ÆE APPLIED ENGINEERING

April 8, 1988

Dear Apple IIGS owner,

Congratulations! You own one of the most expandable and technologically advanced personal computers available today. In order to get the most out of your IIGS, Apple gave your computer expansion slots. These expansion slots are doors to new levels of IIGS possibilities; greater operating speed, increased memory and storage, even IBM compatibility. Expansion cards are the keys to these doors.

We manufacture products for your IIGS ranging from GS-RAM, our best-selling IIGS memory card, to the PC Transporter, the IBM emulator board. The fact is, Applied Engineering is the most successful IIGS expansion card manufacturer in the world. One of the reasons for our success is our exclusive loyalty to the Apple II. Apple enhancements are our only business. Our specialization allows us to devote all of our resources toward creating the best enhancement products possible for your computer.

Find enclosed a product catalog that will provide information regarding our wide variety of quality Apple II products. Use this information to help you determine more ways to make your computer work for you. Our products can be purchased from over 2000 dealers worldwide or you can purchase them directly through Applied Engineering. Should you need any advice or have any questions, please feel free to give us a call.

Sincerely,

Tom Milks
Sales Manager

Why Are Apple Owners So Loyal?

People who have the best often are, but in the case of Apple there's more. Apple owners think back to how Apple got started in 1976, just two people working out of a garage and what happened is the talk of Wall Street and the computer industry as well. Many like the fact that Apple only makes computers. Unlike their competition, they don't make typewriters, copiers or telephones. They do just one thing and that's one reason they do it so well.

At Applied Engineering we think the same way. You see, Applied Engineering is the only major hardware manufacturer totally dedicated to the Apple computer. Whereas most of our competitors must divide their time between IBM, Atari, Radio Shack or other computers, our engineers only design products for the Apple. This dedication allows us to be much more familiar with the Apple and those who use them.

We don't expect you to buy an Applied Engineering peripheral on loyalty alone, but when you compare our products to those made by AST and others you'll find out why Applied Engineering means quality design, innovation, craftsmanship and total Apple compatibility.

The other guys do pretty well considering how busy they are with IBM computers. But at Applied Engineering, ALL of our work involves products for the Apple. In fact, all of our employees were Apple owners before they came to work for us. The people in shipping, engineering, quality control and order entry all use Apples at work and at home.

This one track mindedness of ours allows us to offer the largest storage with AppleWorks and SuperCalc 3a and our Z-80 Plus card now includes the new 5.1 operating system. We can expand the Apple IIGS to over 8 MEGABYTES of memory and the IIc to 1 MEGABYTE, we've got clock cards, music cards, A to D converters, digital controllers, and a BSR system so your Apple can control your whole house with no additional wiring!

Applied Engineering recognizes that we've got to do a better job than our IBM counterparts because we know you're smarter than the average computer buyer, you bought an Apple. You see, our competition has it a little easier, their customers aren't as smart as you. After all, they bought the wrong computer.

So if you need more memory, or 80 columns, or RGB color, or double hi-res graphics, if you want to know the time and temperature or other "real world" conditions, if you'd like to run CP/M software, have a RAM disk, increase the storage of AppleWorks or VisiCalc, if you want your Apple to play music, talk and sing, if you'd like your Apple to control the lights and appliances in your house, then do what NASA does, what Steve Wozniak does, what Ford does, what the U.S. Government, Hughes Aircraft, Honeywell, Westinghouse, AT&T, and even what Apple computer does, call Applied Engineering. Then you will discover what thousands of companies and over a hundred thousand Apple owners already know, that you can be smart and loyal at the same time.

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We Set the Standard

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Applied Engineering Spring/Summer Catalog
1988

Compatible with IIe, II+ and IIGS

RamFactor
Up to 1 MEG on card
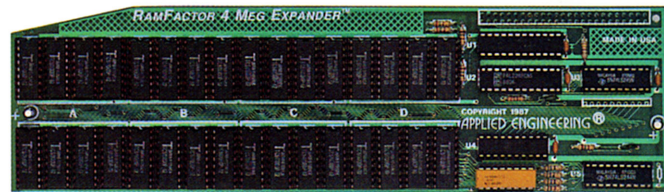
RamFactor 4 MEG Expander
Up to 4 MEG on card

Now you can have a slot 1 through 7 card with up to 5 MEG on one slot

Now anyone with an Apple II+, Franklin, Laser 128, Apple IIe or IIGS preferring to use slots 1 through 7 can now enjoy the speed and performance that they've been waiting for.

With RamFactor, you'll be able to instantly add another 256K, 512K, or a full 1 MEG on the main board and an expansion connector can address an additional 16 MEG of memory for possible future expansion. Since virtually all standard software is automatically compatible with RamFactor, you'll immediately be able to load programs into RamFactor for instantaneous access to information. You'll also be able to store more data for larger word processing documents, bigger databases, and expanded spreadsheets. And with the battery back-up option, you can switch on your Apple and your favorite software will be up and running in just a few seconds.

Very Compatible

All the leading software is already compatible with RamFactor. Programs like AppleWorks, Pinpoint, SuperCalc 3a, Sensible Speller, and many others. And RamFactor is fully ProDOS, DOS 3.3, Pascal 1.3 and CP/AM compatible. In fact, no other slot 1-7 memory card is more compatible with commercial software.

AppleWorks Power

There are other slot 1-7 cards that give AppleWorks a larger desktop, but that's the end of their story. RamFactor is the only slot 1-7 card that increases AppleWorks internal memory limits, increasing the maximum number of records in the database and lines permitted in the word processor, and RamFactor is the only standard slot card that will automatically load all of AppleWorks into RAM dramatically increasing speed and eliminating the time required to access the program

disk, it will even display the time and date on the AppleWorks screen with any ProDOS clock. RamFactor will automatically segment large files so they can be saved on 5.25″ disks. All this performance is available on the Apple IIe, 64K II+, Franklin, or Laser 128 when used with an 80 column display. RamFactor, no other standard slot card comes close to enhancing AppleWorks so much.

"Electronic Hard Disk"

With the RamCharger battery back-up option, the new low power RamFactor will retain programs and data for over 10 hours during power failures or even when you turn your computer off. When power returns, RamCharger automatically recharges the battery to full charge. With power from your wall outlet, RamCharger will back-up your RamFactor card's RAM memory indefinitely. And because RamFactor plugs into slots 1-7, it's the only memory card that can cold boot an Apple without using slow floppy or hard disks. An accessory "Y" cable allows one RamCharger to power two fully expanded RamFactors for more than 4 hours.

Powerful Program Switcher

With RamFactor, you can organize memory into multiple work areas and switch between them. Each work area can contain different programs and, with proper formatting, even different operating systems. Now you can switch from one program to another or even switch from AppleWorks to DOS 3.3 to CP/AM to Pascal 1.3 to ProDOS in under a second. And with our battery back-up option, you can have permanent storage for up to 20 years.

Features:

- 256K to 1 MEG on main board. Expansion connector for possible future expansion to 16 MEG.
- Fully Apple II Memory Expansion compatible in II+ and IIe, RAM disk only in IIGS
- Compatible with Apple IIe, II+, IIGS, Franklin and Laser 128
- Battery back-up option allows you to turn on your Apple and run your favorite programs in just a few seconds
- Can be configured to recognize ProDOS, DOS 3.3, Pascal 1.3, and standard CP/AM
- Built-in RAM drive software (a true RAM disk not disk caching)
- Systems are directly bootable from RamFactor if desired
- Diagnostic software included
- Automatic expansion with AppleWorks 1.3 or 2.0
- Allows Apple II+ and IIe to run your AppleWorks without buying any additional software
- Accelerates AppleWorks
- Displays time and date on the AppleWorks screen with any ProDOS clock
- Fits any I/O slot except slot 3
- Fully socketed and user upgradeable
- 4 MEG RamFactor Expander option available
- 5 year warranty — parts and labor

RamFactor with 256K	**$269**
RamFactor with 512K	**$389**
RamFactor with 1 MEG	**$629**
"Y" cable	**$24**
Battery Back-up Option	**$179**
RamFactor 4 MEG Expander with 1-4 MEG	**CALL**
RamFactor Enhancement Kit— Power reduction for old revision RamFactors	**$20**

Compatible with IIe and II+

TransWarp™. The fastest accelerator you can buy for your Apple™ IIe, II, or II+

Computing at Warp Speed!

It's an experience you shouldn't miss. And with TransWarp, you won't have to. Because TransWarp will run your software up to *3.6 times faster* — leaving other accelerators in the stardust! In fact, with the TransWarp accelerator, your IIe or II+ runs about 30% faster than the IIgs.

No more yawning while your Apple™ slowly rearranges text or calculates spreadsheets. With ultra-fast RAM, TransWarp speeds up *all* Apple software — including AppleWorks, Supercalc 3a, VisiCalc and all educational software, graphics and games. And it's compatible with all standard peripheral cards (such as RamWorks and Apple memory cards), ProFile and Sider hard disks, 3.5″ UniDisks, 80-column cards, modems, clock cards, mice and more! You name it, TransWarp accelerates it. There's even a 16 bit upgrade chip available, for the serious programmer.

An Important Difference

Only TransWarp accelerates your Apple's main memory, ROM *and auxiliary memory.* And with more and more programs residing in auxiliary memory,

buying anyone else's accelerator makes less and less sense.

There's one more difference. Since TransWarp doesn't use memory caching, it accelerates *all* software — and not just most of it.

A Cinch to Use

Simply plug TransWarp into any slot in your Apple II, II+ or IIe — including slot 3 in the IIe. Instantly you'll be computing at speeds you only dreamed about before. And should you ever wish to run at normal speed, simply press the ESC key while turning your Apple on.

Since TransWarp is completely transparent, you won't need pre-boot disks or special software. It's ready to go right out of the package!

Speed = Productivity

Imagine the productivity gains you'll achieve when your programs are running over three times faster. TransWarp is so powerful, your Apple will make IBM PCs™ and even ATs™ look like slowpokes — whether you're planning taxes, plotting charts or playing games!

Take a look at a few of the features that set TransWarp apart:

- 3.6 MHz 65C02

- Ultra-fast on-board RAM for optimum acceleration without disk caching

- Low power consumption for cool operation

- Totally transparent operation with all software

- Plugs into any slot, including slot 3 on the Apple IIe

- Works as 16K language card for Apple II Plus

- 16 bit option available

- 5 year warranty — parts and labor

TransWarp Accelerator   **$219**
16 bit upgrade (may add later)   **$69**

Compatible with IIGS

GS-RAM

Up to 1.5 MEG on one card

GS-RAM Plus

Up to 6 MEG on one card

Now expand the IIGS RAM and ROM with up to 8 MEG of "Instant On" memory with the all new GS-RAM!

GS-RAM Has an All New Design

A design that delivers higher performance including increased speed, greater expandability, and improved software.

More Sophisticated, Yet Easier to Use

GS-RAM works with all IIGS software. In fact *any* program that runs on Apple's smaller memory card runs on the GS-RAM. But with GS-RAM you can have more memory, improved performance, and almost unlimited expansion capabilities. We've designed the new GS-RAM to be easier to use too—you don't have to adjust the size of your RAM disk every time you use a DMA device. No other RAM card with more than 4 banks of memory installed can make the same claim.

More than Just Hardware

Each GS-RAM and GS-RAM Plus includes the most powerful set of IIGS software enhancements available anywhere. In fact, our nearest competitor offers only a fraction of the invaluable programs that we include with each GS-RAM card. This software includes the most powerful disk-caching program available, the GS-RAM Cache. The Cache will make most of your applications run up to 7 *times faster*. Also included is a diagnostic utility that lets you test your GS-RAM by graphically showing the location of any bad or improperly installed RAM chips. And for AppleWorks users, we give you our exclusive Expander program that dramatically enhances both the capabilities and speed of AppleWorks.

Making AppleWorks Even Better

Applied Engineering's Expander program eliminates AppleWorks 2.0 internal memory limits allowing it to recognize up to 8 megabytes of Desktop workspace, and increasing the limits from only 7,250 lines to 22,600 lines in the word processor and from 6,350 records to 22,600 records in the database. The Expander allows all of AppleWorks, including print functions, to automatically load into RAM. The clipboard size will increase from 255 to 2,042 lines maximum. GS-RAM will automatically segment larger files so you can save them onto multiple floppies. And GS-RAM provides a built-in printer buffer that allows you to continue working in AppleWorks while your printer is still processing text. You can even load Pinpoint or MacroWorks and your favorite spelling checker into RAM for instant response.

