New and Improved!

Claris Unleashes A Better AppleWorks

DAZZLE 'EM!
Powerful Presentation Graphics Software

FULL SPEED AHEAD
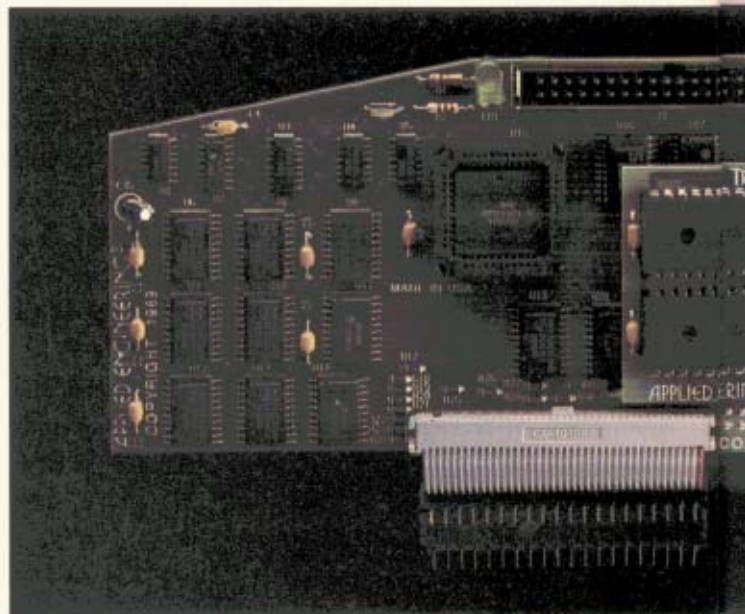**Accelerators for Your Apple II**

APPLEWORKS 3.0

Reviews:
- MacroMate
- Mad Match
- Hometown, U.S.A.
- Super Sign Maker
- Read 'N Roll
- TrianGO GS
- Space Quest II GS

By JOE ABERNATHY + PAUL HUTMACHER

Speed

Breaking the

Limit

Here's one time when patience is no virtue.

Don't wait around for sorts and

calculations—get yourself an accelerator

chip or speedup board and give

your tired old (or new) II

a needed shot in the arm.

WHAT'S THE FASTEST-GROWING category of Apple II products? Accelerators, of course.

Accelerator boards and chips give your Apple II a shot of adrenalin, increasing the speed at which software or even external hardware operates. Whether you're a writer, designer, teacher, businessperson, or a combination of all four, you can benefit from an accelerator.

Accelerators aren't new to the Apple II. Applied Engineering's TransWarp has been speeding up Apple IIs for years, but you've never had the array of options available today. Applied Engineering, Bits & Pieces, and Zip Technology offer products that make your II run faster and jump higher. Or if you call on your Apple II for heavy mathematical calculations (huge spreadsheets and complex graphics), you may want to look at Innovative Systems' Floating Point Engine. If you want your disk drives to spin faster and work harder, check out the Multi-Kache Card from Ohio Kache Systems.

Before you decide to buy an accelerator, though, make sure it's a faster microprocessor you need. If you're frustrated by the amount of disk swapping you're doing, your first priority is probably a hard-disk drive. Or if your word-processor documents have grown so large you can't work with them on the desktop, you need a memory-expansion board. If you use AppleWorks, for instance, you know how important memory is. Using extra memory as a RAM disk eliminates the incessant disk access you encounter when you run AppleWorks on a 128K system. A RAM disk lets your program store and access data at lightning speed.

If your problem is sitting and waiting while your computer calculates a spreadsheet, sorts a database, or flows text into a template in a page-layout program, though, it's time for an accelerator. For writing and page design in programs such as Springboard Publisher and AppleWorks GS, for example, a faster microprocessor means

the difference between working and waiting. Most areas of standard AppleWorks are also good candidates for an accelerator. If you never stray beyond the AppleWorks word processor, however, you can probably live without an accelerator.

Now if you've sold yourself on an accelerator, don't rush out and buy the first one you hear about or see advertised. Make sure you decide on the one that's right for you. To help you get started with your research, here's a look at six speedy products.

TRANSWARP GS TO THE RESCUE

It's the toast of the town. Recently released by Applied Engineering, **TransWarp GS** addresses the biggest rap against the Apple IIGS—sluggish operation. With TransWarp GS, your computer will run nearly three times faster.

