or in the Apple IIGS MEMORY EXPANSION slot.*

Step-By-Step PlusRAM Installation

Follow the step-by-step instructions below to install PlusRAM in your computer:

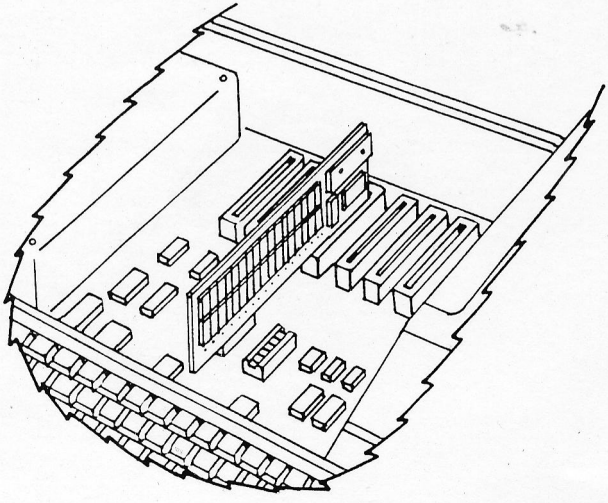
1. Set ALL power switches to OFF (computer, monitor, etc). Don't disconnect the power cord to the Apple (it provides the 'earth' connection for the metal power supply case) .

2. To open your computer pull the lid upwards at the rear (with the Apple IIGS you must press in the right and left *lid latches* while you pull upwards) then slide the lid off.

3. You can now remove the protective (anti-static) packing from PlusRAM, but remember to avoid touching any of the components on the card or the gold edge connector.

4. Align PlusRAM so that the gold edge connector is directly over the slot that you've chosen. The component side of the PlusRAM card must face the right side of the computer (as viewed from the front of the computer).

5. Press the PlusRAM card into the slot, using firm pressure, until the card is completely seated and level.



PlusRAM Installed in Slot 4 of the //e

5. Close the computer and switch it on. You should now run the built-in self-test program (see "How to Run the PlusRAM Self-Test" for instructions). If PlusRAM passes the test then you have successfully completed the installation!

If you want to use AppleWorks version 1.3 (or a more recent version of AppleWorks) with PlusRAM then you should refer to the section "HOW TO USE PlusRAM WITH APPLEWORKS".

If you're using AppleWorks version 1.2 (or an even earlier version of AppleWorks) then you can use PlusRAM too. Refer to "Using PlusRAM With ProDOS", under "HOW TO USE PlusRAM AS A RAM DISK", as AppleWorks is a standard ProDOS program.

If you use PlusRAM with advanced programs which access its memory directly (as programs like AppleWorks 1.3 do) then you should refer to the instructions supplied with the programs.

If you're going to use PlusRAM as a RAM disk you should refer to "HOW TO USE PlusRAM AS A RAM DISK". This section provides instructions on using PlusRAM with ProDOS, CIRTECH CP/M Plus, DOS, SoftCard CP/M version 2.20B and 2.23, and Apple II Pascal version 1.1 to 1.3.

On the reverse side of the PlusRAM support disk is software which will enhance and improve AppleWorks 1.3 (USA, French and German), 1.4 (French) and 2.0 (USA) for the Apple //e and IIGS. Also included is a feature which lets you modify AppleWorks 1.3 (USA) so that it can run on the Apple II Plus (see "HOW TO USE APPLEWORKS 1.3 ON THE APPLE II PLUS" for details).

PlusRAM automatically provides an expanded Desktop of 244K, as soon as you start up AppleWorks (and you can expand PlusRAM up to one Megabyte, providing an *enormous* 1012K Desktop!).

AppleWorks 2.0 on the IIGS

The USA version of AppleWorks 2.0 is designed to use a special IIGS internal memory expansion card to expand the Desktop. If you want an expanded Desktop as described above, using PlusRAM, then just add the AppleWorks enhancements described below.

Enhancing AppleWorks

One of the special features of PlusRAM is the *PlusRAM AppleWorks Enhancer* program, contained on the PlusRAM support disk, which is designed to enhance and improve AppleWorks 1.3, 1.4 and 2.0 (USA).

Before you can use the PlusRAM AppleWorks Enhancer you MUST first make copies of your original AppleWorks *STARTUP* and *PROGRAM* disks, then you can add the AppleWorks enhancements to these copies. You must make these copies, and then keep the original disks somewhere safe, in case you need the original disks in the future (for example, so that you can make new copies if these ones get damaged).

IMPORTANT

ALWAYS use COPIES *of your AppleWorks STARTUP and PROGRAM disks,* NEVER *use the originals. The copies that you use must* NOT *have been modified by any other programs.*

After you have copied your original AppleWorks disks you should start up *the reverse side* of the PlusRAM support disk.

Desktop limiter

With AppleWorks 1.3 (and above) you can have any size of Desktop, from full-size down to 56K. This feature must be installed *BEFORE* you run the AppleWorks enhancement below (full instructions are provided on the PlusRAM support disk).

From the menu displayed on the screen you now choose the command *A) RUN APPLEWORKS ENHANCEMENT*. This will run the enhancer program, which also displays complete instructions and prompts. Just choose the appropriate command for the version of AppleWorks and the Apple computer that you are using.

After you have used the PlusRAM AppleWorks Enhancer you should not use other programs which also try to modify AppleWorks (use an *UNENHANCED* copy of AppleWorks with these other programs).

ASCII Text Files

If you need to convert ASCII text files to normal AppleWorks files then you must use an *UNENHANCED* version of AppleWorks to read in the ASCII text files and save them to disk as standard AppleWorks files.

Using the Multiple-disk Saving Facility

This feature lets you save AppleWorks Desktop Files which are too large for a single disk (for example, a 5.25-inch disk can only hold 136K). When a disk becomes full the enhanced version of AppleWorks will automatically split a large Desktop File into sections which are then saved on separate disk(s).

When you SAVE a Desktop File the enhanced version of AppleWorks will ask you for additional disks if the file is too large to fit on one disk. Each additional disk *MUST* have the same disk volume name as the first disk on which the file was being saved. You can create more disks with the same disk volume name by choosing the *Other Activities* command in the AppleWorks main menu, followed by the *Format a blank disk* command (for full instructions see your *AppleWorks Reference Manual*). Each disk must be numbered as it is used to save a part of the file, because the disks have to be inserted in the same sequence when you load the file back.

When you LOAD a Desktop File saved as above, the enhanced version of AppleWorks will automatically ask you to insert any additional disks required. The disks *MUST* be inserted in the same sequence used to save the file.

You can press the Escape key to stop a SAVE operation before it is complete. If you do this then you *MUST* delete every section of the file that you were saving, on every disk which was used before you pressed Escape.

IMPORTANT | *The previous copy of the file that you were saving when you pressed Escape will have been* destroyed *when the SAVE operation began. This means that you* MUST *re-save the file before leaving AppleWorks, or switching off the computer, otherwise the file will be lost.*

Using RAMCalc in AppleWorks

RAMCalc is a memory-resident, full-function, pop-up calculator which can be called up on-screen at any time while you are using the enhanced version of AppleWorks. It features memory, square root and percentage functions, in addition to the standard arithmetic functions.

To call up RAMCalc, hold down the Solid Apple key (which is equivalent to the Option key on the Apple IIGS) and press C once. The RAMCalc display will appear on the screen instantly. To return to AppleWorks, just press Escape at any time. RAMCalc will be 'frozen' in its current state (including memory contents, number entered in the RAMCalc display, and so on) so that the next time you use RAMCalc it will appear exactly as you left it.

If you want to get an AppleWorks Solid Apple-C function you should use Open Apple-C instead.

You can use the up, down, right and left arrow keys to position the RAMCalc display anywhere on the screen.

The calculator keys that appear on the screen function as shown below (X = number in calculator display, Y = number in working or result register).

■ General Keys

0-9	: Number keys.
.	: Decimal point.
Delete	: Press Delete *once* to clear the display, so that you can enter a replacement number.
Delete,Delete	: Press Delete *twice* to clear everything except the contents of the memory.

■ Basic Calculation Keys

+ or P or p	: Add X to Y.
-	: Subtract X from Y.
* or X or x	: Multiply X and Y.
/ or D or d	: Divide Y by X.
= or Return	: Press either key to display the answer.

■ Memory Keys

M or m	: Press either key to store X in the memory; the previous contents are automatically erased (to clear the memory press Delete, then M or m).
R or r	: Press either key to recall the number in the memory to the display.

■ Special Keys

%	: Use this key for percentage calculations, e.g. to add 5% to 100 enter: *100 + 5 % =*.
S or s	: Press either key to get the square root of the displayed number.
E or ^	: Pressing either key lets you enter the exponent of X for scientific notation (eg. 3.56E3 = 3560).
Space bar	: Press the Space bar to change the sign of X from positive to negative or vice versa (if pressed after E or ^ then the sign of the *exponent* will be changed).
Y or y	: Press either key to exchange X, the number in the display (which is the last value entered) with Y, the number in the working register (the previous value orresult).

RAMCalc does calculations in the order in which they're entered:

for example, 5 + 6 / 2 = 5.5

Using the Apple Mouse with AppleWorks

This feature of the enhanced version of AppleWorks lets you use the Apple mouse for full cursor control (up, down, left, right). The mouse button can also be used instead of Return and Escape.