Grow by Kilobytes or Megabytes

We offer GS-RAM in two configurations so you can increase your memory 256K at a time (GS-RAM) or a megabyte at a time (GS-RAM Plus). Both are IIGS compatible and both come with our powerful enhancement software. GS-RAM can hold up to 1.5 MEG of 256K chips and GS-RAM Plus can hold up to 6 MEG using 1 MEG chips. And since both use standard RAM chips (not high-priced SIMM's), you'll find expanding your GS-RAM or GS-RAM Plus easy, convenient, and very economical. For further expansion, you can plug a 2 MEG "piggyback" card into the GS-RAM's expansion port for up to 3.5 MEG of total capacity. Or up to a whopping 8 MEG on GS-RAM Plus. If GS-RAM owners outgrow 3.5 MEG, they can easily upgrade to GS-RAM Plus for a nominal charge.

GS 2 MEG Expander
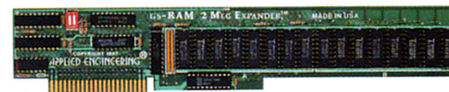
- Expands GS-RAM and GS-RAM Plus
- Up to 8 MEG total memory
- Can be used as stand-alone memory
- DMA compatible

GS-RAM's Got It ALL!

- 6 RAM banks (most cards have 4)
- Memory expansion port
- Ultra-fast disk caching on ProDOS 8 *AND* ProDOS 16
- Expands AppleWorks internal limits
- Includes hi-res self test software
- No soldered-in RAM chips
- Expandable to 8 MEG with 2 MEG Expander
- No configuration blocks to set
- DMA compatible to 4 MEG
- RamKeeper back-up option allows permanent storage of programs & data
- 5 year warranty — parts and labor
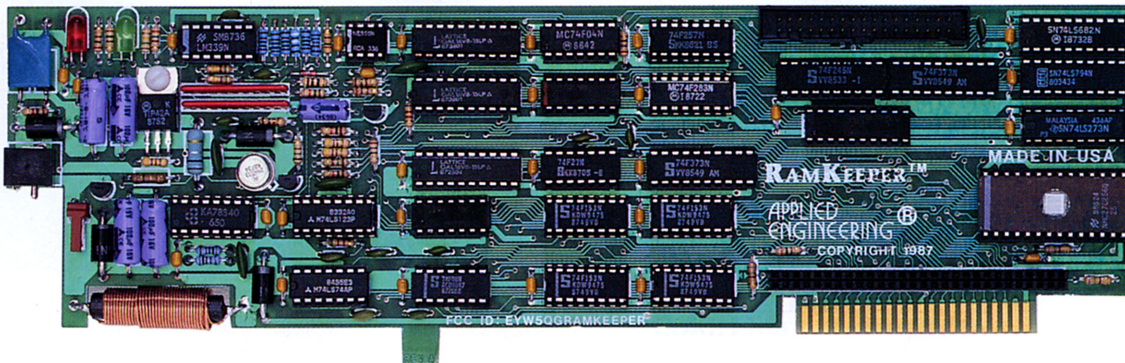- Proudly made in the U.S.A.

Compatible with IIGS

For the "Instant On" Apple IIGS

Permanent Storage with an "Electronic Hard Disk"

Now when you turn on your IIGS your favorite program can appear on screen in just a few seconds! With RamKeeper, your IIGS memory card will retain stored programs and stored data while your IIGS is turned off. RamKeeper allows you to divide your IIGS memory into part "electronic hard disk" and part RAM for your programs workspace—in almost any way you want and at anytime you want. GS-RAM, GS-RAM Plus, Apple IIGS memory card and most other IIGS memory cards are compatible with RamKeeper.

Supports Up to Two IIGS Memory Cards at the Same Time

If you bought your IIGS with Apple's memory card and later wished you had the GS-RAM, no problem. RamKeeper will support both cards plugged into RamKeeper simultaneously!

How It Works

Just unplug your IIGS memory card from your computer, plug your IIGS memory card into RamKeeper, plug RamKeeper into the IIGS memory slot. If you have another IIGS memory card, an additional card socket on RamKeeper will accommodate your second card. That's all there is to it!

Reliability from the Most Experienced

Applied Engineering has the most experience in the industry with battery-backed memory for the Apple so you are assured of the most reliable memory back-up system available. And in the world of battery-backed memory, *reliability* is everything! That's why Applied Engineering uses the more dependable Gel-Cell's instead of Ni-Cad batteries (if Ni-Cad's aren't discharged periodically, they lose much of their capacity). RamKeeper has close to 6 times (about 6 hours) the "total power failure" back-up time of other systems. When power returns, RamKeeper automatically recharges the battery to full charge. With power from your wall outlet, RamKeeper will back-up your IIGS memory cards RAM indefinately.

RamKeeper Has and Does It All!

- Allows instant access to your programs without slow disk delays

- Configure Kilobytes or Megabytes of instant ROM storage for your favorite programs

- Reduces power strain to your internal IIGS' power supply

- Contains back-up and status L.E.D.'s

- Can support up to two IIGS memory cards simultaneously—2 GS-RAMs or 1 GS-RAM and 1 other

- Supports both 256K installed memory chip boards like GS-RAM and the Apple IIGS Memory Expansion Card as well as 1 MEG installed memory chip boards like GS-RAM Plus

- Slot-Mover Option — if slot 7 in your IIGS is occupied, and you are going to use two cards, this option will move the front-side card out of the way.

- 5 year warranty — parts and labor

- Proudly made in the U.S.A.

- RamKeeper comes *complete* with battery, software and documentation

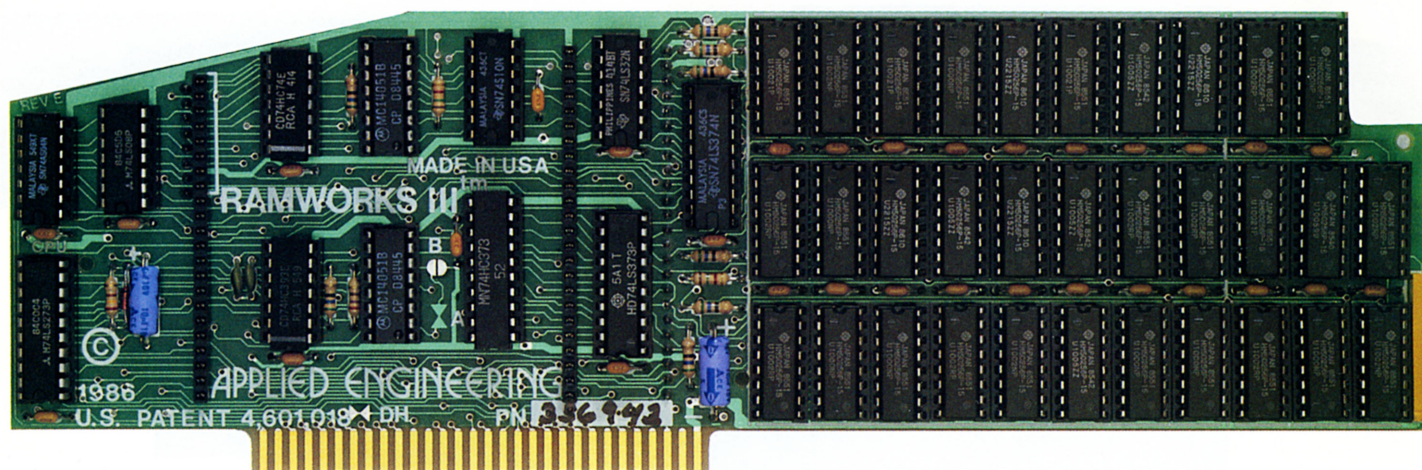|	
RamKeeper	**$189**
Slot-Mover Option	**$39**

Compatible with IIe

Add Up to 3 MEG Memory with the RamWorks® III Expansion Board

You command vast power with Ram-Works III — up to 12 times more memory than your IIe came with.

You work faster, more efficiently. Your IIe does things it could never do before.

Memory intensive software like AppleWorks runs faster. You can put Pinpoint or MacroWorks *and* your spelling checker into RAM at the same time for instant response. And you can work with massive files without constantly going back to your disk drive.

Run AppleWorks 20 Times Faster

With 512K or larger RamWorks, *all* of AppleWorks (including printer routines) automatically loads into RAM.

The result? AppleWorks runs up to 20 times faster. You don't waste time accessing the program disk drive. You switch instantly from word processing to spreadsheets to database. Anytime. And without wear on disk drives.

No other expansion board, not even Apple's, gets so much out of Apple-Works.

RamWorks III gives you a huge AppleWorks desktop — 366K with the 512K RamWorks III and on up to 2251K with the 3 MEG RamWorks III (even after *all* of AppleWorks automatically loads in memory).

RamWorks eliminates AppleWorks'

internal memory limits. While Apple-Works 2.0 makes up to 6,350 database records available, you get up to 22,600 with RamWorks. Instead of AppleWorks' 7,250 word processing lines, you get up to 22,600 lines. And clipboard capacity zooms from AppleWorks' 255 lines to 2,042 lines.

RamWorks boards include an Apple-Works printer buffer — up to 105K in the 512K model — so you can keep working while your printer is printing. Also, you don't have to buy a separate print buffer, a savings of up to $250.00.

Auto-segments Large Files

RamWorks automatically segments large files so they can be saved on two or more disks. When you need to work with the file, you simply load it in the same sequence you saved it.

Add Up to 3 MEG without Using a Single Expansion Slot

RamWorks III, even when it's carrying its full 3 MEG of new memory, fits in your IIe's auxiliary slot. Your valuable expansion slots 1 through 7 are free for other peripheral cards.

If you don't need all of that power now, you can start with as little as 64K. It's easy to add memory to the expandable RamWorks III board as your needs grow.

You can go to 1 MEG on the main board using standard RAMs. That's more memory than most people ever use. (1 MEG is about 500 pages of text.)

For even more power, snap a 512K, 1 MEG or 2 MEG expander card into the RamWorks III low profile connector. The expander card won't interfere with Slot 1.

512K Expander

2 MEG Plus Expander

8
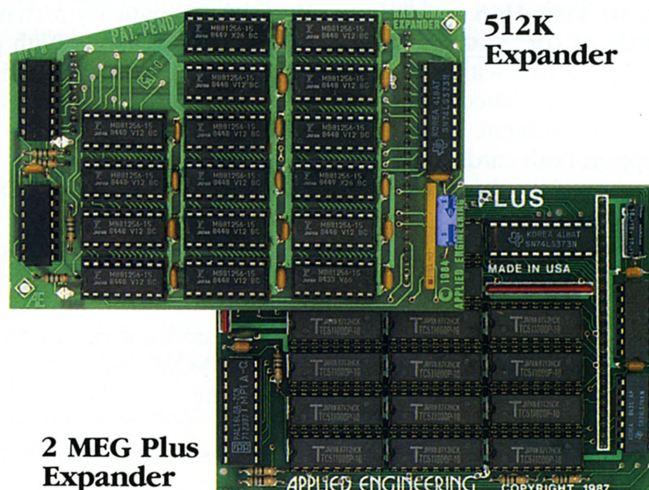
Recover Your Investment in the Wrong Card

Most of it anyway.

If you bought someone else's RAM card — one that's not recognized by your programs — RamWorks III can help recoup your loss. Pull the memory chips off your old card and plug them into RamWorks III.

Truly Compatible

RamWorks III is compatible with more off-the-shelf software than any other RAM card. It is recognized by all memory intensive programs for the IIe.

Its power enhances AppleWorks, Pinpoint, Tax Preparer, Sensible Speller, ProFILER, Managing Your Money, SuperCalc 3a, VIP Professional and many, many more . . . even software written specifically for Apple cards.

RamWorks III is compatible with most hardware add-ons like ProFile and Sider hard disks.

Of course, RamWorks III is fully compatible with all IIe's — enhanced or unenhanced, American or European.

Easy to Install and Use

RamWorks III quickly plugs into your IIe's auxiliary slot. You get memory expansion and super-sharp 80 column text (U.S. Patent 4601018).

RamWorks III comes with everything you need to get up and running. The easy-to-understand manual shows you how to get the most from your new memory. The two accompanying 5.25″ disks include a graphics utility program, AppleWorks enhancement program,

IBM Digital
Output Cable

Apple Analog
Output Cable
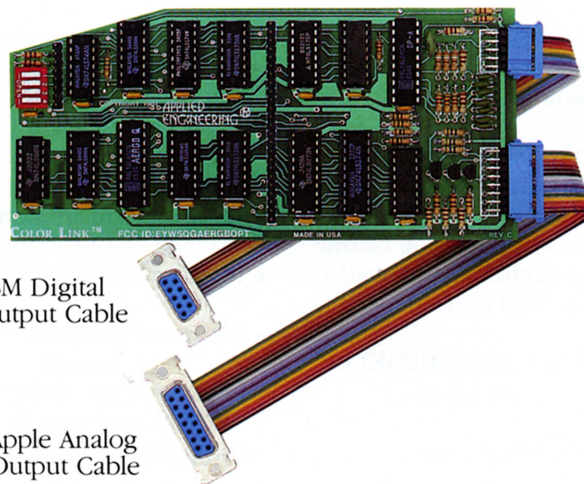
ColorLink® RGB Option

ProDOS and DOS 3.3 RamDrive™ and other useful utility software.