The standard GS is almost three times faster than the IIe, but you don't hear a lot of talk about those numbers. That's because comparing computers based purely on raw speed is deceiving. The IIGS is a perfect example: Because it does so much work maintaining the desktop environment when running 16-bit software, it seems slow. But if all you use on the GS is AppleWorks, Publish It!, and maybe a few other IIe/IIc programs, your GS runs like Bo Jackson. Load AppleWorks GS or Medley and it's William "The Refrigerator" Perry running uphill.

With TransWarp GS, the GS/OS Finder, or Desktop, becomes a tool instead of a colorful novelty; complex programs such as AppleWorks GS are more useful, because you don't waste time waiting when you should be working. Because nearly all GS software is graphics intensive, even casual users can justify TransWarp GS. For Apple IIc and IIe users, faster processing is a luxury; if you own a GS and want to run 16-bit software, it's a necessity.

TransWarp GS is an expansion card that fits into slot 3 or 4 inside the GS. Because of the short length of ribbon cable attaching the

replacement chip to the expansion board, slot 3 is the most practical home for TransWarp GS. To install it, use a screwdriver to remove the main logic chip (65C816) from the IIGS motherboard. Then plug in a TransWarp cable where the chip used to be. The process is easy, and generously illustrated in the user's manual. Applied Engineering's documentation is the best belonging to those six products tested here, although TransWarp GS doesn't need much documentation.

After you've plugged it in, TransWarp GS operates invisibly. There's no configuration or hassle; if you want to slow down for some reason, you can do so at any time by using the TransWarp GS classic desk accessory (CDA), which you access the same way you do the Control Panel. Probably the only reason to change speed would be for game playing or running some other time-dependent software. But unlike IIe games, most GS games are still playable—and even more enjoyable—at full TransWarp GS speed.

When talking about TransWarp GS and other accelerators, you're bound to hear the word *megahertz* (MHz), which refers to the speed at which your computer processes information. The IIe runs at 1 MHz; the IIGS operates in native mode at 2.6 MHz, but can also run in IIe emulation mode at 1 MHz. The current TransWarp GS speed is 7 MHz; as technology advances you'll be able to upgrade it to a predicted speed of 10 MHz.

If you want an even higher-performance IIGS, you can combine TransWarp GS with a math coprocessor, such as the Floating Point Engine, and a disk accelerator, such as the Multi-Kache Card. Adding these three products will drain your bank account by more than $1000, but the results are dramatic.

When we tested the first production version of TransWarp GS on a fully expanded GS, the only compatibility problem involved the Floating Point Engine. Applied Engineering has corrected the difficulty, though; if you have one of the earlier versions of TransWarp ▶

GS and want to use the Floating Point Engine, an update is available from Applied Engineering.

Zip Technology has announced a GS accelerator of its own, and others are rumored. As this issue of *inCider* goes to press, however, TransWarp GS is the only product of its kind. It's available; it works great; and it's the productivity boost IIGS owners have been waiting for.

ORIGINAL TRANSWARP: STILL SPEEDING ALONG

The original **TransWarp** increases the speed of the IIe or II Plus by more than three and a half times. Like its new GS cousin, it operates reliably and invisibly.

TransWarp wasn't the first Apple II accelerator, but it's the only remaining accelerator for the II Plus and IIe that operates as an expansion card rather than a replacement chip, like Zip Chip and Rocket Chip. Note that if you own a IIc, your options are limited to such chips.

While Zip Chip and Rocket Chip don't take up an expansion slot and are faster in most operations, TransWarp still offers many benefits. For starters, it's been in production long enough to ensure against compatibility problems. Accelerator technology is so sophisticated that difficulties can arise unexpectedly as you add new software and hardware to your system. Buying a TransWarp is no guarantee against that, but it's at least a strong hedge.

To achieve its speed, TransWarp employs both a faster main logic chip (also known as the *central processing unit*, *CPU*, or *microprocessor*)

and 256K of *fast RAM* (random-access memory), memory designed to operate at accelerated speed. (In contrast, *slow RAM* is memory that operates with 1-MHz microprocessors.) TransWarp uses this fast memory as temporary internal storage for information the computer would otherwise have to read from a (slow) disk. In the Apple II Plus, TransWarp doubles as a 16K "language card" to bring system memory up to 64K without requiring a separate board.