You can use the Apple mouse to move the cursor around within the AppleWorks spreadsheet, database or word processor, and to choose commands in the AppleWorks menus (the mouse will only move the cursor *up* or *down* within menus).

To move the cursor up, down, left or right just push the mouse in the appropriate direction. The Apple keys have the same effect with the mouse as they do with the arrow keys.

Click the mouse button (press and quickly release the button *once*) to do a Return. Give the mouse button a double click (*two* quick clicks) for an Escape.

The AppleWorks Printer Buffer

The enhanced version of AppleWorks automatically 'connects' an 'invisible' 42K buffer to your printer. The great advantage of this buffer is that you can resume using AppleWorks immediately after telling the program to print something, instead of having to wait for the printer to actually finish printing.

Any files or documents sent to your printer are automatically stored in the buffer; while you carry on working with AppleWorks the contents of the buffer are automatically transferred to your printer. It's as if everything gets printed instantly!

The print buffer is automatically 'connected' to the first printer you use after starting up the enhanced version of AppleWorks. If you have more than one printer, you can decide which one to buffer by printing to it first when you start up.

Printer cards

The printer buffer only works with printer cards that support the *Pascal 1.1 protocol* for peripheral cards (for example, the CIRTECH *Champion* printer card, and the built-in Apple IIGS serial ports). To check your printer card: put your printer 'off-line', then print one or two lines using the enhanced version of AppleWorks. AppleWorks will 'hang' (stop working) if your card doesn't support this protocol (put the printer 'on-line' to return to AppleWorks). The printer buffer will not be connected if your printer card doesn't support the Pascal 1.1 protocol (AppleWorks just prints as usual).

If you want to stop printing something contained in the buffer you just press Solid Apple-Open Apple-E (or Option-Apple-E on the Apple IIGS) to empty the buffer. The speaker will bleep to tell you that the buffer is empty (remember, your printer may have its own internal buffer which you must also empty).

Buffer full

If you print several files or documents, or just one large one (larger than 42K), then the printer buffer may become full before everything has been stored. If this happens you can't continue using AppleWorks until some of the contents of the buffer are printed (thus making room in the buffer).

The AppleWorks Clock Display

This feature will read the time and date from a ProDOS compatible clock and display them, in 'inverse' video, in the bottom right corner of the screen. The time and date are displayed in the format: 'DD/MM/YY HH:MM' (day/month/year hours:minutes).

Apple IIGS

You *MUST* use ProDOS 8 with AppleWorks on the Apple IIGS if you want the Clock Display to work. A copy of ProDOS 8 is supplied on your Apple IIGS System Disk.

This feature modifies the USA version of AppleWorks 1.3 (a program designed for the Apple //e) to enable it to run on the Apple II Plus. The *Apple mouse* feature and *Multiple-Disk Saving Facility* are also added automatically.

Memory limits in Apple II Plus

The other AppleWorks enhancements are not available with AppleWorks 1.3 (USA) on the the Apple II Plus. This is because the internal memory in the Apple II Plus is too small to fit in these enhancements. This is also the reason why more recent versions of AppleWorks (such as AppleWorks 2.0) can't be modified to run on the Apple II Plus.

To use AppleWorks 1.3 (USA) on the Apple II Plus you must have:

- A PlusRAM card of any size, with the PlusRAM support disk.
- A 16K language card in slot 0 (for ProDOS).
- A VIDEX VIDEOTERM (or VIDEX compatible) 80-column text card (with inverse ROM fitted) installed in slot 3.
- *COPIES* of your AppleWorks 1.3 (*USA version*) disks.
- At least one disk drive.
- An Apple II Plus shift key modification (see below).

The Shift Key Modification

This simple modification allows each of the Apple II Plus shift keys to perform as a real shift key, providing lowercase and uppercase capabilities without affecting the normal operation of your Apple II Plus in any way (the Videx Videoterm 80-column text card uses the shift key modification to provide uppercase and lowercase display). You may even have a shift key modification already fitted, as it is required by many programs, but if you do not then just follow the step-by-step instructions below.

To carry out the modification you will need 18 inches of insulated wire with a small clip at each end (suitable for integrated circuits), or a small soldering iron and some multi-core solder, for attaching the wire.

1. Turn the Apple II Plus OFF.
2. Remove the lid from your Apple II Plus.
3. With the keyboard towards you, locate the keyboard encoder connector (this is a row of 25 pins underneath the right side of the keyboard).
4. Connect one end of your wire to *pin 24* of the keyboard encoder connector (this is the second pin from the right if you are facing the keyboard).
5. Locate the 74LS251 integrated circuit on the Apple main board (it's in *row H*, just in front of the GAME I/O connector).

6. Connect the other end of your wire to *pin 1* of the 74LS251 (pin 1 is marked with a dot beside it on the top of the integrated circuit, or it's the first pin on the right side at the end with the notch).

7. The shift key modification is now complete; replace the lid on your Apple II Plus.

Key Combinations for AppleWorks 1.3

The Apple II Plus keyboard doesn't have all the keys necessary for using AppleWorks. The key combinations listed below provide the functions of these 'missing' keys:

Apple II Plus Keys	Equivalent Apple //e Key
Control-E	Up Arrow
Control-X	Down Arrow
Control-D	Right Arrow
Control-S	Left Arrow
Shift-(Left Arrow)	These keys will delete letters on the left side of the cursor.
Control-A	Caps Lock: After pressing Control-A letter keys will send uppercase letters to AppleWorks until Control-A is pressed again. To type '@', ']' and '^' use the shift key with Caps Lock *ON*.

To type the //e character shown on the right, press Control-Z, followed by the II Plus character on the left:

You type	This appears on the screen
>	]
<	[
)	}
(	{
/	\
!	|
=	~
'	`
-	_
C	Control-\
D	Control-]
E	Control-^
F	Control-_

On the Apple II Plus the Apple keys are emulated using the Escape key. Press Escape once to enter *AppleKey mode*. The next key pressed will be an Apple key command for AppleWorks. For example, to give an Open Apple-E command you press Escape followed by E.

Pressing Escape twice will give the normal escape function.

AppleKey mode and Control-Z mode

When you press Escape or Control-Z the speaker will click to remind you that another key is expected.

This section contains instructions which will show you how to use PlusRAM as a RAM disk with ProDOS, CIRTECH CP/M Plus, DOS 3.3, MicroSoft SoftCard CP/M, and Apple II Pascal.

The rest of this page contains general information about PlusRAM which you should read before going to the appropriate sub-section for your operating system.

How PlusRAM Works

PlusRAM is designed to be used just like an ordinary Apple disk drive. You can use PlusRAM to store anything that you can store on a 5.25-inch disk or a 3.5-inch disk. This includes BASIC programs, 'documents' or text files, data files, code files, binary programs, etc.

PlusRAM accepts exactly the same commands as a disk drive. For example, you can use ProDOS commands like *CATALOG*, *LOAD PROG,S5* and *RUN/MYDISK/PROG*, or CP/M commands like *DIR C:*, just as you do with an ordinary disk drive.

Before you can use an ordinary 5.25-inch or 3.5-inch disk you have to format it first. PlusRAM automatically formats itself as a *data disk* for the first operating system you use with it (ProDOS, Pascal, CP/M or DOS 3.3).

If you want to start up (*boot*) from PlusRAM you have to turn PlusRAM into a start up disk *BEFORE* you copy any files to it. Instructions on how to start up each operating system from PlusRAM are provided in the relevant sub-section for each operating system.

Although PlusRAM works just like an ordinary disk drive it can load, run and save programs in a *fraction* of a second. This is because PlusRAM is completely electronic and has no moving parts, unlike ordinary disk drives which are mechanical and slow.

IMPORTANT

PlusRAM uses RAM (Random Access Memory) to store information (such as programs). You must remember that anything you save on PlusRAM will be lost forever if the computer is switched off. For this reason any important information (programs or data) that you save in PlusRAM MUST *also be transferred to ordinary disk(s) at regular intervals (or at least before you switch off the computer!).*

You DON'T need to have any special technical knowledge of how PlusRAM works to be able to use it. You should just remember that PlusRAM appears to work in exactly the same way as an ordinary disk drive, and that you can use exactly the same commands with PlusRAM as you use with any disk drive.

Specific instructions for using PlusRAM with each of the various operating systems (ProDOS, CP/M, Pascal and DOS 3.3) are provided in the sub-sections below. You only need to refer to the instructions for the operating system(s) that you're actually going to use with PlusRAM.

ProDOS fully supports PlusRAM, so you don't need to do any special setting up. This means that you can use PlusRAM immediately for saving and loading files. If you want to be able to start up (boot) ProDOS from PlusRAM you'll have to format it first (see "How to Start Up ProDOS From PlusRAM" for full instructions).

PlusRAM is recognised by ProDOS as a 'block storage device' (with 511 blocks in the case of PlusRAM 256K). PlusRAM automatically formats itself with a ProDOS directory *if ProDOS is the first operating system to use it.* If ProDOS is NOT the first operating system to use PlusRAM then you must format PlusRAM (using the ProDOS Filer, System Utilities disk, Mouse Desk or some similar utility program).

The volume name of PlusRAM, when it has automatically formatted itself, is */RAMn* (*n* = PlusRAM's slot number). As an example, if a program requires a pathname for saving a file called *DOCUMENT* you would use */RAM5/DOCUMENT* to save it in PlusRAM (assuming PlusRAM is in slot 5).