Superior Color Graphics, More Readable Text

The ColorLink™ RGB option gives brilliant, sharp graphics and text.

It meets all Apple standards for RGB output control. So it's compatible with more off-the-shelf software.

You can use Apple or IBM RGB monitors. ColorLink provides Apple standard analog and IBM standard digital RGB outputs (cables included).

ColorLink offers four text colors so you can use the one that's easiest on your eyes (others offer only green).

The ColorLink option plugs into the back of RamWorks III. It doesn't interfere with Slot 1.

You can order ColorLink with your RamWorks III board or add it later.

Optional 16 Bit Power

You can explore powerful programming possibilities with Applied's optional 65C816 card. It's capable of linerally addressing more than 1 MEG.

It connects to RamWorks III's built-in CPU port. Instead of using another slot, AE's 65C816 card simply replaces the 65C02. It maintains complete 8-bit compatibility.

The RamWorks basic® Alternative

Need power but not all the capabilities of RamWorks III? Look at RamWorks basic. It has the same performance features as RamWorks III, it's attractively priced and it's available with up to 512K memory on the main board, and can use all the RamWorks III "Piggy Back" options.

Backed by the Leader

Applied Engineering has been designing and building Apple enhancements for over 8 years. We invented large RAM cards for the Apple. Today, our innovative technology leads the field. We sell more Apple enhancements than anyone else, including Apple Computer. So you know we'll be around to solve problems and answer questions.
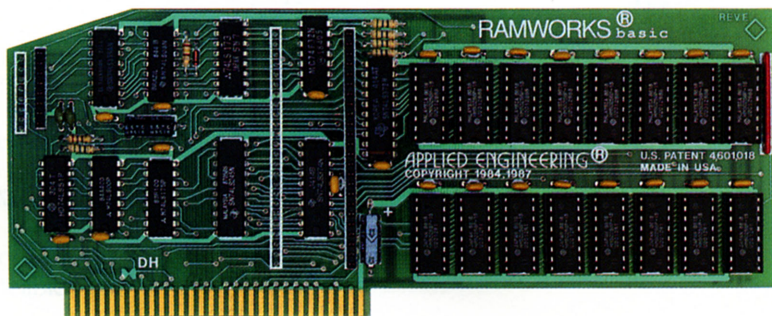
RamWorks basic® Expansion Board

More on next page

It's Got It All

- 5 year warranty — parts and labor

- Super sharp 80 column text (U.S. Patent 4601018) with or without RGB option

- Double high resolution graphics (with or without RGB option)

- Expandable up to 1 MEG (1024K) on main board

- Can use 64K or 256K RAMs in any memory block

- Linear addressing co-processor port

- Automatic AppleWorks Expansion — from 366K on a 512K RamWorks III and 2251K on a 3 MEG RamWorks III

- Accelerates AppleWorks

- Built-in AppleWorks printer buffer

- 100% compatible with all standard IIe software

- RAM Drive™ and ProDrive,™ the ultimate disk emulator software included free

- Compatible, RGB option featuring ultra high resolution color graphics and multiple text colors, with cables for both Apple and IBM type monitors

- Self-diagnostic software included

- Lowest power consumption (U.S. Patent 4601018)

- Takes only one slot — No slot 1 interference

- Software industry standard

- 16 bit option

- Advanced computer aided design

- Used by Apple Computer, Steve Wozniak and virtually all software companies

- Displays date and time on the AppleWorks screen with any ProDOS compatible clock

- Much, much more!

RamWorks basic with 64K	**$189**
RamWorks basic with 256K	**$199**
RamWorks basic with 512K	**$299**
RamWorks III with 64K	**$209**
RamWorks III with 256K	**$219**
RamWorks III with 512K	**$339**
RamWorks III with 1 MEG	**$579**
RamWorks III with 1.5 MEG	**$849**
RamWorks III with 3 MEG	**$1749**
512K Expander	**$349**
2 MEG Plus Expander with 1 MEG	**$689**
2 MEG Plus Expander with 2 MEG	**$1189**
65C816 16 Bit Card	**$159**
ColorLink RGB Option	**$129**

CP/AM MEGDrive™

CP/AM MEGDrive is just like Ram-Drive, only for CP/AM. CP/AM MEG-Drive runs on any Z-80 card that runs standard CP/AM, e.g. Applied Engineering Z-80 Plus, Microsoft Soft Card or PCPI. CP/AM MEGDrive will dramatically speed up the operation of most CP/M software because CP/M normally goes to disk fairly often. Fast acting software like dBase II, WordStar and Turbo Pascal becomes virtually instantaneous when used with CP/AM MEGDrive.

Z-80 Plus, Microsoft version	**$29**
PCPI APPLI-CARD version	**$29**

VC IIe Expander

VC IIe Expander gives owners of VisiCalc IIe and Advanced VisiCalc IIe increased storage. When used with VC IIe you'll get 141K workspace (128K RamWorks III or larger required). When used with advanced VC IIe you'll get 235K with a 256K RamWorks III and 437K with a 512K RamWorks III.

VC IIe Expander	**$29**

Comparison Between RamWorks, RamFactor and GS-RAM

Many of the features and benefits of RamWorks III, RamFactor, and GS-RAM are the same; however, there are differences that we would like to point out so that you can make the best choice.

Most importantly, RamWorks III is specially designed for the Apple IIe and GS-RAM is specially designed for the Apple IIGS. These cards will not work on a II+, Franklin or other compatibles. RamFactor is compatible with the IIe, II+, IIGS, Franklin, Laser 128 and most compatibles.

All three cards are equally compatible with commercially prepared programs. However, RamWorks and GS-RAM offer more power with AppleWorks but RamFactor can be battery backed-up in smaller sizes. If your primary application is AppleWorks and you have a IIe or a IIGS you may prefer RamWorks or GS-RAM respectively. But if you prefer to use slots 1-7, RamFactor would be the better choice. All three products are so good you'll be happy no matter which one you choose.

Capability	RamWorks® III	RamFactor™	GS-RAM™ GS-RAM Plus™
Computer compatibility	Apple IIe	Apple II+, IIe, IIGS and compatibles	Apple IIGS
Maximum memory on main card	1 Megabyte	1 Megabyte	1.5 MEG GS-RAM 6 MEG GS-RAM Plus
Expander cards (for expansion beyond main card)	512K, 2 MEG	RamFactor 4 MEG, "Y" connector for 2 RamFactors	2 MEG RAM
Compatible slot	Auxiliary slot	Slots 1-7 except 3	Memory expansion
RAM disk	Disk based	EPROM/disk based	IIGS control panel
Software standard	Yes	Yes	Yes
Battery back-up	No	Yes	No on main board*
AppleWorks compatibility	All versions	Versions 1.3 or 2.0	Version 2.0
Maximum number of records in database	22,600	22,600	22,600
Maximum number of lines in word processor	22,600	22,600	22,600
Lines in WP and DB clipboard	2042	2042	2042
Autoload AppleWorks	Yes	Yes	Yes
Displays time on screen with ProDos clock	Yes	Yes	Yes
Auto-segments large files	Yes	Yes	Yes
AppleWorks printer buffer	Yes	No	Yes
Fully socketed and user upgradeable	Yes	Yes	Yes
16 bit option (65C816)	Yes	No	No

Comparisons made using AppleWorks 2.0, however, similar performance is obtained using older AppleWorks versions with RamWorks.

*RamKeeper provides the GS-RAM and GS-RAM Plus with battery back-up.

Compatible with IIe, II+* and IIGS
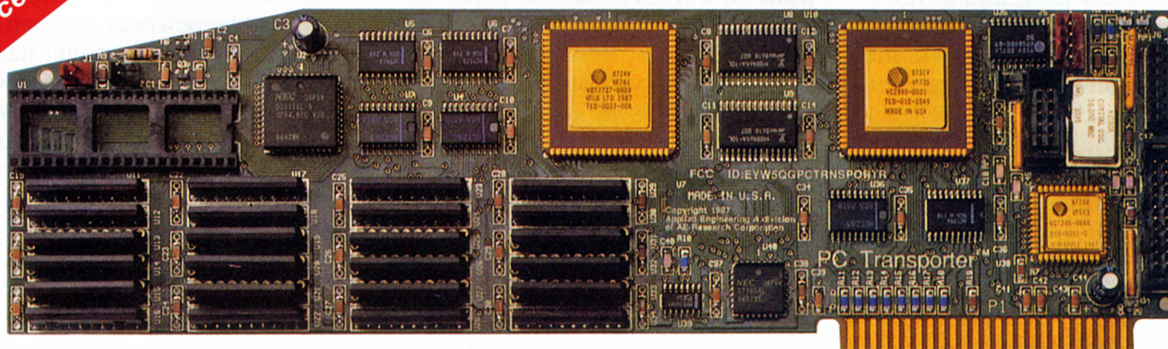
The Apple II expansion board that lets you run MS-DOS programs

Welcome to the world of MS®-DOS. Welcome to over 10,000 software packages you could never use before. Packages like Lotus® 1-2-3®, Multi-Mate®, dBASE III PLUS™, even Flight Simulator.

PC Transporter turns your Apple® into the most versatile personal computer you can own. Now you can run MS-DOS programs on your Apple II®* like you would on an IBM® personal computer or compatible. With one important difference. You'll run most programs *three times faster* than an IBM PC/XT®.

PC Transporter also accepts our optional 8087-2 Math Co-processor Chip to make even faster work of number-crunching tasks.

It's Good for Business. And for Pleasure

If you use an Apple at home, you now have access to a wealth of new communications programs, games and bulletin boards. You can tap into the world's largest library of business programs, too.

If you use an IBM PC or compatible at work, you can bring most of your programs home and run them on your Apple.

Educators no longer need to limit student to the Apple world, but can offer practical IBM software experience as well. And Apple-based businesses finally have access to IBM business software.

Less Expensive than an IBM Clone

Yes. You can get a stripped-down IBM clone for about the same price as the PC Transporter. But add in the peripherals you need to get the clone up and running, and the clone would cost about three times what our American-made card costs. You don't have to buy new hardware to use PC Transporter.

Works with Hardware You Already Own

PC Transporter lets MS-DOS programs work with the hardware you've already invested in. Including drives, monitors, printers, printer cards, clock cards and serial cards.

Once you've installed PC Transporter, IBM programs will recognize your Apple hardware as IBM hardware. For example, a ProDOS® clock will work just like an IBM clock with IBM software. And an Apple ImageWriter® will work like an IBM Graphics Printer.

You can use your own IIe or IIGS™ keyboard, even while running IBM software. Or you can buy an optional IBM-style keyboard (required for the II Plus).

PC Transporter supports an Apple mouse as an IBM compatible serial mouse.

From ProDOS to MS-DOS and Back—at Lightning Speed

Now you can instantly shift between Apple's ProDOS applications and IBM's MS-DOS applications.

Running in the IBM mode, PC Transporter gives you up to 640K of user RAM and 128K of system RAM.

But even when you're *not* running MS-DOS programs, PC Transporter makes your Apple a better computer. You can access up to 768K of extra RAM for use with your Apple programs. PC Transporter conforms to the Apple II Memory Expansion Card protocol when in Apple mode. That's a $300 value even if you never use the card for MS-DOS.

And three other memory choices are available—pick one that's right for you.

Install It and Forget It

PC Transporter is an expansion card that works in Apple slots 1 and 2 and 4 through 7.

You don't need special skills or tools to install it. Even if you've never installed an expansion card, it takes about 15 minutes.

*PC Transporter supports Apple IIe, IIGS and FCC Certified Apple II Plus.

VISA MasterCard and C.O.D. 214/241-6060

Functions as a Universal Disk Drive Controller

PC Transporter supports both 3.5″ and 5.25″ MS-DOS formatted diskettes. If you plan to run IBM applications from 5.25″ floppy disks, you'll need our versatile 5.25″ 360K Drive System. Use your Apple 5.25″ disk drive to run Apple format 5.25″ disks and the Applied Engineering 5.25″ 360K Drive to run IBM format 5.25″ disks.

If you want to use the new 3.5″ disks, an Apple Disk 3.5 Drive will support both IBM MS-DOS formatted disks and Apple ProDOS. The PC Transporter acts like an Apple 3.5 Drive disk controller for IIGS, IIe and II Plus users.

PC Transporter will support up to 5 drives in a number of combinations. For example, you can connect a 5.25 Applied Engineering 360K Dual-Drive System directly to the card. Then plug two daisy-chained Apple 3.5 Drives (not the Apple UniDisk 3.5) to the 360K Dual-Drive System. For a fifth drive, you can use a ProDOS file as an IBM hard disk.