For overall usability, reliability, and sturdiness, the TransWarp card may still be the best bet. Sturdiness is a concern that comes up in any discussion of accelerator chips: Whether it's a replacement microprocessor or the original 65C02, every time you pull a chip you risk weakening its legs, and replacement chips are bulkier and have flimsier legs than the original part. If you have to swap them in and out several times as you try to isolate a system problem, for example, they may not hold up to the strain. In addition, Applied

Engineering recently cut TransWarp's price to $169, making it even more competitive with the faster chip products.

ZIP CHIP: FAST AND GETTING FASTER

The 4-MHz **Zip Chip** was the first chip-based accelerator available for the Apple II, and at $149 it still offers the best price. But there's also a new 8-MHz Zip Chip available for $199—only $20 more than the price of the original Zip Chip.

Zip Chips compete with the 5-MHz Rocket Chip ($159) and the new 10-MHz Rocket Chip ($219). Zip has also announced that in the fall it will ship a IIGS accelerator to compete with TransWarp GS.

Zip directly replaces the II Plus' 6502 or the IIe/IIc's 65C02 main logic chip. Remove the original chip with a small screwdriver or pulling tool (which Zip Technology provides). Both the Zip and Rocket manuals include illustrations to clarify the process.

Plug in Zip Chip, then run a program that records your configuration preferences. A replacement for the ProDOS file STARTUP reads the parameters each time you turn on your computer. If you choose to not configure Zip Chip, it will default to the following settings:

system speed: 4.0 MHz
slots fast: 1, 3, 4
paddles: normal
sound: fast

If you have a disk drive in slot 1, 3, or 4, you'll probably want to change the settings back to standard 1-MHz speed.

To boot at normal speed (1 MHz), press the escape key while turning on the power. You can configure Zip Chip to run at 20 different speeds, from about half the standard 1 MHz to 4 MHz. Most people will probably leave it at full speed unless running an arcade game or other program requiring the slower speed.

The configuration program lets you set the speed for each slot. The Zip utility disk, provided with the chip, also contains a diagnostic program and a memory-testing program, plus ZIP.HELLO and ZIP.STARTUP to boot DOS 3.3 and ProDOS disks, respectively, in any configuration you want. Run STARTUP or HELLO every time you use Zip Chip, unless you're happy with the default settings. If you own a II Plus, early versions of the diagnostic program may fail, even though everything's working properly. Contact Zip Technology for an upgrade.

Your Zip Chip can accelerate up to 30 64K banks of auxiliary-slot ►

memory (RamWorks, for example), and it can take advantage of *caching*, a memory-management technique that further enhances the speed of your Apple. (See the accompanying sidebar, "Cache as Cache Can.") Because of this sophisticated RAM management, Zip Chip has hidden speed advantages over TransWarp, most noticeable in the acceleration of an auxiliary-slot RAM card. Zip's memory-management system, however, doesn't work with peripheral-slot RAM boards, such as the Apple Extended Memory Card.

Zip Chip's memory-management scheme won't work in conjunction with a DMA (direct memory access) card such as the Multi-Kache disk accelerator or CP/M coprocessors, either. To get around this conflict, you can configure slots containing these cards to work at normal speed. (In the case of Multi-Kache, you can remove a jumper cable to disable the DMA mechanism. Multi-Kache won't work as fast, but it still offers a performance increase.) Zip Technology has corrected a previous Zip Chip compatibility problem; you can now use it with Corvus-brand hard-disk drives.

Note that the Zip Chip instruction manual provides detailed information for programmers; this lets you create "Zip Chip aware" software to manipulate system-speed options individually.

ROCKET CHIP: THE FASTEST YET

The new 10 MHz **Rocket Chip** is the fastest Apple II accelerator. Even the original 5-MHz Rocket Chip performs at a level close to that of the 8-MHz Zip Chip in some areas. Its speed advantage stems from its acceleration *and caching* of devices in slots 1–7.

Rocket Chip accelerates all slots at full speed, except for 5 and 6, which are reserved for disk drives. If your drives are in slots other than 5 or 6, use the configuration program to set the appropriate slots to 1 MHz. Remember, even though your computer is now running at fast speed, your disk drives are still operating at 1 MHz.

As Zip does, Rocket Chip uses a 16K memory cache to speed up

operations, including up to 30 64K banks of auxiliary-slot memory. It allows caching for any device that isn't dependent on speed. Modems, printers, and most hard drives, for instance, aren't compatible.