You can copy files to PlusRAM, in the same way as to any other disk, using the ProDOS Filer, Mouse Desk or some similar utility program.

IMPORTANT *If you're using the ProDOS Filer then it must be version 1.1 or later. This is because earlier versions create an incorrect ProDOS directory when you format PlusRAM. Correct versions of ProDOS and the Filer are contained on the* reverse side *of the PlusRAM support disk.*

The example below shows how to copy the program *AppleWorks* to PlusRAM, using the ProDOS Filer:

1. Start up the *reverse side* of the PlusRAM support disk.
2. Press F for Filer.
3. Press F for File Commands.
4. Press C for Copy Files.
5. Replace the PlusRAM support disk with your copy of the AppleWorks *STARTUP* disk.
6. Type */APPLEWORKS/=* as source, and press Return.
7. Type */RAM5/=* as destination (assuming PlusRAM is in slot 5) and press Return *TWICE*.

All the files on the AppleWorks STARTUP disk will then be copied to PlusRAM.

You should now repeat steps *'5.'* to *'7.'*, using the AppleWorks *PROGRAM* disk instead of the STARTUP disk.

If you want to be able to start up (*boot*) ProDOS from PlusRAM then you have to turn PlusRAM into a *startup disk*.

The first thing you must do to turn PlusRAM into a startup disk is format PlusRAM (using the ProDOS Filer, Mouse Desk, or some similar utility program).

Next you must copy the SYS files *PRODOS* and *BASIC.SYSTEM*, (again using the Filer or an equivalent program) followed by any other programs and files you require.

Alternatively, after you have formatted PlusRAM you can copy all the files of an application program (such as AppleWorks) which must include a version of the SYS file PRODOS and some other SYS file which has a filename ending with ".SYSTEM".

The example below shows you how to format PlusRAM using the ProDOS Filer:

1. Start up your ProDOS Users Disk.
2. Press F to choose the Filer.
3. Press V to choose Volume Commands.
4. Press F to choose Format.
5. Type the number of PlusRAM's slot.
6. Type a volume name for PlusRAM (or press Return to accept the default volume name)
7. Press Y when asked if it's OK to erase what's there (remember that formatting *destroys* anything stored in PlusRAM)
8. The message FORMAT COMPLETE will appear when PlusRAM has been formatted, press Escape twice to return to the Filer main menu.

If you want to start up ProDOS from PlusRAM you have to leave the program that you've been using and return to BASIC. You should then see the BASIC prompt (a bracket, ']') on the screen. Type PR#*n* (*n* is the PlusRAM slot number) and press Return. ProDOS will start up from PlusRAM in an instant.

If you've installed PlusRAM in slot 7 of an enhanced Apple //e (a 65C02 version) then you can just press Control-Open Apple-Reset to start up ProDOS instantly.

With an Apple IIGS you can use the built-in Control Panel Program to set *Startup Slot: n* (*n* is the PlusRAM slot number). Then you can start up from PlusRAM (installed in any slot) just by pressing Control-Open Apple-Reset.

PlusRAM is treated by DOS 3.3 just like an ordinary disk drive, except for having a capacity of 240K (with PlusRAM 256K).

DOS 3.3 Drives

You can expand PlusRAM from its initial 256K, in steps of 256K, to a maximum of 1 Megabyte. Expanding PlusRAM will provide *TWO* equal sized DOS drives (each using half the PlusRAM's available memory) accessed as D1 and D2. (DOS 3.3 cannot recognise drives larger than 400K, so this is the maximum size of each DOS drive available on PlusRAM).

How to Make DOS Recognise PlusRAM

PlusRAM is designed to be recognised by DOS 3.3 without the need for patching. It will also work with most non-standard versions of DOS (e.g. 48K DIVERSI-DOS).

To make DOS 3.3 recognise PlusRAM you should do the following:

- Start up (*boot*) DOS in the normal way (for example, using your *DOS 3.3 System Master disk*).
- Now type the DOS command IN#*n* (*n* is the PlusRAM slot number) then press Return. ↵

After a second a '\' character will appear on the screen. This is to tell you that you can now use PlusRAM with DOS.

If PlusRAM has not already been used by DOS then the IN#*n* command automatically initializes PlusRAM *as a data disk* for DOS 3.3.

Initializing

If you use PlusRAM with DOS 3.3 after using some other operating system (for example, ProDOS or CP/M) then PlusRAM is automatically initialised for DOS 3.3 when you give the IN#*n* command (or BRUN the PLUSRAM program, see below). This *destroys* any programs, information or data that you may have stored in PlusRAM while using the previous operating system.

For convenience you can make a BASIC program (for example a *HELLO* program on one of your disks) give the IN#*n* command for you. Just add the following line (you can change the line number):

- 10 PRINT CHR$(4);"IN#5" (*using slot 5 as an example*)

After giving the IN#*n* command you can use PlusRAM to LOAD, RUN and SAVE in just the same way as with an ordinary disk. However, at this point you *CANNOT* start up (*boot*) DOS 3.3 from PlusRAM.

How to Start Up DOS From PlusRAM

If you want to be able to start up DOS 3.3 from PlusRAM you don't need to type the IN#*n* command. Instead you should do the following:

- First, start up DOS in the normal way (for example, using your *DOS 3.3 System Master disk*).

- Next, replace your *DOS 3.3 System Master disk* with your copy of the special PlusRAM support disk.

- Now type the DOS command BRUN PLUSRAM and press Return.

The binary program *PLUSRAM* will automatically INIT PlusRAM as a DOS Master Disk. This means you can now use PlusRAM just like an ordinary disk *AND* you can start up DOS 3.3 from PlusRAM.

When you want to start up DOS 3.3 from PlusRAM you have to leave the program that you've been using and return to BASIC. You should then see the BASIC prompt (a bracket, ']') on the screen. Now type PR#*n* (*n* is the PlusRAM slot number) and press Return. DOS will start up from PlusRAM and be ready to use immediately.

If you've installed PlusRAM in slot 7 of an enhanced Apple //e (a 65C02 version) then you can just press Control-Open Apple-Reset to automatically start up DOS.

With the Apple IIGS you can use the built-in Control Panel Program to set *Startup Slot: n* (with *n* being the PlusRAM slot number). Then you can start up from PlusRAM (installed in any slot) just by pressing Control-Open Apple-Reset.

For convenience you can copy (using FID) the *PLUSRAM* binary program from the PlusRAM support disk to your ordinary DOS 3.3 disks.

You can automatically run the *PLUSRAM* program by adding the following line to a program (you can change the line number):

- 10 PRINT CHR$(4);"BRUN PLUSRAM"

Working with DOS

All standard DOS 3.3 programs will work with PlusRAM. A few programs (such as *COPYA*) will only recognise or use ordinary Apple 5.25-inch disk drives. These programs are limited in this way because they assume that all disk drives or storage devices have the same capacity, structure and hardware as a 5.25-inch (Disk][type) disk drive.

All DOS 3.3 commands (except INIT) will work in exactly the same way with PlusRAM as they do with an ordinary disk drive.

INIT command

You *must* CATALOG an ordinary DOS 5.25-inch disk *BEFORE* trying to INITialize a blank 5.25-inch disk.

After you've used IN#*n*, or BRUN *PLUSRAM*, then INIT will only INITialize blank disks as DOS 3.3 *data disks*, which can't start up DOS 3.3 (this prevents you formatting other disks with a version of DOS which will not work on other computers).

If you want to INIT a DOS 3.3 startup disk you must start up from your *DOS 3.3 System Master disk* (and you must *not* use IN#*n* or BRUN PLUSRAM when you want to INIT a DOS 3.3 startup disk).

For full details about all the DOS 3.3 commands (and how to use them) please refer to the *Apple II DOS Manual*.

Special FID

You *MUST* use the special version of the *FID* (File Developer) program which is supplied on the PlusRAM support disk. This special version has been modified so that it will work correctly with large storage devices like PlusRAM (because the old version of *FID* DOESN'T!). Special *FID* operates just like old *FID*. Detailed instructions for using *FID* can be found in the *Apple II DOS 3.3 Manual*.

SPEEDOS

This is a 'Public Domain' program, published in the magazine *Call-A.P.P.L.E.* and written by Lee DeRaud. To use *SPEEDOS* insert the PlusRAM support disk and type: BRUN SPEEDOS, then press Return. DOS 3.3 will now work approximately 3 to 10 times faster than usual. PLEASE NOTE: when *SPEEDOS* has been used the INIT command is no longer available.

PlusRAM is used by CP/M in just the same way as an ordinary disk drive, except that PlusRAM 256K has a capacity of 240K.

The CIRTECH *CP/M Plus System* automatically recognises PlusRAM as a RAM disk, and lets you use PlusRAM immediately.

PlusRAM is automatically formatted with a CP/M directory (if one doesn't already exist) when you start up (*boot*) CP/M Plus. This will *destroy* any information or data that you may have stored in PlusRAM using another operating system.

If you want to start up CP/M Plus from PlusRAM then you must use the program COPYSYS.COM (supplied on the *CP/M Plus System Master* disk). Please refer to your *CP/M Plus System User's Manual* for full details about COPYSYS.COM.

PlusRAM is supplied with unique support software (on the special PlusRAM support disk) which will allow you to use older versions of CP/M with PlusRAM (see below).