Versatile Data Storage

PC Transporter reads MS-DOS and translates it into Apple native ProDOS. That means you can store IBM programs and data on any ProDOS storage device including the Apple 3.5 Drive, Apple UniDisk™ 3.5, Apple 5.25″ drive, SCSI or ProDOS compatible hard drives. (You can even use the Apple UniDisk 3.5 with its own controller card for storing programs and data, but not for directly booting an IBM formatted disk.)

You can even use our 360K PC-compatible drive for ProDOS storage, and a 143K Apple 5.25″ drive for MS-DOS storage.

Better IBM Graphics than IBM

Because analog is sharper than digital, PC Transporter with an analog RGB monitor provides CGA graphics superior to IBM's digital display—even while running *IBM* software! Or you can plug PC Transporter directly into an IBM digital RGB monitor if you wish.

You can also use an Apple composite monitor or Apple IIGS analog RGB monitor in IBM text or graphics mode.

Created by Apple's Original Designers

The brains behind PC Transporter were also behind your Apple II.

The PC Transporter design team includes the former project manager for the creation of the Apple IIe and IIc. The co-designer of the Apple II disk controller. The first full-time Apple programmer and author of the ProDOS operating system.

And that's just a few members of the team.

So you know the PC Transporter and your Apple were made for each other.

Support and Service from the Leader in Apple Add-ons

Applied Engineering sells more Apple peripheral boards than anyone else—including Apple Computer. So you know we'll be around after the sale.

PC Transporter comes with a 15 day money back guarantee. If you're not fully satisfied after using it, return it for a full refund. PC Transporter also comes with a 1 year warranty.

Specifications

CPU: High performance true 16 bit V-30 microprocessor; chip has full 8086 and 8088 instruction set operating at 7.16 MHz

User RAM: 640K maximum (IBM)

System RAM: 128K

Apple User RAM: 768K maximum

Input/Output Devices

- Video
  TTL RGB video
  NTSC composite video
  NTSC composite input (Apple II video)
  Apple IIGS analog with adapter

  CGA modes:
  Mode 0: 40 x 25 text; 16-level monochrome
  Mode 1: 40 x 25 text; 16 foreground and 8 background colors
  Mode 2: 80 x 25 text; 16-level monochrome
  Mode 3: 80 x 25 text; 16 foreground and 8 background colors
  Mode 4: 320 x 200 graphics, 4 colors
  Mode 5: 320 x 200 graphics, 4-level monochrome
  Mode 6: 640 x 200 graphics, monochrome

- Floppy disk controller
  Controls two double-sided, 40 track 5.25″ or 80 track 3.5″ disk drives
  Reads and writes IBM 8 or 9 sector disk formats
  Supports Apple format on 3.5″ and 5.25″ floppy disk drives
  Can boot ProDOS diskettes on double-sided 3.5″ or 5.25″ floppy disk drive

- Keyboard
  "F" keys, control, shift, shift lock, open and closed Apple lines remapped for PC/XT style keyboard
  Optional IBM PC keyboard port

- Psuedo I/O
  Common IBM PC/XT I/O devices supported with common Apple II I/O devices (such as Apple mouse and ProDOS clock)
  Hardware trap for I/O and BIOS locations

- Sound: uses Apple II speaker for both IBM and Apple sound output

- Power supply requirements
  PC Transporter on standby: 5 volts; 350 mA
  PC Transporter active: 5 volts; 600 mA
  PC Transporter active with 8087-2; 5 volts; 1,075 mA

- Dimensions
  Length: 10,30 inches
  Height: 3.05 inches

- Space required
 Occupies only one expansion slot (1-7 except 3)

All of the options for PC Transporter are available from Applied Engineering.

5.25″ IBM Format 360K Drive System

Optional unit allows MS-DOS programs on 360K 5.25″ disks to boot from PC Transporter. Unit can also accept up to two IIGS 3.5″ drives daisy-chained to back of unit as well as additional expansion for another 360K 5.25″ Half-Height floppy drive. Combined with PC Transporter, the Drive System can also be used for storing up to 360K per disk of ProDOS programs and data.

5.25″ 360K Single-Drive System (expandable to 2 drives)	**$269.00**
5.25″ 360K Dual Drive System	**$399.00**
5.25″ Half-Height 360K Drive (additional drive for One-Drive System)	**$135.00**
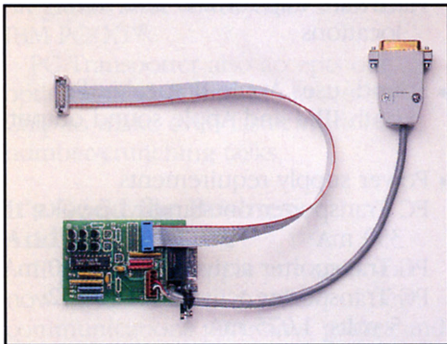
ColorSwitch   **$44.00**
(included with IIGS Installation Kit)

Contains 15 pin analog RGB output and automatically switches inputs between an analog version of PC Transporter RGB output and Apple analog RGB output.

Mastering DOS   **$17.95**

Most extensive and easy to understand guide using PC and MS-DOS we have seen. Cover price regularly $19.95.

Sony RGB Monitor   **$519.00**

The finest quality RGB Trinitron monitor we have tested. Packed with features: displays NTSC composite color video, analog RGB, digital RGB, plus it's a remote-control, full cable-ready 13″ television!

Analog RGB Cable   **$39.00**
(for use with Sony monitor)
Digital RGB Cable   **$39.00**
(for use with Sony monitor)
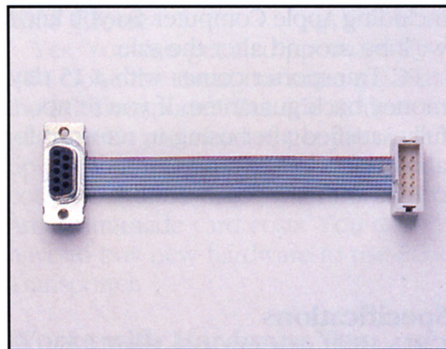
Digital RGB Adapter   **$24.00**

Contains 9 pin digital RGB connector that allows a digital RGB monitor cable to plug directly into PC Transporter.

Heavy Duty Power Supply   **$69.00**
(IIe and II Plus only)

Applied Engineering's heavy duty 6000 MA Power Supply. Fills needs of today's power user.
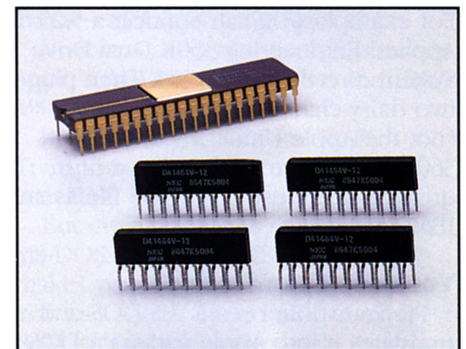

IBM-style Keyboard   **$139.00**

IBM-style Keyboard available for users who prefer to use real IBM-type keyboards with their IBM programs. Includes IBM Keyboard Cable. (Required for Apple II Plus.)

IBM Keyboard Cable   **$34.00**

Available for PC Transporter users who already have an IBM-style keyboard. (Required for Apple II Plus.)

128K ZIP Memory Chip Set   **$70.00 per set**

PC Transporter memory expansion chips. Expand in 128K increments.

8087-2 Math Co-Processor Chip   **$229.00**

For super-fast number-crunching. 8MHz maximum clockrate. Plugs directly into 8087 chip socket on PC Transporter.

Make your Apple speak IBM

PC TRANSPORTER memory choices.		
RAM in Apple mode:	RAM in IBM mode:	Price:
384K	256K	**$489.00**
512K	384K	**$559.00**
640K	512K	**$629.00**
768K	640K	**$699.00**

Note: The IBM mode is 128K less because the PC Transporter uses 128K for system memory.

IIGS Installation Kit   **$49.00**
Includes ColorSwitch and drive cable.
IIe, II Plus Installation Kit   **$39.00**
Includes drive cable, keyboard cable, video cable and speaker cable.
PC Transporter Installation Video
Included FREE in Installation Kits.

AE Extended 80 Column Card
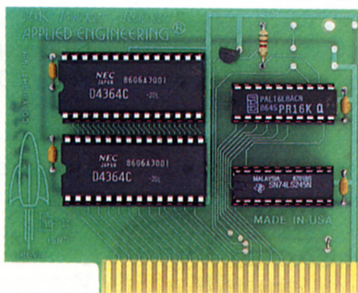
Compatible with IIe
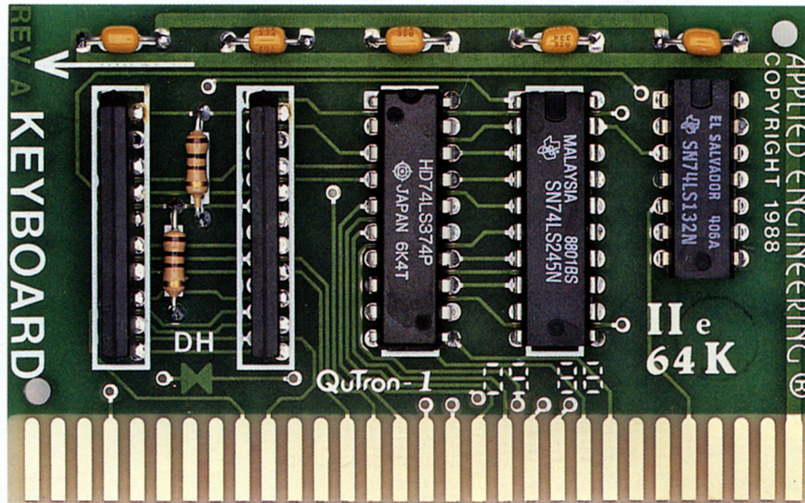
Features

- Plugs into the Apple IIe auxiliary slot and functions EXACTLY like Apple's Extended 80 Column Card

- Expands your Apple IIe to 128K memory

- Provides an 80 column text display

- Compatible with Apple IIe 80 Column and Extended 80 Column Card software

- Can be used as a solid state disk drive to make your programs run up to 20 times FASTER (will act as half a drive)

- Permits your IIe to use double high resolution graphics

- Automatically expands AppleWorks to 56K desktop

- Automatically expands VisiCalc to 95K storage in 80 columns!

- ProDOS will use the AE Extended 80 Column Card as a high speed disk drive

- Documentation included, we show you how to use all 128K

- 5 year warranty — parts & labor

Extended 80 Column Board $99

16K Pocket Rocket RAMcard

Compatible with Apple II and II+

16K Pocket Rocket

Features

- Expands Apple II & II+ to 64K

- 16K memory expansion card for the Apple II and II+ fully compatible with Applesoft, CP/M and Pascal. Plugs into slot 0.

- Low power-reduced chip count

- Allows II+ to run ProDOS

- No jumper cable or chips to remove

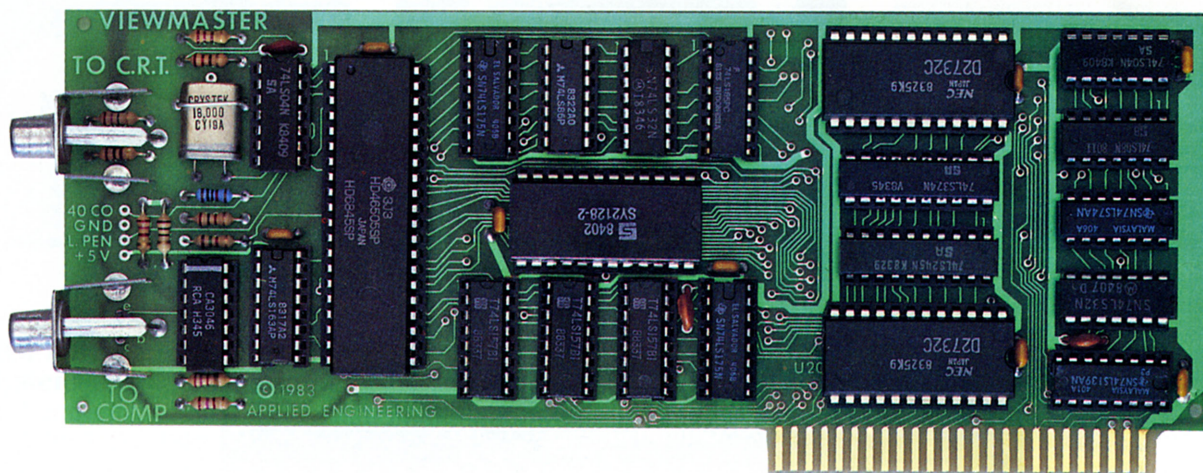- 5 year warranty — parts and labor

16K Pocket Rocket RAMcard $89

VISA MasterCard and C.O.D. 214/241-6060

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Compatible with II+ and Franklin

There used to be about a dozen 80 column cards for the Apple, Now There's Only ONE!