Rocket Chip configuration options include eight speeds from 0.050 MHz (much slower than the normal 1 MHz speed of the Apple II) to 5 MHz; five sound options; Applied Engineering TransWarp protocol (for compatibility with smart software); speed for slots 1–7; caching for slots 1–7; and expansion-RAM caching. As with Zip Chip, pressing the escape key while turning on your computer slows the entire system down to 1 MHz. Like Zip, Rocket Chip can't accelerate DMA devices. It's also incompatible with the SMT no-slot clock. Both Bits & Pieces and SMT offer patches to correct the problem, however.

Rocket Chip lets you individually select which operations to accelerate, but it assumes you have a standard computer setup; you don't have to configure your system if you want to match the defaults. If you have, say, a modem card in slot 2, though, you'll run a program every time you start your computer to slow down this slot. And if you want to cache a hard disk in slot 7, you'll run a separate program to configure it.

Note that hard-drive caching isn't possible with many drives, including Apple SCSIs. The SCSI card from CMS Enhancements allows caching, but don't attempt it unless you're expert enough to know the risks involved, particularly in network situations.

Unlike Zip Chip, Rocket doesn't provide a BASIC program for easy custom configuration. You must configure the chip every time you turn on your computer, unless you choose to stay with the default settings.

If you have experience with Applesoft BASIC, writing a HELLO (DOS 3.3) or STARTUP (ProDOS) program that configures Rocket Chip's speed is simple.

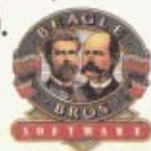Rocket Chip and Zip Chip offer similar features. Zip is less ►

expensive; however, Bits & Pieces offers a faster chip. In deciding between the two, consider price and features, but support as well. Ask around to see whether people have had problems with either company.
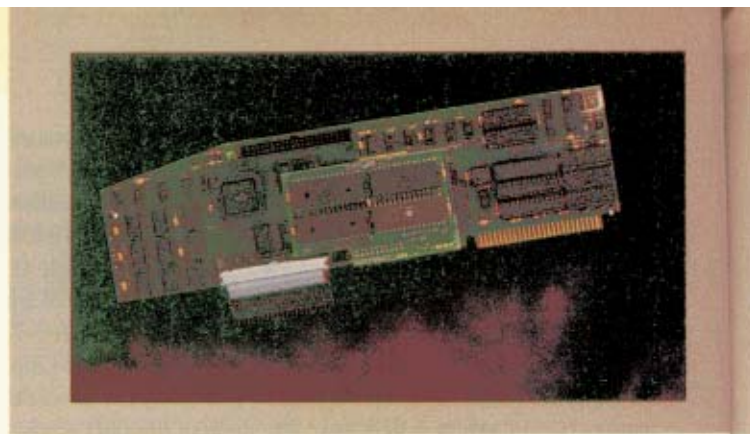
FLOATING-POINT WHAT?

If a marketing professional had named this floating-point math coprocessor, we'd be calling it Business Partner or Graphics Manager. As it is, this unique and useful accelerator has the intimidating tag of **Floating Point Engine** (FPE).

Innovative Systems' FPE intercepts internal math calls that require extended-precision results and routes them through its faster math circuitry. (See the accompanying **Tables** for benchmarks.) In fact, FPE is the most efficient accelerator for computer-aided-design graphics, AppleWorks spreadsheets, and scientific models.

Teachers or students exploring the relationships between math and computer science (fractal geometry, for example) will enjoy using FPE. Math and graphics-intensive programs are most likely to benefit, but you'll find acceleration hidden in many other applications written in languages whose internal structure requires extended-precision mathematics. On the GS, any program that issues calls through the Standard Apple Numerics Environment (SANE) toolset will benefit from FPE. These typically include drawing, scientific, and other math-oriented programs.

A program patch included with FPE lets you enhance the speed of standard AppleWorks spreadsheets. Otherwise, Apple IIe programs must be specifically written to take advantage of a math coprocessor. Few are, but software tools included with the card will help you develop your own software if you have the interest and the programming experience. Also, many of the new compilers, such as ByteWorks' ORCA/Pascal and ORCA/C, marketed to professional software designers include support for FPE.

FPE works in the background, in conjunction with a traditional accelerator. If you're sketching a complex graphic—in TopDraw, for example, or some fractal-imaging program—you could have a TransWarp GS speeding up the screen drawing while your FPE boosts the internal math of the graphics calculations.