How to Make CP/M 2.20B or 2.23 Recognise PlusRAM

Support for Microsoft SoftCard CP/M versions 2.20B (56K) and 2.23 (60K) consists of a program called PLUSRAM.COM (supplied on the PlusRAM support disk).

After you run PLUSRAM.COM (see instructions below) CP/M version 2.23 will recognise PlusRAM as "drive D:"; version 2.20B will recognise it as "drive F:".

First, copy PLUSRAM.COM onto your normal CP/M startup disk by following the instructions below:

1. Put your CP/M startup disk in drive A: (it must contain the PIP.COM program) and the PlusRAM support disk in drive B:, then start up CP/M.

2. Type PIP A:=B:PLUSRAM.COM and press the Return key (this will copy PLUSRAM.COM onto your CP/M startup disk).

To make SoftCard CP/M recognise PlusRAM you just type PLUSRAM then press Return. After a moment the CP/M prompt will appear and PlusRAM will be ready for use (as "D>" with CP/M 2.23, or as "F>" with CP/M 2.20B).

When you run PLUSRAM.COM the program formats PlusRAM with a CP/M directory (if one doesn't already exist) and modifies the SoftCard CP/M system so that it will operate with PlusRAM.

PLUSRAM format

Running PLUSRAM.COM will format PlusRAM for SoftCard CP/M, and at the same time *destroy* any programs, information or data that you may have stored on PlusRAM using another operating system.

One important feature of PLUSRAM.COM is that it automatically copies the SoftCard CP/M system onto PlusRAM. This allows you to instantly start up SoftCard CP/M from PlusRAM!

When you want to start up CP/M from PlusRAM you first have to get back to BASIC. You should then see the BASIC prompt (a bracket, ']') on the screen. Now type PR#*n* (*n* being the PlusRAM slot number) and press Return. CP/M will start up from PlusRAM in an instant.

If you've installed PlusRAM in slot 7 of an enhanced Apple //e (a 65C02 version) then you can just press Control-Open Apple-Reset to automatically start up CP/M instantly.

If you start up CP/M from an ordinary disk you *must* run PLUSRAM.COM *every time*.

Another advantage when you use PLUSRAM.COM is that you no longer need to have a SoftCard CP/M system disk in drive A: when you exit from a program or press Control-C. This makes SoftCard CP/M much easier and faster to use.

If you have SoftCard CP/M 2.23 then your *System Master* disk will contain a program called AUTORUN.COM. You can use this program to automatically run PLUSRAM.COM whenever you start up CP/M 2.2 so PlusRAM will be ready to use immediately.

Leaving SoftCard CP/M

You can't start up another operating system after using SoftCard CP/M on an Apple II Plus, because SoftCard CP/M does a 'warm start' when you press Control-Reset. To avoid this problem a program called BOOT.COM is supplied on the PlusRAM support disk. Just type BOOT and press Return to make your computer start up (*boot*) from slot 6 (which is usually a disk controller card).

If you want to start up from any slot just type BOOT *n* (where *n* is the number of the slot from which you want to start up). Make sure that the slot does have a disk drive in it!

Working with CP/M

When you're using PlusRAM as a RAM disk you can use PIP.COM (on your CP/M *System Master* disk) to transfer your programs and files from ordinary disks to PlusRAM, and from PlusRAM to ordinary disks.

The example below shows how to copy the files for *WordStar* (a word processor program) from an ordinary disk in drive A: to PlusRAM:

1. Put your *System Master* disk in drive A:.
2. At the "A>" prompt, type PIP and press Return.
3. Replace the *System Master* disk with your *WordStar* disk.
4. Type D:=A:WS*.* then press Return (type F: instead of D: if you're using CP/M 2.20B).
5. All files starting with "WS" will be copied to PlusRAM by PIP. Press Return after all the files have been copied to get back to the "A>" prompt.

To run *WordStar* from PlusRAM just 'log on' to drive D: by typing D: (F: for CP/M 2.20B) followed by Return. Then, at the "D>" (or "F>") prompt, type WS and press Return.

You may need to re-install your version of WordStar so that it can find the *WSMSGS* file on drive D: (or drive F:) instead of the usual drive A: (see your *WordStar* Manual for installation instructions).

PlusRAM is recognised by Pascal as a 'block structured device', with a volume name of RAM*n* (*n* is the PlusRAM slot number). PlusRAM has a capacity of 511 blocks (with the 256K card) and is used in just the same way as an ordinary disk drive.

You must have some means of copying files if you want to use PlusRAM with Pascal. If you have a version of the *Apple II Pascal Development System* you can use this. If you only have a 'run-time' system it must include a facility for copying files to and from PlusRAM.

All the standard Pascal "SYSTEM." files will operate with PlusRAM just as they do with an ordinary disk drive.

Pascal 1.3

When you start up Pascal 1.3 the operating system automatically recognises PlusRAM, and PlusRAM will format itself as a *data disk* for Pascal 1.3 (if Pascal 1.3 is the first operating system to use it). This means that you can use PlusRAM straight away, but you cannot start up from PlusRAM.

Starting Up Pascal 1.3 From PlusRAM

You can start up (*boot*) Pascal 1.3 from PlusRAM if you first format PlusRAM, then copy the Pascal 1.3 "SYSTEM." files to PlusRAM. Formatting PlusRAM will *destroy* any information you may already have stored in PlusRAM. You can use the *Apple II Pascal Formatter* from the *APPLE3:* disk of the *Apple II Pascal Development System* (or an equivalent program if you don't have the Development System) to format PlusRAM.

The step-by-step instructions below show you how to format PlusRAM using the Pascal Formatter:

1. Start up Pascal 1.3 using your *APPLE1:* disk.

2. Type F for F)iler then V for V)olS.

3. Make a note of the volume number for PlusRAM (next to the volume name "RAM*n*") then type Q for Q)uit.

4. Place your *APPLE3:* disk in drive 2.

5. Type X, then type #5:FORMATTER and press Return.

6. Type the volume number for PlusRAM (from step 3. above) then press Return.

7. Type Y to destroy any old directory.

8. Enter a new volume name (any name you want, for example PR5) then press Return.

9. PlusRAM is formatted instantly (remember, this *destroys* any information you may already have stored in PlusRAM). Press Escape to exit from the Pascal Formatter, so that you can copy the files you require.

10. Type F for F)iler.

11. Type T for T)ransfer.

12. Type #4:SYSTEM.=,#11:$ (assuming PlusRAM is volume #11) then press Return.

13. This copies all the Pascal "SYSTEM." files from *APPLE1:* to PlusRAM.

14. You can now start up Pascal 1.3 from PlusRAM.

Startup Device

When you start up Pascal 1.3 from PlusRAM, PlusRAM becomes volume #4 because the Pascal startup device is always assigned to volume #4. The disk drives will be re-assigned as volumes #11 and #12.

Pascal 1.1 and 1.2

These older versions of Apple II Pascal don't recognise PlusRAM automatically. Support software (called 'ATTACH' drivers) are supplied on the special PlusRAM support disk, and this allows you to use PlusRAM with Pascal 1.1 or 1.2.

You must copy three files (detailed below) from the PlusRAM support disk to your Pascal startup disk. After this the Pascal system will automatically read and 'attach' these files to itself *every time* you start up Pascal. These 'ATTACH' drivers automatically format PlusRAM (*but only as a data disk*) which *destroys* any information you may already have stored in PlusRAM using another operating system.

Pascal 1.1 ATTACH Files

Thethree files you must copy onto your Pascal 1.1 startupdisk are:

PAS11.ATTACH
PAS11.DATA
ATTACH.DRIVERS

PlusRAM will appear as volume #10 to the Pascal 1.1 system.

IMPORTANT

After copying these files to your Pascal 1.1 startup disk you must use the Pascal Filer C)hange command to change the name of the file PAS11.ATTACH *to* SYSTEM.ATTACH *and also* PAS11.DATA *to* ATTACH.DATA.

Pascal 1.2 ATTACH Files

The three files you must copy onto your Pascal 1.2 startup disk are:

SYSTEM.ATTACH
ATTACH.DATA
ATTACH.DRIVERS

You must keep the names of these three files EXACTLY the same as they are above. PlusRAM appears as volume #20 to the Pascal 1.2 system. Follow the example below to copy these files to your Pascal 1.2 startup disk:

1. Start up Pascal using *APPLE1:*.

2. Press F for F)iler.

3. Press T for T)ransfer.

4. Put the PlusRAM support disk into drive 2.

5. Type #5:ATTACH.=,#4:$ then press Return.

6. This will copy the files *ATTACH.DATA* and *ATTACH.DRIVERS* from the PlusRAM support disk onto *APPLE1:*

7. Press T for T)ransfer.

8. Type #5:SYSTEM.=,#4:$ then press Return.

9. This will copy the file *SYSTEM.ATTACH* onto *APPLE1:*

10. Start up Pascal 1.2 from *APPLE1:* and PlusRAM will be ready for immediate use.

PlusRAM is designed to be easily expanded from 256K of memory to 512K, 768K or to a full *One Megabyte* (1024K) of memory. For each 256K increase you just plug in eight integrated circuits ('chips') called 'Dynamic Random Access Memories' (*'DRAMs'*).