	BUILT-IN SOFTSWITCH	SHIFT KEY SUPPORT	LOW POWER DESIGN	80 COLUMN HOME	7X9 DOT MATRIX	LIGHT PEN INPUTS	40 COLUMN OVERRIDE	INVERSE CHARACTERS
VIEWMASTER 80	YES	YES	YES	YES	YES	YES	YES	YES
SUP'RTERM	NO	YES	NO	NO	NO	NO	YES	YES
WIZARD 80	NO	NO	NO	NO	YES	NO	YES	YES
VISION 80	YES	YES	NO	NO	YES	NO	NO	NO
OMNIVISION	NO	YES	NO	NO	NO	NO	YES	YES
VIEWMAX 80	YES	YES	NO	NO	YES	NO	NO	YES
SMARTERM	YES	YES	NO	NO	NO	YES	YES	NO
VIDEOTERM	NO	YES	YES	NO	YES	YES	NO	YES

Each Viewmaster 80 includes our powerful AppleWorks Expand software, allowing AppleWorks to run on the II+ with only 64K (or more) memory. (We recommend the RamFactor memory card, but most compatible Apple memory cards will work.) The software provides our full range of AppleWorks enhancements, including expanded records and word processor lines, multi-disk saving, time and date display on screen with any ProDOS clock, and more!

Features

- All new design

- 80 characters by 24 lines

- Fully compatible with all Apple languages and software. Includes AppleWorks enhancement software

- Very sharp 7X9 character matrix with true descenders

- Highest compatibility with existing 80 column software

- Power and input connector for light pen

- Very low power consumption through the use of CMOS devices

- High speed (18 MHz) scroll rate

- Upper and lower case characters with true descenders, both inverse and normal

- All on-screen editing functions are supported
- User definable cursor shape

- Compatible with Apple II, II+ and IIe

- 5 year warranty — parts and labor

TOTAL compatibility is the secret to the Viewmaster 80's great success. The Viewmaster 80 works with 80 column applications (including CP/M, Pascal, WordStar, Format II, Easywriter, Apple-Works, Supertext 80, Zardax, Apple PI, Letter Perfect, dBase II, VisiCalc, Multiplan, and hundreds of others).

Viewmaster 80 delivers a super sharp, state of the art display, with a 7 x 9 character matrix giving you a clear, easily readable character.

Whether you're buying your first 80 column card or replacing a less powerful one, you'll appreciate the many extra features built in to the Viewmaster 80 because every feature of every 80 column card is already in the Viewmaster 80. The Viewmaster 80 is compatible with the Apple II, II+, and Franklin computers.
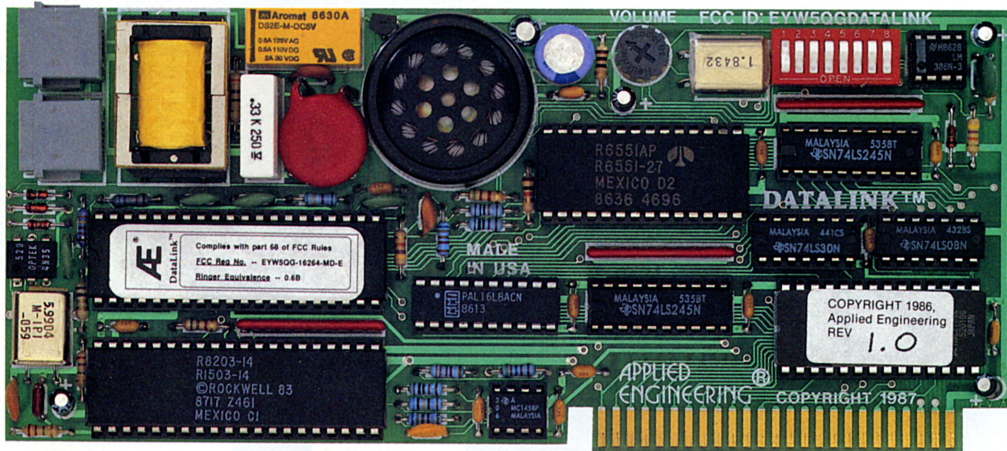
Viewmaster 80   **$159**

VISA MasterCard and C.O.D. 214/241-6060

Now you can tap into a world of information—without draining your resources. Our DataLink™ modem lets your Apple IIGS, IIe or II+ communicate with other computers, download free software from networks and bulletin boards, access database services and more. For a remarkably low price.

The World at Your Fingertips

With the DataLink modem, you'll be able to draw information from thousands of databases. Send and receive electronic mail—even overseas. Join clubs and bulletin boards to exchange software or solve computing problems with other Apple users. Download free public domain software. And share files with personal computers and mainframes.

DataLink offers high speed, reliable telecommunications for your Apple IIe, IIGS or II+. DataLink is the newest, most advanced internal 1200 BAUD modem available for the Apple. A design so advanced it couldn't have been made before mid 1987.

There's Nothing Missing on DataLink

Unlike most other modems, Data-Link comes with its own easy-to-use communications software in ROM and disk that supports macros, file transfers, on-line time display, data capture and datascope mode. The software also allows you to store hundreds of phone numbers for auto-dialing and log on.

A compact design allows DataLink to fit in any slot—including slots 1 and 2 of the IIGS with a cooling fan installed. DataLink operated at 1200 or 300 baud. Built-in diagnostics check for accuracy of data transmission, and DataLink lets you track the progress of calls either electronically or via an on-board speaker.

Introductory Offers from Popular Networks Included

When you purchase DataLink, you'll get a fee-waived membership and usage credit to The Source worth $64.95. $60.00 worth of free on-line time from NewsNet. A free $50.00 subscription to the Official Airline Guide, and a free subscription to the GEnie network worth $18.00!

Features

- 1200 and 300 baud
- Hayes® "AT" command compatible but with more commands
- 1200 or 300 BPS half or full duplex
- Bell 212A and 103 compatible
- Communications software in ROM for II+, IIe and IIGS
- Communications software on disk for IIe and IIGS
- On-line help screens
- Works in any slot of the IIe, IIGS or II+ (except 0)
- Auto-dial, auto-answer
- Call progress detection electronically or with speaker (speaker has volume control)
- Built-in self test
- Two built-in phone connectors
- Phone cable included
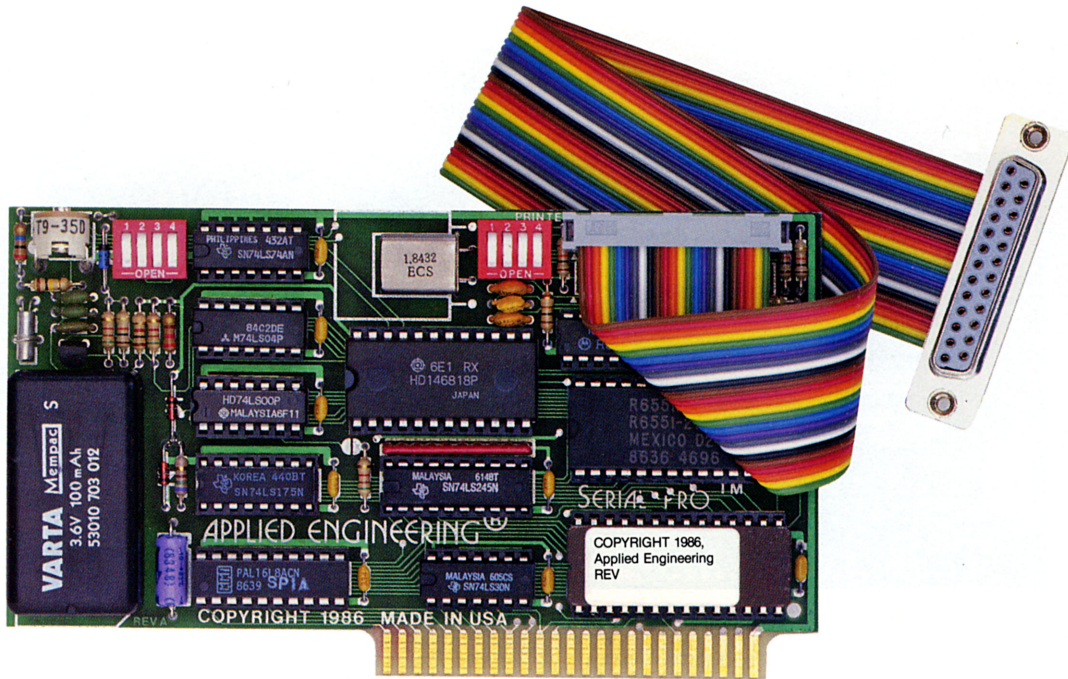- 5 year warranty — parts and labor

DataLink   **$219**

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Compatible with IIe, II+ and IIGS

Serial Pro is a powerful multifunction card for the Apple IIe, II+, IIGS and Franklin computers. Serial Pro combines a powerful serial port for interfacing to either a printer, or a modem or other serial device, with a full function clock/calendar card. Serial Pro's serial port is compatible with virtually all letter quality and dot matrix serial printers, including Apple's Image-Writer and ImageWriter II. The serial port can communicate with the fastest external modems at baud rates from 50 to 19,200.

Set-up is easy, because unlike other cards, there are no dip switches to program or disks to use. Serial Pro has a built-in set-up screen that allows all parameters to be set. And on-screen help that makes it super easy. An on-board battery stores your selections for over 20 years, but you can change them at any time.

Serial Port Features

- Fully Super Serial Card compatible but more versatile and easier to use

- Compatible with printers

- Compatible with modems

- Prints graphics to printer (without software)

- Baud rates from 50 to 19,200

- Variable word length, number of stop bits and parity selection

- Variable handshaking, linefeed and graphics selection

- Crystal controlled circuits are used to provide ultra accurate baud rates

Clock Calendar Features

- ProDOS, DOS 3.3 and AppleWorks compatible. Displays time and date on the AppleWorks screen.

- Automatically time and date stamps AppleWorks files

- 12/24 hour clock format

- 20 year auto recharging nickel-cadmium battery

- Switch selectable real-time interrupts

- Built-in on-screen time and date setting (no software needed)

- Does not use phantom slots

Serial Pro is perfect for Apple IIe, II+, IIGS or Franklin owners in need of a serial port or clock/calendar or both. But unlike other multifunction cards on the market, Serial Pro does not use phantom slots. Other multifunction cards use phantom slots, meaning that other slots must be kept empty. Because Serial Pro doesn't use this technique, all the slots in your computer are usable.

Serial Pro comes complete with manual, cable and detailed instructions for connecting to all the leading printers and modems.
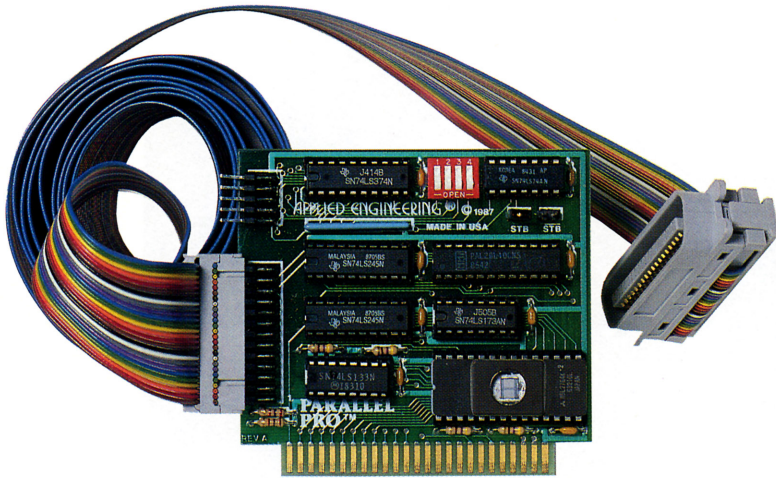
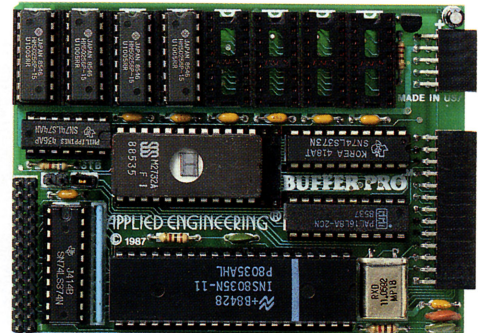**Serial Pro**   **$139**

VISA MasterCard and C.O.D. 214/241-6060

Parallel Pro™ and Buffer Pro™

Compatible with IIe, II+ and IIGS

Parallel Pro   **Buffer Pro Option**

The most powerful Apple printer/buffer interface you can buy

Parallel Pro

When you're trying to find the right parallel interface for your printer, look to Applied Engineering to bring you the best in quality and features.

Features

- Compatible with Apple IIe, IIGS, and II+ (works in any slot except 3)

- Fully compatible with ProDOS, DOS 3.3, Pascal 1.3, and CP/M

- Works automatically with all software

- Supports almost all parallel printers including: Epson, IBM, Okidata, C. Itoh, NEC, Star Micronics, Toshiba, and more

- Conforms fully to the Centronic Standard

- Built-in control panel allows easy access to set-up information

- Automatic formatting of BASIC listings

- Built-in self test and Buffer Pro™ support

- Extensive graphics print capability for the hi-res, double hi-res, and the IIGS super hi-res screens

- Buffer option available (see above)

- Includes 6-ft. cable for connecting to your printer

Buffer Pro™

Buffer Pro adds memory to Parallel Pro, freeing your Apple from running the printer. With Buffer Pro, you can continue to use your Apple while the printer is printing. To add Buffer Pro to Parallel Pro, simply unplug the cable on Parallel Pro and plug Buffer Pro where the cable was, then plug the cable onto Buffer Pro, That's it!

Features

- Compatible with IIe, IIGS, and II+

- Fits in a IIGS with or without fan

- Adds 32 to 256 pages of printer buffering

- User expandable using 64K or 256K RAM chips one chip at a time and in any combination. Each 256K chip adds approximately 32 pages (maximum of 8 chips)

- Connects directly to Parallel Pro

- Works automatically with all software

- May be paused or cleared with simple commands (unlike other buffers, you don't have to "shoot the computer" if you want to stop the print-out before it's done)

Both Parallel Pro and Buffer Pro come with a comprehensive manual, a 5 year warranty — parts and labor, and outstanding technical support if needed.

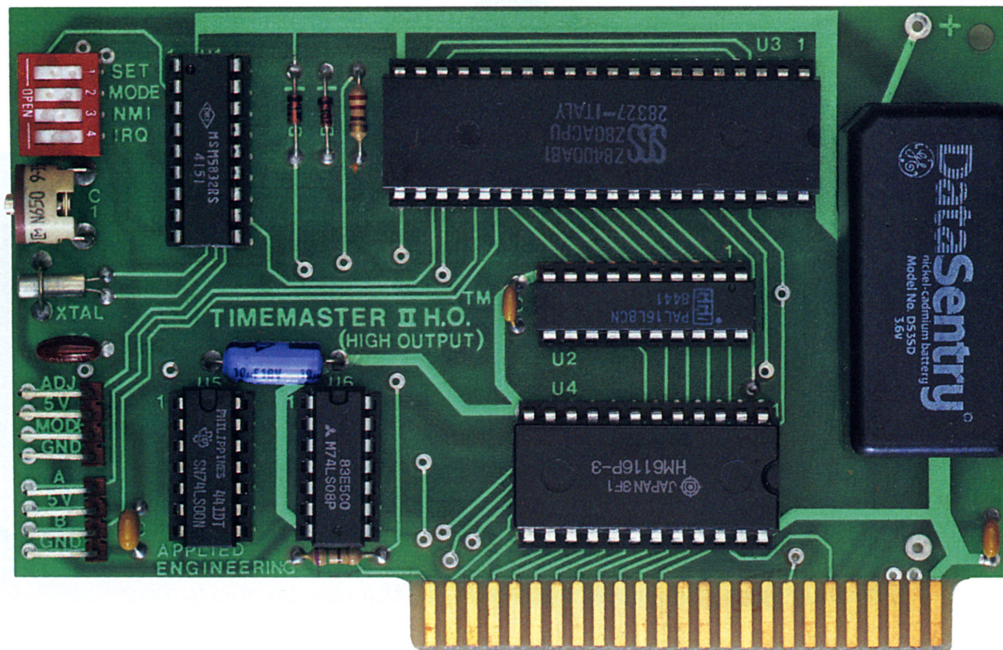|	
Parallel Pro	**$99**
Buffer Pro Option:	
with 32-page buffer	**$109**
with 128-page buffer	**$159**
with 256-page buffer	**$219**

VISA MasterCard and C.O.D. 214/241-6060

Compatible with IIe, II+ and IIGS

Features

- The first clock that displays the date and time on the AppleWorks screen and database files

- Allows AppleWorks to time and date stamp all data files automatically

- Meets and surpasses all protocols as defined by Apple

- Absolutely, positively totally ProDOS and DOS 3.3 compatible

- Time in hours, minutes, seconds and milliseconds

- 24 hour military format or 12 hour with AM/PM format

- Date with year, month, day of week, and leap year (other clocks say they have the year, but they don't; it's just that ProDOS will calculate the year based on day of week and it only does this for 7 years)

- The easiest programming in BASIC

- Fully buffered data buss

- Eight software controlled interrupts so you can run two programs at the same time (many examples are included)

- Digital I/O Port for advanced applications

- Compatible with ALL of Apple's languages. Sample programs for machine code, Applesoft, CP/M and Pascal on 2 disks

- On-board timer lets you time any interval up to 48 days long down to the nearest millisecond

- Accuracy 0.00005%

- High quality P.C. board, gold plated connector, all I.C.'s in high quality sockets, with mil. spec. components used throughout

- Auto Recharging nickel-cadmium battery designed to last over 20 years

- Five year warranty — parts and labor

Timemaster H.O. is the first clock to display the date and time on the AppleWorks screen

	PRO-DOS COMPATIBLE	INCLUDES DOS DATER	MILLISECOND TIME	YEAR DATA	LARGEST SAMPLE SOFTWARE	REMOTE SET PORT	BSR PORT	EMULATES ALL OTHER CLOCKS
H.O	YES	YES	YES	YES	YES	YES	YES	YES
BRAND A	NO	NO	YES	NO	NO	NO	NO	NO
BRAND C	NO	NO	NO	NO	NO	NO	NO	NO
BRAND M	NO	NO	NO	NO	NO	NO	NO	NO
BRAND P	YES	YES	NO	YES	NO	NO	NO	NO
BRAND S	NO	NO	NO	YES	NO	NO	NO	NO
BRAND T	YES	NO	NO	NO	NO	NO	YES	NO

H.O.—for Those Who Need It, Simplicity

At first, all clock cards seem to give you about the same things. Until you put them to work. Then you'll find out if they do everything you expected. Or make you do everything the hard way or maybe they won't even do it at all.

You know what makes the difference? It's not just having the newest, whizziest features, but rather what those features actually do for you in the real world. And that's the whole idea behind the Timemaster H.O. because the H.O. is designed to work with you in a natural, intuitive way.

What we're really talking about here is useability. When you get right down to it, it's not any one big thing, but a combination of a lot of little things. Like full emulation of ALL other clocks. Yes, we emulate brand A, Brand T, Brand P, Brand C, Brand S and Brand M too. It's easy for the H.O to emulate other clocks, we just drop off features. That's why the H.O. can emulate others, but none of the others can emulate us.

The Timemaster H.O. will automatically emulate the correct clock card for the software you're using. You can also give the H.O. a simple command to tell it which clock to emulate. This is great for writing programs for those poor unfortunates who bought some other clock card. In fact, you could put ALL the competitive cards in every slot in your Apple and you still wouldn't have all the features of the Timemaster H.O.

Of course, most programs will use the Timemaster H.O. in its native mode, but it's comforting to know that you can use programs written for other products without any modification.

The Timemaster H.O. comes with a ton of fun and useful software. It has an easy-to-read yet detailed manual, a 20 year auto-recharging battery and a 5 year warranty — parts and labor.

H.O. — for Those Who Can Handle It, Performance

If you program (or are learning to), you'll find the H.O. a joy to use. A 36 page manual has many program examples. Soon you'll wonder how you ever got along without your H.O. And speaking of software, you also get 2 disks full of some really fantastic sample programs in machine code, DOS 3.3, ProDOS, BASIC, PASCAL and CP/M. In fact, we provide more sample software than all the competition combined. Hobbyist take note: Most of the machine code programs come with their source code on disk. In Pascal, the H.O. will update the filer and disks with the correct date and time. All routines are installed in the SYSTEM LIBRARY for easy use. You'll never use the Date command again! Other software includes Appointment Book so you'll never forget to do anything again. Just enter appointments up to a year in advance then forget them. Appointment Book will remind you.

As for ProDOS, well, the H.O. is totally ProDOS compatible. The H.O. works with ProDOS software like AppleWorks, Catalyst IIe, SuperCalc 3a, Word Juggler and ALL other ProDOS software. And let's get one other thing out of the way—No other clock is more compatible with ProDOS than the Timemaster II H.O.; none, zero, zip.

DOS 3.3 users will appreciate our Dos-Dater software, which upgrades the DOS on your disks so that DOS 3.3 will use the H.O. to time and date (including the year) disk files. Every time a program is saved or modified, the time and date are stored in the CATALOG with the name. You can now tell when a program was saved or when a file was last modified, and this date stamping feature is completely automatic.
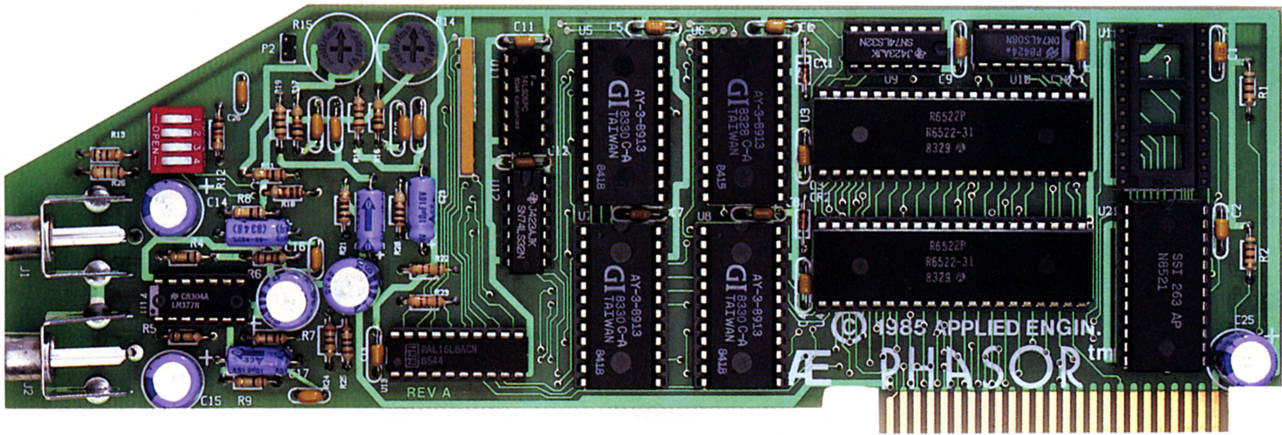
Remote Control

Our BSR X-10 interface option for the H.O. allows you to remotely control lights and electrical appliances through your BSR command console in your home or office. You're already wired because a BSR system sends its signals over regular 120 volt wiring. That means you can control any electrical device in your home or office without any additional wiring.

The X-10 is easy to program because it is controlled by firmware in ROM on the Timemaster H.O. One simple command will turn on or off any appliance or light (lights can be brightened or dimmed too). Use your Apple for security lighting, heating and A.C. control, lab/process control, waking up Junior, re-waking up Junior and controlling your T.V. set (just think, you need not miss another episode of Star Trek).

Is the Timemaster H.O. a simple, easy to use clock for beginners? Or a sophisticated, high performance peripheral for the experienced? The answer is "YES".

Timemaster H.O.	**$99**
BSR Option (may be added later)	**$29**
BSR Command Console	**$39**

Compatible with IIe, II+ and IIGS

Enter the CP/M world with the new Z-80 Plus card from Applied Engineering and introduce your Apple to thousands of CP/M programs. Only the Z-80 Plus comes with standard CP/AM 5.1 software, the most advanced system for running Apple CP/M programs ever. Only CP/AM 5.1™ has advanced features like built-in disk emulation for popular memory expansion boards (those made by Apple and Applied Engineering and others) to give you a faster system with more storage. You also get menu driven utilities that are much easier to use than the older CP/M utilities so you can get down to all that great CP/M software faster. Each Z-80 Plus runs older Apple CP/M programs too, down to Version 1.6 (2.2 is the most popular). With the Z-80 Plus you can run the largest body of software in existence and the Z-80 Plus is the only card on the market capable of accessing more than 64K in an Apple IIe. If you have RamWorks, up to 3072K is available to CP/AM as a RAMdisk; with RamFactor, up to 5120K. And each Z-80 Plus includes our CP/AM MEGDrive software, enabling IIe owners to use an extended 80 column card, or a RamWorks card as an ultra-fast RAM disk enabling CP/M

software to run 10 to 20 times faster. So fast acting software like WordStar and dBASE II become virtually instantaneous.