>>> WARNING >>> | *To prevent damage to PlusRAM, and to ensure correct operation of your card and computer, you* MUST *use the DRAMs listed below (or a DRAM type which matches the specification completely).*

■ Approved DRAMs for expanding PlusRAM:

HITACHI: HM50256P-12, HM50256P-15

TOSHIBA: TMM41257P-12, TMM41257P-15

These DRAMs meet the following specification:

256Kx1 bit DRAM, 16 pin (DIL), 150nS maximum access time, CAS before RAS refresh, and hidden refresh mode.

Other DRAM types | The DRAM types listed above have been tested and approved by CIRTECH. CIRTECH (UK) Ltd. cannot be held responsible for any damage or failure of your PlusRAM card or Apple computer caused by using non-approved types of DRAM. If you are not sure that the DRAMs you have are the correct type then *DON'T* use them. CIRTECH cannot give advice on alternative DRAM types, other than those stated above.

Fully compatible 256K memory expansion kits are available direct from CIRTECH at *very* competitive prices.

Step-By-Step Memory Expansion

>>> WARNING >>> | BEFORE *and* DURING *installation of the memory expansion you should touch an 'earthed' surface (such as the metal case of the Apple power supply) to remove any static charge you may be carrying. You should also place the PlusRAM card on a clean, static-free surface while installing the DRAMs.*

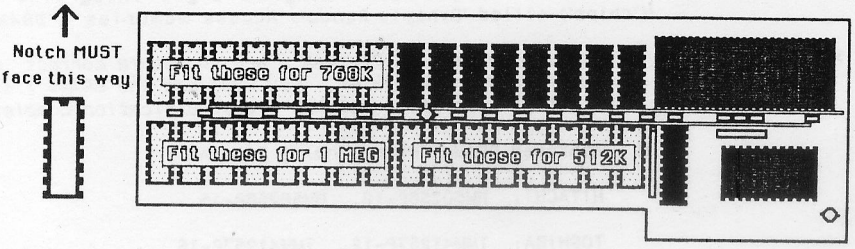
1. Switch off the computer and remove the PlusRAM card.

2. Refer to the illustration below to find out the group of sockets into which you must insert the DRAMs (you must expand PlusRAM in sequence, for example, the 512K sockets must be filled before the 768K sockets, and so on).

3. Align each DRAM as shown below (the notch of each DRAM *MUST* face in the same direction as those on the original eight DRAMs, that is towards the top edge of the card.

4. Align the pins of each DRAM with its socket on PlusRAM and firmly push the DRAM into the socket until it is fully inserted.

>>> WARNING >>> | *Take care that none of the DRAM pins get bent, broken or incorrectly inserted, otherwise the DRAM and PlusRAM may be damaged.*



5. *DOUBLE-CHECK* that the DRAMs are all correctly inserted.

6. Replace your PlusRAM in the computer and switch on.

7. Start the in-built self-test (see "How to Run the PlusRAM Self-Test" for instructions) to check that the newly installed DRAMs are working (make sure that the *SIZE* displayed corresponds to the newly expanded memory size).

8. If the *SIZE* displayed during the self-test is correct, *and* PlusRAM passes the self-test, then you have successfully expanded your PlusRAM memory!

If you have any problems while you're using PlusRAM then the points below will provide some help. In addition, reading carefully right through this *User's Guide* may reveal a solution!

- PROBLEM: *PlusRAM not recognised by a program*

  Check that you have done everything required to make the program's operating system (ProDOS, DOS, CP/M or Pascal) recognise PlusRAM.

  CIRTECH CP/M Plus automatically recognises and uses PlusRAM, as do ProDOS and Pascal 1.3, so this problem should not occur with these operating systems. However, some programs may not use the operating system properly, or they may use a modified or non-standard operating system which will not allow use of a memory expansion card.

  To make SoftCard CP/M 2.23 or 2.20B recognise PlusRAM you must run the *PLUSRAM.COM* program.

  To make Apple II Pascal 1.1 and 1.2 recognise PlusRAM you must copy the appropriate 'ATTACH' files for your version of Pascal (1.1 or 1.2) from the PlusRAM support disk to your Pascal startup disk (using, for example, the Pascal Filer to 'transfer' the files).

  To make DOS 3.3 recognise PlusRAM you must give the IN#*n* command, or BRUN the *PLUSRAM* binary program.

  If you have an Apple IIGS make sure that you have used the *Control Panel Program* to activate the slot that PlusRAM is installed in as "Your Card" (full instructions for using the Control Panel Program are given in your *Apple IIGS Owner's Guide*).

- PROBLEM: *Can't start up from PlusRAM*

  PlusRAM may not be formatted as a startup disk for the operating system that you're using.

  With DOS 3.3 you must BRUN the *PLUSRAM* binary program to initialize PlusRAM as a startup disk.

  With CIRTECH CP/M Plus you must run *COPYSYS.COM* to format PlusRAM as a startup disk.

  With SoftCard CP/M 2.20B or 2.23 you must run *PLUSRAM.COM* to format PlusRAM as a startup disk *and* to modify the CP/M system so that it will use PlusRAM.

  With Apple II Pascal version 1.3 you must use the Pascal Formatter and Filer supplied with Pascal 1.3 (or an equivalent program) to format PlusRAM as a startup disk.

  To format PlusRAM as a ProDOS startup disk you must use the ProDOS Filer, Mouse Desk, or some similar utility program.

  Pascal 1.1 or 1.2 will only start up from 5.25-inch disks, so they can't be made to start up from PlusRAM.

- PROBLEM: *Data or files stored in PlusRAM appear to be scrambled or corrupted.*

  Make sure that PlusRAM is installed correctly. If PlusRAM has been expanded you should make sure that this was also done correctly. You should run PlusRAM's built-in self-test program to check the card (for full details see "How to Run the PlusRAM Self-Test").

If you have a problem which you can't solve then you should contact the dealer from whom you bought your PlusRAM. You must try to give your dealer all the information asked for in the list below, so that your problem can be dealt with as quickly and efficiently as possible:

- The type of card you're having problems with (is it a PlusRAM or a PlusRAM-XTRA?).

- The type of Apple computer that you have (for example, //e II Plus), and the number of the slot in which you installe PlusRAM.

- Whether PlusRAM has been expanded (if so, what DRAM type did you use and how many DRAMs did you use?).

- Details of all the other devices connected to, or installed in, your computer (for example, hard disks, printer cards) including the number of the slot in which each device is installed, model details or the version number of each device, and the manufacturer of each device.

- The name of the program/software that you're using when you find the problem, any version numbers that the program may have, and the publisher of the program.

- A description of what happens when you find the problem. This description must be as exact as possible. For example:

  What were you trying to do when you found the problem?
  Does the problem happen all the time/every time?
  What exactly is displayed on the screen, before you found the problem and after?
  What keys did you press before you found the problem?
  Do any keys work after you find the problem?
  If the computer 'hangs' or 'stops working' is a cursor still being displayed on the screen?
  Does the prompt for the built-in 'monitor' program (an asterisk, '*') appear on the screen?

Please provide as much information about the problem as possible. Something which you might not think relevant to your problem may actually be very important.

After you install your PlusRAM or expand its memory (or if you seem to have any problems using your PlusRAM) you should run the in-built PlusRAM self-test program. This will test the RAM and other circuitry on the PlusRAM card.

IMPORTANT | *The self-test will destroy any information or data that you may have already stored in PlusRAM!*

Follow the instructions below to test PlusRAM:

1. First, switch on your computer so that the Applesoft BASIC prompt (']') will be displayed.

2. Choose the command, from the table below, which corresponds to the slot in which your PlusRAM is installed:

PlusRAM slot	Command to type
slot 1	CALL 49418
slot 2	CALL 49674
slot 3	CALL 49930
slot 4	CALL 50186
slot 5	CALL 50442
slot 6	CALL 50698
slot 7	CALL 50954

3. Type the appropriate command, then press the Return key. The screen is cleared and the self-test will start immediately.

The self-test will run until you press the Escape key (unless an error is detected during the self-test).

When you have finished using the self-test you should switch off the computer before you use any other software.

If the self-test detects an error on your PlusRAM card then it displays a special FAIL message. Please make a note of this message *and* of the pass number when it is displayed. If you need to contact your dealer for help you *must* have this information.

PlusRAM is a mass storage device designed to operate as a fast 'solid-state' disk drive. To do this, it contains onboard firmware which lets you use PlusRAM's memory without the need for complex modifications to standard operating systems or programs.

Direct Access

A description of how to access PlusRAM's RAM directly is given at the end of this section, but it is *STRONGLY* recommended that you use the onboard firmware to handle any memory access for you. This will avoid conflict with any operating system's use and guarantee compatibility with future mass storage devices. The actual hardware design may change in the future, but the firmware will still perform in exactly the same way.

IMPORTANT

PlusRAM has an auto-format feature which provides directories for ProDOS or Pascal 1.3 when they access PlusRAM for the first time. To do this the PlusRAM firmware must check the value at location $BF00 in the Apple's memory to identify the operating system. If this value is $00, a Pascal directory is written; if it is $4C, a ProDOS directory is written (if it is any other value no directory will be written). If you wish to change from a ProDOS directory to a Pascal directory, or vice versa, you must use the FORMAT command first.

ProDOS Block Device Protocol

This interface with PlusRAM is fully compatible with the ProDOS block device protocol for intelligent storage devices, which is fully documented in Apple's 'ProDOS technical reference manual'. A brief summary of the facilities is given below.

Commands are sent to PlusRAM instructing it to transfer (read or write) 'blocks' (512 bytes per block) from PlusRAM's memory to the Apple's memory, and vice versa. This is done by making a machine language call to a *ProDOS entry address* in PlusRAM's onboard ROM.