You'll have two computers in one and the advantages of both, all at an unbelievably low price.

Features

- Totally compatible with all CP/M software
- Fully compatible with Microsoft disks (no pre-boot required as with others)
- Executes the full Z-80, 8080 and 8085 instruction set
- Does everything the other Z-80 cards do plus supports Z-80 interrupts
- Specifically designed for High speed operation in the Apple IIe and IIGS (runs nearly as fast in the II+ and Franklin)
- Green "CP/AM Working" LED indicator, the Z-80 Plus does not interfere with non-CP/M programs
- An on-card ROM eliminates many I.C.'s for a cooler, less power consuming board
- Compatible with 5.25″ and 3.5″ disk drives as well as the Sider hard disk

- The Z-80 Plus can access up to 3072K of RAMdisk memory (most programs only need 64K)
- Runs on any Apple II, II+ IIe or IIGS with at least 64K memory. Works with any 80 column card, but does not require one
- The Z-80 Plus will allow you to run: dBase II, WordStar, Spell Star, Turbo Pascal, Cobol-80, Fortran-80, Peachtree and ALL other Apple CP/M based software
- Fast clock: 2MHz (Z-80B)
- Documentation included
- High quality P.C. board, gold plated connector, all I.C.'s in high quality sockets, with mil. spec. components used throughout
- Compatible with Apple II, II+, IIe and IIGS
- 5 year warranty — parts and labor

With the Z-80 Plus, you can access one of the largest bodies of software in existence. Two computers in one and the advantages of both, all at an unbelievably low price.

Z-80 Plus   **$149**

VISA MasterCard and C.O.D. 214/241-6060

Phasor—for the thunderous, booming power you so desperately need

Phasor is a complete high performance stereo music, sound and speech synthesizer for the Apple IIe, II+ or IIGS. Phasor offers 12 musical and sound effects voices (channels) and 4 white noise generators for percussive sounds. Phasor also gives your Apple the power of uncanny speech, with its unlimited vocabulary speech synthesizer.

What makes Phasor so desirable is not just that it offers the very best in both sound and speech, but the fact that Phasor automatically enhances and is recognized by more off the shelf software than any other sound card. Phasor works with ANY program that works with ANY sound card. Programs written for the Mockingboard™, the ALF music card, Synphonix™ and the Super Music Synthesizer actually sound better on Phasor. In fact, Phasor has twice the accuracy and 4 times the output power of the nearest competitor. Phasor adds exciting pulse pounding sound to all of the better games like Skyfox, Under Fire, Willy Byte, Tactical Armor Command, Maze Craze, Zaxxon, Ultima IV; to name a few. Educational software like Music Construction Set, Guitar Master and Music Star are greatly enhanced by Phasor's power.

But even if you don't own any software, Phasor comes with a ton of entertaining and educational software that will let you enjoy Phasor for a long, long time.

Phasor is an astonishing peripheral card that generates explosive sound effects, vibrant music and excellent speech from your Apple. It adds a new dimension of exciting sounds to games, educational programs, music programs and programs you create yourself.

Features

- The most compatible sound card available. Fully Mockingboard™, ALF, and Super Music Synthesizer compatible but with many enhanced capabilities

- 12 simultaneous sound channels, 4 white noise generators, 1 voice channel expandable to 2 voices

- Easy to use "COMPOSE" software. You'll start right away inputting your favorite songs. Our manual shows you how, step by step. The hi-res screen shows what you've entered in standard sheet music format

- Included Software: Music Editor, Sound Effects Editor, Text-to-Speech, and over 30 songs and sound effects ready to run, not copy protected! ProDOS based

- Easy to program in BASIC to generate speech and complex sound effects. Now your games can have explosions,

phasor zaps, train whistles, death cries. You name it, this card can do it

- Unlimited vocabulary voice

- Simple commands adjust rate of speech, pitch, volume and more

- Powerful 4 watt stereo amplifier for direct connection to any size speakers

- Requires Apple IIe, II+, IIGS (64K minimum) with one disk drive

- Software is RAM based when used with any standard RAM card for ultra-fast operation

- 5 year warranty — parts and labor

WARNING: Applied Engineering will not be responsible for shattered windows, cracks in plaster, or government personnel mistakenly thinking an alien attack is taking place in your neighborhood. Phasor is equipped with volume controls. Please keep them at the appropriate level. Thank you.
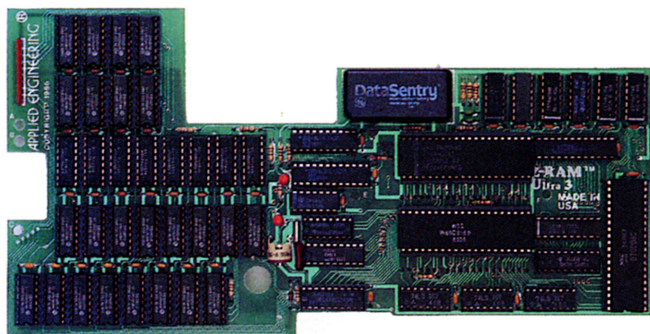
Phasor   **$179**

VISA MasterCard **and C.O.D. 214/241-6060**
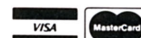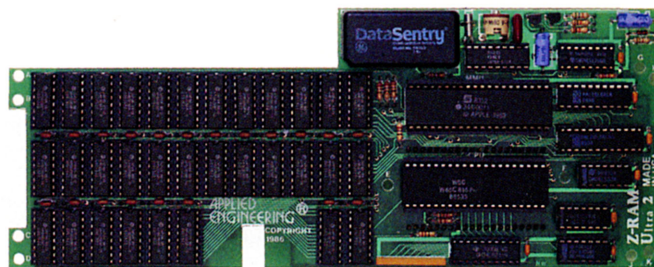
Compatible with IIc

Z-RAM Ultra 3:
Memory to 1 MEG, Clock and CP/M
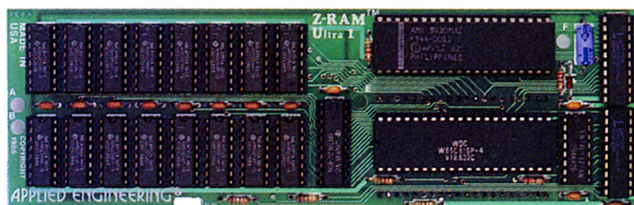256K **$369**   512K **$489**   1 MEG **$729**

Z-RAM Ultra 2:
Memory to 1 MEG, Clock
256K **$289**   512K **$409**   1 MEG **$649**

Z-RAM Ultra 1:
Memory to 512K
256K **$219**   512K **$339**

Z-RAM Ultra fits neatly inside any IIc, new or old. Installation is easy, clear instructions show you how. You'll need a screwdriver and about 20 minutes.

Your Apple can become a computer you never dreamed it could be. Because the most exciting chapter in the Z-RAM history of turbo charged IIc's has just been written. It's called Z-RAM Ultra. And it takes IIc expansion into a whole new realm.

The AppleWorks Amplifier

With any Z-RAM Ultra, your AppleWorks word processor capacity will instantly increase from 7,250 lines to over 22,600 and the maximum number of records from 6,350 to over 22,600. Available desktop memory rockets to over 720K with *all* of AppleWorks loaded into RAM. Z-RAM Ultra even expands the clipboard and autosegments large files so they can be saved on two or more disks. AppleWorks will now run about 10 times faster in your IIc with one disk drive than in other IIc's with two disk drives. Nothing else comes close to enhancing AppleWorks like this!

Z-RAM is also a high speed solid state disk drive. With Z-RAM your programs will load and save over 20 times faster. Z-RAM's RAM disk is compatible with Applesoft, ProDOS, DOS 3.3, Apple Pascal and CP/M. And with Z-RAM you can copy a disk in one pass. Just insert the original, remove the original, insert blank disk! That's it! Z-RAM is another disk drive, only 20 times faster, 4 times larger capacity, and no whirring, clicking or waiting!

Only with Ultra 3

But before you start panting over all that extra memory, don't forget that the Z-RAM Ultra 3 card has a built-in high speed Z-80 microprocessor that allows you to run CP/M programs like WordStar, dBase II, Turbo Pascal, Microsoft BASIC, FORTRAN and COBOL and over 5,000 other CP/M programs. So Z-RAM Ultra 3 not only makes Apple programs run better and faster, it lets you run MORE programs.

Only with Ultra 2 or Ultra 3

A built-in real-time clock. Displays the time and data on AppleWorks screens and files, and is fully ProDOS compatible.

With the Z-RAM Ultra card installed, your IIc is still your IIc only now you'll have that extra memory that AppleWorks and other programs need.

Features

- Works in any IIc, new or old
- Up to 1 MEG memory (you choose how much) lets you store, load and run programs up to 20 times faster
- Expands and accelerates all memory intensive programs, including AppleWorks

- No jumper wires, clips or drive removal—so installation takes only a few minutes and a screwdriver
- Optional 65C816 16-bit processor plugs right in with no component changes
- Printer buffer lets you continue working while printing AppleWorks files
- Real-time clock displays time and date on AppleWorks screens and files, and is ProDOS compatible for use with other ProDOS software
- Run CP/M programs with Z-RAM Ultra's built-in Z-80B microprocessor

Z-RAM is 100% compatible with all IIc software and hardware including the mouse, second drive, modem and printer. Z-RAM is easily handled by the IIc power supply as power consumption is kept very low by using custom integrated circuits and a patent pending power saving design.

Z-RAM comes complete with manual and software, and a 5 year warranty — parts and labor.

Compatible with IIc
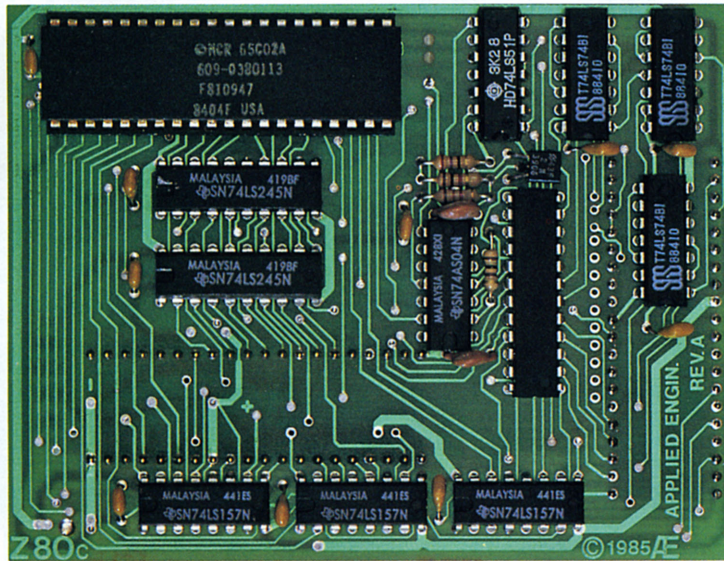
Apple IIc owners can now run one of the single largest bodies of software in existence. Enter the CP/M world with the new Z-80c and introduce your IIc to thousands of new programs. With the Z-80c, you'll be able to run WordStar, dBase II, Turbo Pascal and thousands of other programs that require CP/M. But your IIc will still be your IIc because the Z-80c only turns on when using a CP/M disk.

The Z-80c comes standard with the new 5.1 software, the most advanced system for running Apple CP/M programs ever. But it also runs other versions of CP/M including the popular 2.2 and 2.23 and is fully compatible with Microsoft disks with no pre-boot.

But naturally you'd expect top performance from the Z-80c. After all, it's from Applied Engineering and we've got years of experience with Z-80 cards for the II+ and IIe.

The Z-80c can use all 128K in the IIc, or 64K can be reserved as a RAM disk.

The Z-80c fits neatly inside the IIc. Installation is easy and only takes about 10 minutes (it just plugs in). After installation, your IIc will act and look just like other IIc's, only now you can run all that great Apple CP/M software that others can only dream about.

The Z-80c comes complete with Z-80 card, 5.1 operating system, utility disk,

a plain English owners manual and a 5 YEAR WARRANTY. And although the Z-80c is the only CP/M interface on the market for the IIc, we've priced it as though the competition was fierce.

When you consider the fact that many people spend 2 or 3 thousand dollars on a CP/M only computer, our price of $159 is an offer that's practically irresistible.

Features

- Totally compatible with all Apple CP/M software

- Executes the full Z-80, 8080 and 8085 instruction set

- Fully compatible with Microsoft disks (no pre-boot required as with others)

- Specifically designed for High Speed Operation in the Apple IIc

- An on-card ROM eliminates many I.C.'s for a cooler, less power consuming board

- A semi-custom I.C. and a low parts count allows the Z-80 to fly through CP/M programs at a very low power level

- The Z-80 will allow you to run: dBase II, WordStar, SpellStar, Turbo Pascal, Cobol-80, Fortran 80, Peachtree and all other Apple CP/M based software

- Fast clock: 2MHz (Z-80B)

- Documentation included

- High quality P.C. board, gold-plated connector, with mil. spec. components used throughout

- 5 year warranty — parts and labor

The Z-80c will give you two computers in one and the advantages of both, all at an unbelievable low price.

Z-80c **$159**

Compatible with IIe, II+ and IIGS
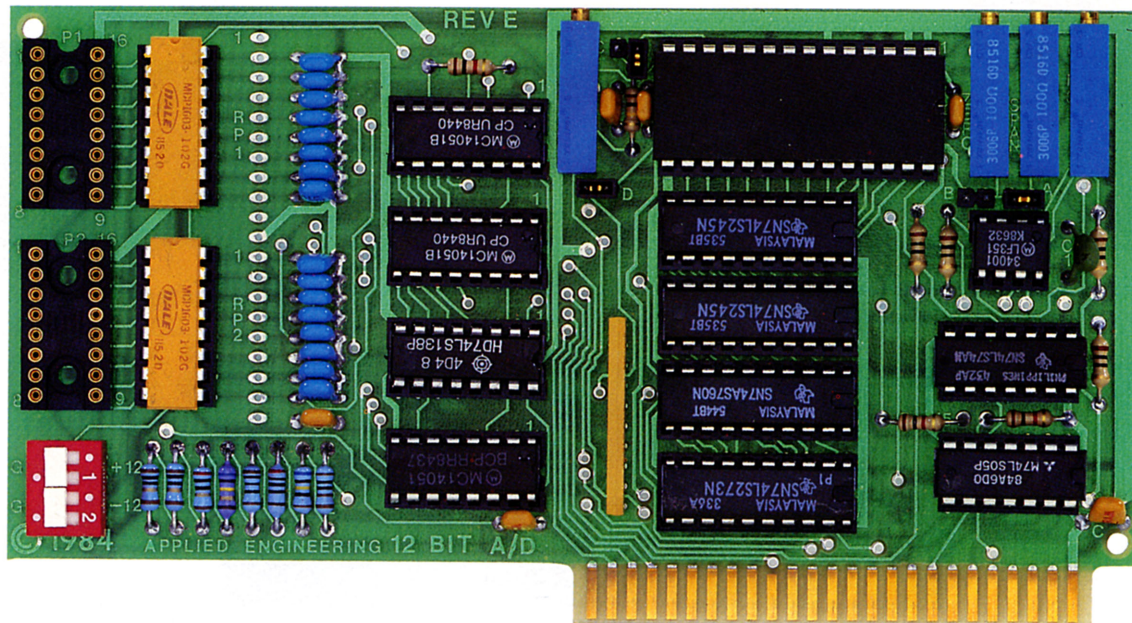
Features

- Design incorporates the latest in state-of-the-art I.C. technologies
- Complete 12 bit A/D converter with an accuracy of 0.03%
- 16 input channels
- 9 software programmable full scale ranges, any of the 16 channels can have any range at any time. Under program control, you can select any of the following ranges: +/−10 volts, +/−5V, +/−2.5V, +/−1.0V, +/−500mV, +/−250mV, +/−100mV, +/−50mV, or +/−25mV
- Very fast conversion (25 micro seconds)
- Analog input resistance greater than 1,000,000 ohms
- LASER-trimmed scaling resistors

- Low power consumption through the use of CMOS devices
- The user connector has +2 and −12 volts on it so you can power your sensors
- Works in any slot including slot 3 in the IIe
- Only elementary programming is required to use the A/D
- Input filtering for all 16 channels can filter out any frequency over a value you select, from 2Hz to 100,000 KHz
- The entire system is on one standard size plug in card that fits neatly inside the Apple
- Systems include several sample programs on disk for BASIC and machine code including source code

- Works in any slot of a IIe or II+ including slot 3 of a IIe

Our latest A/D card features true 12 bit resolution and data acquisition rates of up to 40,000 samples per second, 16 input channels and 9 software programmable gains. The AE 12 bit A/D easily out performs the competition.

A few applications may include the monitoring of flow, temperature, humidity, wind speed, wind direction, light intensity, pressure, RPM, soil moisture, and many more.

12 Bit, 16 Channel A/D   **$279**

Signal Conditioner

Compatible with IIe, II+ and IIGS

Our 8 channel signal conditioner is designed for use with our A/D converter. This board incorporates 8 F.E.T. op-amps, which allow almost any gain or offset. For example: an input signal that varies from 2.00 to 2.15 volts or a signal that varies from 0 to 50 mV can easily be converted to 0-10V output for the A/D.

The signal conditioner's outputs are on a high quality 16 pin gold I.C.

socket that matches the one of the A/D so a simple ribbon cable connects the two. The signal conditioner can be powered by your Apple or from an external supply.

Features

- 4.5″ square for standard card cage and 4 mounting holes for standard mounting
- 22 pin .156 spacing edge card input connector (extra connectors are

easily available i.e. Radio Shack)
- Large bread board area
- Uses F.E.T. op-amps for an input impedence of 10,000,000,000 ohms
- Full detailed schematic included
- All gains and offsets are programmed with easily constructed plug in component platforms (Two blank platforms included)

Signal Conditioner   **$79**
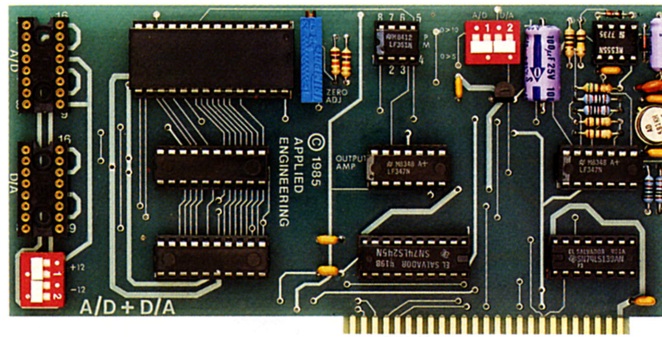
Commercial, industrial, and scientific data acquisition and control functions are now practical with Applied Engineering's A/D + D/A card.

A/D + D/A Features

- Single PC card
- 8 channels A/D
- 8 channels D/A
- Superfast conversion time
- Very easy programming
- Many analog ranges
- Manual contains sample applications
- Works in any slot of a IIe or II+ including slot 3 of a IIe

A/D Specifications

- 8 channels
- 0.3% accuracy
- On-board memory
- Fast conversion (.078 mS per channel)
- A/D process totally transparent to Apple (looks like memory)
- Eliminates the need to wait for A/D conversion (just peek at data)
- No missing codes over full temperature range

- 50K ohms analog input resistance
- User programmable input ranges are 0 to 10 volts, 0 to 5, −5 to +5, −2.5 to +2.5, −5 to 0, and −10 to 0

The A/D section is an 8 bit, 8 channel memory buffered, data-acquisition system on a single Apple plug-in card. It consists of a high speed 8 bit successive approximation A/D converter, an 8 channel multiplexer, 8 x 8 dual-port RAM, and all necessary control logic. The A/D process takes place on a continuous, channel sequencing basis. Data is automatically transferred to its proper location in the on-board RAM. No A/D converter could be easier to use.

D/A Specifications

- 8 channels
- 0.3% accuracy
- On-board memory
- On-board output buffer amps can drive 5 MA of output current
- No missing codes over full temperature range

- D/A process is totally transparent to the Apple (just poke the data)
- Fast conversion (.003 mS per channel)
- User programmable output ranges are 0 to 5 volts and 0 to 10 volts

The D/A section contains 8, 8 bit voltage output, digital to analog converters, with output buffer amplifiers and all interface logic on a single card. No trims are required to achieve the full specified performance. Separate on-card latches are provided for each of the eight D/A converters. No D/A converter could be easier to use. The on-board amplifiers are LASER-trimmed during manufacture, thereby eliminating any requirement for offset nulling.

A few applications may include the measurement and control of temperature, humidity, wind speed, wind direction, light intensity, pressure, RPM, soil moisture, process control, automatic test equipment and many more.

A/D + D/A   **$199**

I/O 32

Features

- Provides 4, 8-bit programmable I/O ports
- Any of the 4 ports can be programmed as an input or an output port
- All I/O lines are TTL (0-5 volt) compatible
- Your inputs can be anything from high speed logic to simple switches
- Programming is made very easy by powerful on-board firmware
- The I/O 32 is your best choice for

any control application
- Manual includes many programs for inputs and outputs

Some Applications Include:

Burglar alarm, direction sensing, use with relays to turn on lights, sound buzzers, start motors, control tape recorders and printers, use with digital joystick.

The I/O 32 features twin 6821 PIAs (Programmable Interface Adaptors). However, unlike previous offerings

from other companies, the I/O 32 has its own powerful on-board firmware. This on-board firmware makes your programming a snap from BASIC. Of course, if you want to control the I/O 32 directly you can.

So whether you're a beginning BASIC programmer or an expert at machine language programming, the I/O 32 is the perfect solution to any control application.

I/O 32   **$89**

Heavy Duty Power Supply

Compatible with IIe and II+

With today's advanced peripherals it's easy to overload the standard Apple power supply. Applied Engineering now offers a heavy duty 6000 MA Power Supply to fill the needs of today's power user.

The standard Apple power supply is rated at only 2500 MA. Use the chart below by adding up the peripherals in your Apple to determine if your system is overloaded.

Device	MA's (apx)
Apple IIe (only)	1000
Apple II+ (only)	1500
5.25″ disk interface	400

3.5″ disk interface	500
Hard disk interface	700
Typical 1 MEG RAM Card	1100
1 MEG RamWorks III	400
Accelerator	500
Clock card	200
CP/M card	300 - 1000
Modem	400 - 900
Printer interface	300 - 600

As you can see, it's easy to exceed the 2500 MA's that Apple's power supply can deliver. With Applied Engineering's Heavy Duty Power Supply you'll have over 6000 MA's available for even fully loaded Apples.

Specifications
- Same size as Apple's power supply using same 4 mounting holes
- Input voltage: 90 to 135 VAC / 60 Hz or switchable to 180 to 270 VAC / 50 Hz
- High efficiency switching type design
- Output: +5V @ 6000MA, +12V @ 2500MA, −12V @ 1000MA, −5V @ 1000MA
- Ripple: 10mV typ.
- Full load operating temperature: 32° to 122°F (0° to 50°C)
- Full 1 year warranty

Heavy Duty Power Supply   **$69**

5.25″ Half-Height Disk Drive

Apple Compatible
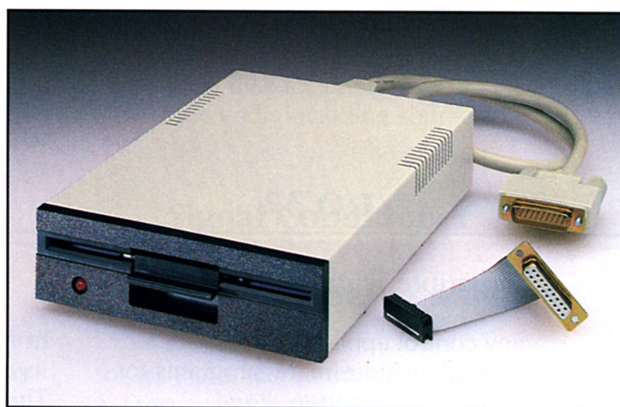
- Fully compatible with all Apple software
- Compatible with IIe, IIc, II+ and IIGS
- Special pulse motor makes it accurate, reliable and fast
- Requires adapter cable for use with Apple Disk II Controller Card
- 143K formatted, 35 tracks, 16 sector

- Super quiet
- Full 1 year warranty — parts and labor
- Complete with 24″ long cable that plugs directly into your controller card

5.25″ Half-Height Disk Drive   **$139**
(specify computer when ordering)

- **Disk II-style Controller Card** available if needed; handles 2 disk drives. Compatible with IIe, II+ and IIGS   **$59**

- **Adapter Cable** adapts drive for use with Disk II-style Controller Card **Now included FREE with drive**

Order Form

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P.O. BOX 5100
CARROLLTON, TX 75011

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                                          (as on card)

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15 day money back guarantee on Applied Engineering hardware when ordered direct.

Add $3 for shipping in the U.S., $5 to Canada, $10 outside U.S.

Prices Subject to Change Without Notice

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APPLIED ENGINEERING
P.O. BOX 5100
CARROLLTON, TX 75011

Applied Engineering Spring/Summer Catalog
1988

"I've purchased several Applied Engineering products over the years. They're always well made and performed as advertised. I recommend them whole-heartedly!"

—STEVE WOZNIAK
Apple Inventor and
Co-Founder