The ProDOS entry address is calculated by adding the *byte* '$xx', found at location $C*n*FF of the ROM, to the *address* '$C*n*00' (*n* = PlusRAM's slot number); so the ProDOS entry point becomes: '$C*n*xx'.

Before making the ProDOS call a few Zero Page locations, which pass command information to PlusRAM, must be set up as below:

Command (location $42)

Your command is stored here. The four comands available are:

0 = STATUS - return size of PlusRAM's memory (in blocks), X-register = lo-byte, Y-register = hi-byte.

1 = READ - read a specified 512 byte block from PlusRAM to a specified area in the Apple's memory.

2 = WRITE - write 512 bytes from a specified area in the Apple's memory to a specified 512 byte block in PlusRAM.

3 = FORMAT - destroy any information contained in PlusRAM and prepare it for a new directory.

Unit Number (location $43)

Always set to $*n*0 (*n* = PlusRAM's slot number).

Buffer Pointer (locations $44-$45)

The 2-byte start address (lo-byte in $44, hi-byte in $45) of your 512 byte block buffer in the Apple's memory.

Block Number (locations $46-$47)

The 2-byte number (lo-byte in $46, hi-byte in $47) of the block in PlusRAM to which, or from which, data is written or read.

If the command is completed successfully then, on return to your program, the Carry flag will be *clear* and the A-register = 0. If there was an error, the Carry will be *set* and the A-register will contain the error code (see your *Apple II ProDOS Technical Reference Manual* for details of error codes).

Using the PlusRAM SmartPort

The firmware in PlusRAM contains support for the Apple SmartPort interface, which emulates the disk port in the Apple //c and IIGS. You can make calls to the PlusRAM SmartPort, in a similar manner to ProDOS MLI calls, which will:

- return *STATUS* information about PlusRAM, or the PlusRAM SmartPort.
- *READ BLOCK*s or *WRITE BLOCK*s (of 512 bytes) from PlusRAM's memory to the Apple's (and vice versa).
- *FORMAT* PlusRAM (i.e. destroy any previous directory information and prepare PlusRAM for a new directory).
- *READ* or *WRITE* a specified number of bytes (up to 64K) to main (or auxiliary) memory from PlusRAM memory (and vice versa).

IMPORTANT | *Do not use the SmartPort to move data to the Zero Page or to the Stack, because these are both used by the SmartPort itself.*

SmartPort Call Format

SmartPort calls are made up from a single *Command Number* byte followed by a 2-byte pointer to a *Parameter List* (the length and structure of which depends on the call being made). A simple SmartPort call is outlined below:

```
        LDA $CnFF       ;Read LSB of ProDOS entry
        CLC
        ADC #$03        ;Add 03 to get the SmartPort entry address.
        STA SPCALL+1    ;Modify JSR address.
                        ;
SPCALL  JSR $Cn00       ;'00' modified by above (SmartPort entry)
        DFB #$0x        ;The Command Number (see below).
        DW  SPLIST      ;Pointer to the Parameter List (see below)
                        ;for the command specified.
        BCS ERROR       ;After the SmartPort call the firmware
```

```
                        ;returns to your program here; the carry
                        ;flag is set if there's been an error, and
                        ;the A-register contains the error code.
                        ;
                        ;
SPLIST EQU *            ;At address 'SPLIST' you must have a
                        ;Parameter List appropriate for the Command
                        ;you specified (see below).
```

The seven valid Command Numbers for PlusRAM are:

$00 - STATUS (of PlusRAM or of the PlusRAM SmartPort)
$01 - READ BLOCK (transfer 512 bytes *from* PlusRAM)
$02 - WRITE BLOCK (transfer 512 bytes *to* PlusRAM)
$03 - FORMAT (prepare PlusRAM for new directory)
$04 - CONTROL (has no effect on PlusRAM)
$08 - READ (transfer up to 64K *from* PlusRAM)
$09 - WRITE (transfer up to 64K *to* PlusRAM)

The Parameter List for each SmartPort call is made up of one or more items of data which give the SmartPort details about the call, e.g. how many parameters a call has, where a block is to be read to or how many bytes are to be written by a WRITE call, etc. The items which make up the various Parameter Lists are:

Address Pointer - a 3-byte number (lo, mid, hi) which specifies an address within PlusRAM.

Auxiliary Memory | If the hi-byte of the Address Pointer has *bit 7* set, then the data will be transferred to or from the *auxiliary* 48K bank of your computer (the extended 64K 80 column card provides this auxiliary bank in an Apple //e).

Block Number - the 3-byte number (lo, mid, hi, with hi = 00) of a block in PlusRAM which is to be read from or written to.

Buffer Pointer - the 2-byte address (lo, hi) of a buffer used by the command (e.g. to return status information or to deposit bytes or blocks read from PlusRAM).

Byte Count - a 2-byte number (lo, hi) which specifies the number of bytes to be transferred by a READ or WRITE command.

Control Code - only used by the CONTROL command, always $00 (has no effect on PlusRAM).

Control List - a 2-byte pointer (lo, hi) to a pair of 'count bytes' which are always $00, $00 for PlusRAM.

Parameter Count - the number of items in a Parameter List.

Status Code - a 1-byte number which specifies the type of STATUS call being made.

Status Code $00 - Return Device Status

The Device Status information, *when Unit Number = $01*, consists of four bytes, returned in the buffer specified

by *Buffer Pointer*. The eight bits of Byte 1 have the following meanings:

Bit 7 : 1 = PlusRAM is a block device,
Bit 6 : 1 = is a writable device,
Bit 5 : 1 = is a readable device,
Bit 4 : 1 = is on line,
Bit 3 : 1 = can be formatted,
Bit 2 : 0 = is not write protected,
Bit 1 : 0 = is not interrupting,
Bit 0 : 0 = is not open.

Bytes 2-4 give PlusRAM's size in blocks (lo, mid, hi).

If a Unit Number of $00 is used then the Device Status information is for the SmartPort itself. Eight bytes are returned: Byte 1 = $01 (because PlusRAM is the only device connected), Bytes 2-8 = $00.

Status Code $03 - Return Device Information Block (DIB)

The Device Information Block consists of twenty-five bytes returned in the buffer specified by *Buffer Pointer*.

Byte 1 is the same as the first byte in the Device Status information, i.e. $F8.

Bytes 2-4 are PlusRAM's size in blocks (lo, mid, hi).

Byte 5 is the length of PlusRAM's *Device Name* ($07).

Bytes 6-12 are ASCII characters for PlusRAM's Device Name: *RAMCARD*.

Bytes 13-21 are ASCII space characters.

Bytes 22-23 are the Device Type Code, followed by the Device Subtype Code.

Bytes 24-25 are the ROM version number.

Unit Number - for all calls to the PlusRAM SmartPort, except STATUS, the Unit Number is $01 (a STATUS call with a Unit Number of $00, *and* a Status Code of $00, will return information about the SmartPort).

Details of the Parameter List for each command are given below:

■ STATUS

Parameter Count (= $03)
Unit Number (= $01 for PlusRAM information)
(= $00 for SmartPort information)
Buffer Pointer
Status Code (= $00 for Return Device Status)
(= $03 for Device Information Block)

■ READ BLOCK

Parameter Count (= $03)
Unit Number (= $01)
Buffer Pointer
Block Number

■ WRITE BLOCK

Parameter Count (= $03)
Unit Number (= $01)
Buffer Pointer
Block Number

■ FORMAT

Parameter Count (= $01)
Unit Number (= $01)

■ CONTROL

Parameter Count (= $03)
Unit Number (= $01)
Control List
Control Code (= $00)

■ READ

Parameter Count (= $04)
Unit Number (= $01)
Buffer Pointer
Byte Count
Address Pointer

■ WRITE

Parameter Count (= $04)
Unit Number (= $01)
Buffer Pointer
Byte Count
Address Pointer

The PlusRAM Hardware

Access to the RAM devices on PlusRAM is made through a Read/Write data port on the card, with the address that you wish to access being written into a 3-byte address register. The addresses of these registers are as follows:

Low-Address = $C080+$*n*0
Mid-Address = $C081+$*n*0
High-Address = $C082+$*n*0
Data Port = $C083+$*n*0

(*n* = PlusRAM's slot number)

You must first set up the address in PlusRAM that you wish to access, by writing the 3-byte value into the appropriate registers (low, mid, high) then read or write your data through the data port. The 3-byte address is *automatically* incremented every time you access the data port, which lets you move blocks of data very quickly.

IMPORTANT | *Be careful which 6502 instructions you use to access the data port - some indexed instructions do a* double access *to the location and this will cause the address to be auto-incremented* twice *instead of once.*

Once again, it is *strongly recommended* that you do not use PlusRAM by directly accessing the hardware, but instead use the firmware on PlusRAM (by making ProDOS or SmartPort calls) to carry out any data transfer that you require.

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INTRODUCTION TO THE RAMDESK MANAGER

The RamDesk Manager is a unique software package designed to enhance the capabilities of the PlusRAM-xtra memory card. It allows you to divide the memory on PlusRAM-xtra into one, two, three or four *Program Areas*. Each Program Area behaves like a completely independent RAMdisk, usable only by the programs stored in it. You can keep several different types of program in PlusRAM-xtra at the same time. For example, you can have AppleWorks (ProDOS) in one Program Area, WordStar (CP/M) in another and Format-80 (DOS 3.3) in a third. Any individual program can be quickly recalled at any time, without having to continually swap and re-boot slow floppy disks.

The RamDesk Manager also lets you make high-speed copies (*Backups*) of the contents of any Program Area onto any Apple-standard disks (5.25, 3.5 or hard disk). These copies can be used to quickly re-load (*Restore*) your programs into a Program Area.

Making a RamDesk Startup Disk

When you first start up (boot) the PlusRAM Support Disk, it will automatically ask you to make a *RamDesk Startup Disk*. You must use this new disk to start up the RamDesk Manager, *NOT* the PlusRAM Support Disk. You can use the original disk to make any additional RamDesk Startup Disks you may require.

Various DOS 3.3, CP/M, Pascal and ProDOS files are also contained on this disk, and you should refer to the sections dealing with these operating systems for further information.

IMPORTANT | *If your startup disk is not a 5.25 disk, then it will only contain the RamDesk Manager,* NOT *the above files. You must copy these files from your original PlusRAM Support Disk.*

Starting Up the RamDesk Manager

Place your RamDesk Startup Disk in Drive 1 and switch your Apple ON. The RamDesk Manager will automatically select and load the correct version of RamDesk for your machine and install itself inside the PlusRAM ready for instant recall (see 'Recalling the RamDesk Manager', page 8).

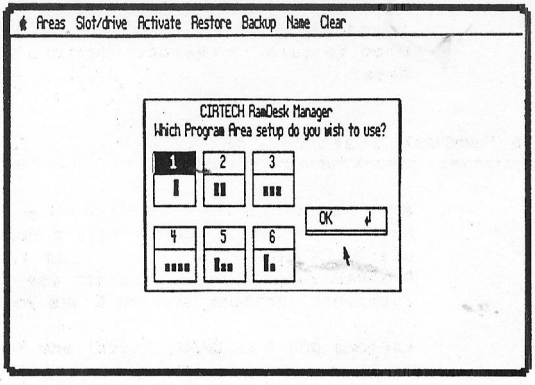
After the RamDesk Manager has started up you will be presented with one of the screens shown below:

The Graphic RamDesk

The graphic RamDesk is designed to operate on an enhanced 128K Apple //e or an Apple IIGS. It fully supports the AppleMouse // and the double hi-resolution graphics mode.

Incompatible monitors

If your monitor isn't displaying the graphic RamDesk very well (perhaps because its resolution is too low) you should make sure that the computer is sending a monochrome signal. On the //e, move the 'colour killer' switch (on the right of the motherboard, 6in from the back panel) to *MONO* (on the IIGS use the *Control Panel Program* to set the 'Display Type' to *Monochrome*). If this doesn't improve the display you may prefer to use the text RamDesk (see below).

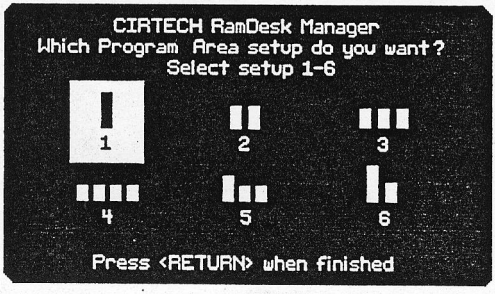


Text Alternative

You can use the text RamDesk on the enhanced 128K //e, or the IIGS, by pressing *Space* while the RamDesk Startup Disk is starting up.

The Text RamDesk

The text RamDesk is designed for the non-enhanced //e and][+ computers, to provide the same facilities as the graphics version but using the 40 column text display.



Selecting the Program Area Set-up

You must now select the way in which you wish to divide up PlusRAM's memory. Several set-up options are available:

1 - one Program Area which uses all PlusRAM's free space
2 - two equal-sized Program Areas
3 - three equal-sized Program Areas
4 - four equal-sized Program Areas
5 - one half-sized and two quarter-sized Program Areas
6 - one three-quarter-sized and one quarter-sized Program Area

The option you select will depend on the size and number of programs you will be using in PlusRAM.

Text RamDesk

To select a set-up, just press a number from 1 to 6, then press RETURN. The RamDesk Manager will then ask you which Program Area you wish to see; just press RETURN for now.

Graphics RamDesk

You can select the set-up using the keyboard as above or you can use the AppleMouse (if you have one). Just point at the option then press and release the Mouse button to select it (click on the OK box, or press RETURN, when you have finished).

The main RamDesk screen will appear after you have made your choice.

Using the RamDesk Manager

The RamDesk Manager has several main functions, selected from the *menu bar* at the top of the screen. How these functions are selected depends on the version of RamDesk you are using.

Text RamDesk

To select a function, use left and right arrow keys to move to the function (it will appear in inverse text) then press *Return*.

Graphics RamDesk

You can select a function by pointing to it with the mouse, then pressing and holding down the mouse button (the function will show in inverse text and the corresponding menu will appear below it). The item in the menu can be selected by moving the mouse to point to the item and releasing the mouse button. You can also use the keyboard by pressing *ESC* once to enter 'keyboard mode', then use the arrow keys (up/down and left/right) to move within the menu bar and menus. Just press *RETURN* when the function is in inverse, or press *ESC* again to exit from 'keyboard mode'.

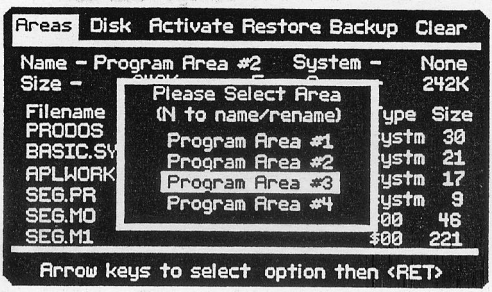
Both versions of RamDesk have 'short-cut' methods for selecting various functions, see *'Short-cut Keys'* below.

Each function in the menu bar is described below:

Show a Program Area

This function will 'show' the contents, size and space available in a Program Area.

You should select *'Areas'* from the menu bar. A window will appear on the screen.



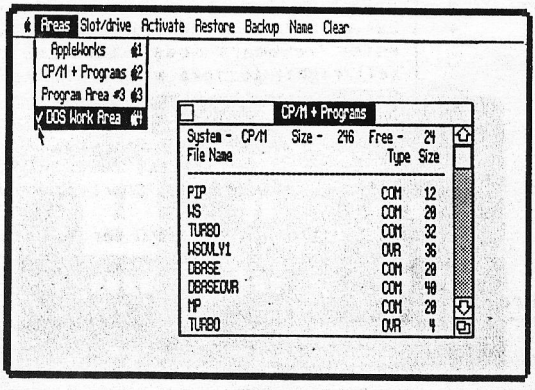
Use the arrow keys to select a Program Area from the list, then press *RETURN*.

Select a Program Area from the *'Areas'* menu. You can show as many Areas on the screen as you wish but the other functions will only work on the top Area (its name is in inverse). To bring an Area to the top, either select it again from the *Areas* menu or click the mouse on it.

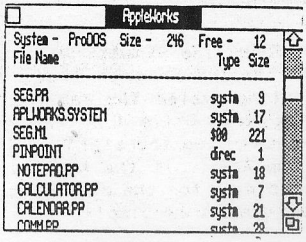
- **Moving:** You can move an Area around the screen by pointing to its name and, while holding down the mouse button, dragging it to a new position, then releasing the button. You can also do this by holding down the *CLOSED-APPLE* key (or the *option* key on the IIGS) and pressing *D* once; then use the arrow keys to re-position the Area and press RETURN when you have finished.

- **Hiding:** An Area can be removed from the screen (hidden) by clicking the mouse on the 'hide box' in the top left corner of the Area or by pressing *CLOSED-APPLE H*.

- **Scaling:** You can alter the size of the Area box by moving the 'grow box' in the bottom right corner of the Area with the mouse, or by pressing *CLOSED-APPLE G* and using the arrow keys.



These features are particularly useful if you wish to view the contents of more than one Program Area.



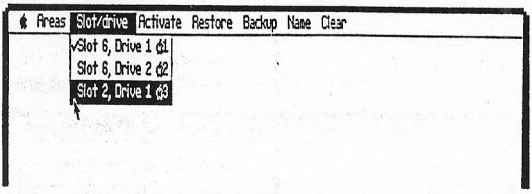
Inside each display you will find complete information on the Area. The display shows which operating system is in the Area, the Area size (in Kbytes), the approximate space unused (in Kbytes), and a full catalog of the files in the Area. The catalog shows the file names, file types and file sizes. The sizes are displayed in the unit appropriate to the operating system, eg. blocks for ProDOS or Pascal, sectors for DOS, and Kbytes for CP/M. ProDOS catalogs show the contents of sub-directories as well as main directories by placing a leading space in front of the filename, the number of spaces indicating the number of levels from the main directory to the file. With DOS catalogs, the drive number (1 or 2) of the file is printed in front of the file name.

You can 'scroll' through the catalog by using the up/down arrow keys on an Apple //e or by using the '<' or '>' keys on an Apple][. With the graphic RamDesk, you can scroll by 'clicking' the mouse on the arrows at the right edge of the Area display or by 'dragging' the small box up or down between the arrows.

Select Slot and Drive

Slot/drive allows you to choose the storage device for *Backup* and *Restore*, or the slot from which to start up. The menu shows any *Apple-standard* disk drives and storage devices connected to your computer. You can change to another slot or drive at any time.

Graphic RamDesk | The currently selected drive is indicated by a 'tick' or 'check mark' in the menu.



Text RamDesk | The currently selected drive is shown in inverse in the window.

Activate a Program Area

When you select *Activate*, the RamDesk Manager will start up the operating system in the top program Area . If the Program Area doesn't have an operating system the RamDesk Manager asks you to insert a 'startup disk' into Drive 1 of the selected Slot. If the area is empty, you should use the startup disk for the programs you wish to use in the Area. If the Area already contains files you must use a startup disk for the operating system shown beside 'System - ' in the Program Area display.

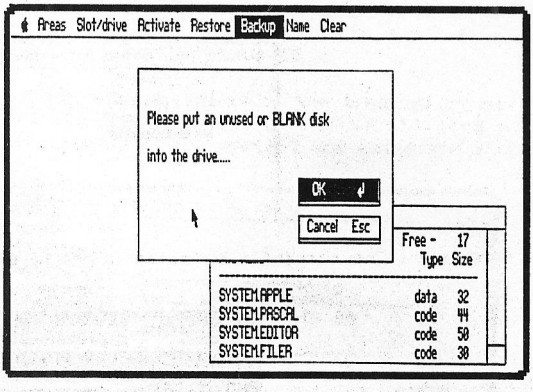
Copying operating systems

Full instructions for copying each operating system to PlusRAM are given in the PlusRAM manual under the sections: 'Starting Up /ProDOS / DOS / CP/M 2.20B or 2.23 / Pascal 1.3 / from PlusRAM'; see 'PlusRAM OPERATION AS A RAMDISK'.

Backup a Program Area

Backup lets you make special high-speed copies (called *Backup Disks*) of the used sections (including files and programs) in the top Area. You can use these *Backup Disks* to quickly re-load (and start up) the Area without having to use slow file copy programs (such as FILER or FID). *Backup* can also be used at any time to minimise loss of data caused by power interruption or failure.

When you select *Backup*, the RamDesk Manager will ask you to place blank or unused disks into the disk drive until all the information in the top Program Area has been copied to disk. You may find it convenient to label these *Backup Disks* with the name of the Area, so that you can locate them when you wish to *Restore* the Program Area (see below).



Backup Disks

Any disk can be used as a Backup Disk (blank disks are automatically formatted during Backup). Make sure you use a disk which contains no important data, as Backup will erase it.

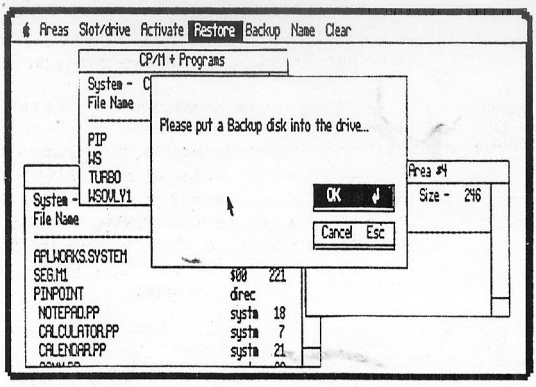
You will notice that the name in the Area menu has a 'tick' or 'check mark' (or an inverse asterisk with the text RamDesk) beside it to show that the Area has been backed up. The tick is removed when you *Activate* the Area.

ProDOS Devices

The RamDesk Manager allows you to *Backup* to any mass storage device which uses the ProDOS block device protocol, such as the UniDisk 3.5 or a hard disk. A hard disk must be prepared correctly before it can be used for Backup (see 'Using a ProDOS Hard Disk', page 9, for details).

Restore a Program Area

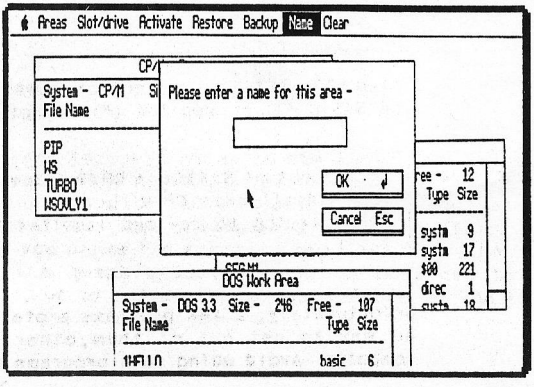
'Restore' allows you to re-load the contents of a Program Area from *Backup Disks* created using *Backup*.



The RamDesk Manager will ask you to insert the *Backup Disks* into the drive (they can be inserted in any order) until all the information has been read back into the Program Area.

Name a Program Area

This function (which is part of the *'Areas'* menu in the text RamDesk) allows you to type in a name for each Program Area to help you identify the contents of that Area.



You can rename a Program Area at any time. The name of the Area is saved on the *Backup Disk* during *Backup* and read in again on *Restore*.

Clear a Program Area

'Clear' will erase *ALL* of the files and data stored in the top Area. It can be used to free a Program Area for some other application or program.

Switching Program Areas

When you wish to swap from one Program Area to another, you must first get out of the program you are using. Then you simply recall the RamDesk Manager (so that you can select and Activate another Area). These two procedures are described below.

Getting Out of A Program

Before you can recall the RamDesk Manager, you must first get out of the program you are using. Most programs have an *exit* or *quit* option which will return you to either the Applesoft prompt (]) or the Monitor prompt (*). If this option is NOT available, the following should be used:

Apple //e and IIGS

Getting out of a program is easy on the Apple //e or IIGS. Just press *Control-OpenApple-Reset*, then *Control-Reset*, and the ']' prompt will appear at the bottom of the screen.

Startup Slot

If you have an enhanced (65C02) Apple //e with PlusRAM in slot 7, just press *Control-OpenApple-Reset* to recall the RamDesk Manager instantly! With the Apple IIGS, you can use the *Control Panel Program* to select PlusRAM's slot as the *startup slot*, so that you can recall the RamDesk Manager instantly from PlusRAM in any slot, just by pressing *Control-OpenApple-Reset*.

Apple][or][+

Press CTRL-RESET to get out of most programs and return to either the BASIC (]) or Monitor (*) prompt.

SoftCard CP/M

To get out of SoftCard CP/M you must run the *BOOT.COM* program (see 'Recall from CP/M' below). This is because SoftCard CP/M keeps trying to re-load itself from disk when you press CTRL-RESET.

Unfortunately, a few programs protect themselves so that there is no way to get out of them other than by switching off the computer. Avoid using such programs with the RamDesk Manager.

Recalling the RamDesk Manager

After the RamDesk Manager has started up, it installs itself automatically inside PlusRAM so that you can recall it instantly.

To recall the RamDesk Manager (for all machines):

- At the *Applesoft* prompt (]), type:

  PR#n and press *Return* (n = PlusRAM's slot number)

- At the *Monitor* prompt (*), type:

  nControl-P followed by *Return* (n = PlusRAM's slot)

Recall from CP/M

You can recall the RamDesk Manager from within CP/M by using the BOOT.COM program. You should copy BOOT.COM from the PlusRAM Support Disk onto your CP/M startup disk, or onto PlusRAM itself (see 'Working with CP/M' in the PlusRAM Manual for details of copying to PlusRAM). When you wish to recall the RamDesk Manager, just type BOOT *n* (where *n* = PlusRAM's slot number) at the A> prompt and press *Return*.

Short-cut Keys

Short-cut Keys are simple one or two key combinations which can quickly select most of the RamDesk functions without using the Mouse (graphic RamDesk) or cursor keys (text RamDesk).

Function	Graphic RamDesk	Text RamDesk
Activate a Program Area	[closed-A] A	A
Backup top Program Area	[closed-A] B	B
Clear top Program Area	[closed-A] C	C
Name/rename top Program Area	[closed-A] N	N
Restore a top Program Area	[closed-A] R	R
Show a Program Area	[closed-A] 1-4	1-4
Drag a Program Area	[closed-A] D	
Grow a Program Area	[closed-A] G	
Hide a Program Area	[closed-A] H	
Select Slot/drive	[open-A] 1-9	
Scroll catalog	[closed-A] up/down	> & <

[closed-A] and [open-A] refer to the Apple //e 'closed Apple' and 'open Apple' keys located at either side of the space bar. If you are using an Apple IIGS the *option* key is equivalent to the 'closed Apple' key. You should hold the appropriate 'Apple' key down while you press the function key. A list of the 'Short-cut keys' for the graphic RamDesk can be obtained by pressing [closed-A] I, or by selecting the Apple symbol at the left of the menu bar.

Using a ProDOS Hard Disk

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Using a ProDOS Hard Disk

The RamDesk Manager automatically supports any ProDOS compatible hard or fixed disk drive. Part of the hard disk may be allocated

for use by *Backup*, by using a small program on the reverse side of the PlusRAM Support Disk. This program will locate PlusRAM and the hard disk in your machine and modify the directory of the hard disk to prevent ProDOS from using the top section of the disk. To run the program, just start up your computer using a *COPY* of the *reverse* side of the PlusRAM Support Disk, select *'PREPARE HARD DISK FOR BACKUP'* and follow the instructions.

IMPORTANT *If your hard disk contains multiple operating systems, you* MUST *make sure that you start up your computer from the* ProDOS *partition on the hard disk to ensure that the RamDesk Manager can find the correct area to use for Backup.*