While FPE isn't for everyone, it's fascinating to look at the people who own it. The list includes Glen Bredon, author of ProSel; Scott Gentry, graphics-forum leader on AppleLink Personal Edition; the people at Western Design Center, creators of the IIGS' 65C816 main

Table 1. GS speed benchmarks.	GS	GS with FPE	GS with TWGS
Draw fractal-graphics image	870	407	
Boot GS Finder	110	110	103
Calculate capital gains with AW spreadsheet	19	10	7
Lauch AW from GS/OS	26	25	20
Import 60K of AW text into Springboard Publisher layout	117	117	72
Import 32K AW database into AWGS	169	N/A	84
Calculate sales tax with AWGS spreadsheet	85	N/A	35

all times in seconds   **N/A** = not applicable   **AWGS** = AppleWorks GS   **TW** = TransWarp
AW = AppleWorks   **FPE** = Floating Point Engine   **TWGS** = TransWarp GS

Table 2. IIe/IIc speed benchmarks.	IIe/IIc	Rocket 5MHz	Rocket 10MHz	Zip 4MHz	Zip 8MHz	TW
Sales tax	36	10	6.7	11.8	7.3	12.3
Capital gains	46	13.1	7.3	15.3	9.7	16.1
Find & replace "the" with "my" in 60K AW file	5	1.7	1	2.1	1.3	2.2
Springboard	165	77.3	37.7	128.9	111.8	139

Note: Fractal images are created using Mandelbrot math; because of the number of calculations involved, one image may take 20 hours to draw on the GS. Although this test is designed to reveal a floating-point math coprocessor, it sheds a positive light on TransWarp as well. The various AppleWorks and AppleWorks GS timings were chosen to show the performance of typical home and business undertakings. Other pursuits in which speed is of special benefit include drawing, painting, programming, running a bulletin-board host system, database sorting, list handling, and various science and engineering applications. For many games acceleration isn't desirable because it destroys the balance of play, but if you're a big fan of simulations, you might enjoy faster processing.
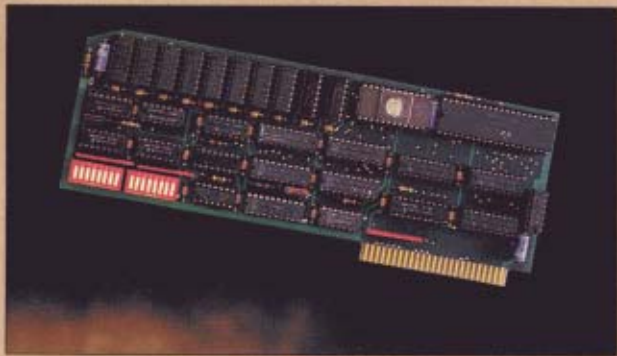
logic chip; and technologists at Applied Engineering, Apple Computer, and several major software houses. Many astronomers, mathematicians, and physicists also use FPE.

If the Floating Point Engine is such a great idea, why doesn't anyone else sell a math coprocessor for the Apple II? The idea is catching on: Applied Engineering has already announced Fast Math, which it plans to ship this summer.

MULTI-KACHE CARD: STASHING YOUR DATA

Disk drives for the Apple II are designed to operate at a particular speed. Regardless of how fast your current microprocessor hums, your drives churn at a rate designed for the original microprocessor in your Apple—and that seems pretty slow to most II users. There's a way to boost your disk drive's performance, though: The Multi-Kache Card from Ohio Kache Systems (OKS) accelerates the speed

at which you can access information from external drives.

We evaluated a Multi-Kache Card that worked with 5¼-inch and 3½-inch drives, but OKS also offers one for SCSI hard-disk drives. Tests on the prerelease SCSI version running in conjunction with TransWarp GS show up to a 40-fold speed increase in some typical operations in comparison to the stock IIGS. (Note that currently some copy-protected 3½-inch disks—primarily game software—fail when you run them with Multi-Kache installed.)

The Multi-Kache Card attacks from two directions: It reads and writes to your disks at 8 MHz, eight times faster than any other Apple II disk drive; and it stores disk-based information in hidden memory so that disk access takes place at RAM-disk speed. When you insert a new disk, your computer reads it into this background RAM—and your keyboard operations aren't slowed by waiting for even fast disk access. When you save a file, writing to disk occurs in the background, too, freeing your computer immediately for further operations. When your disk drive's red light goes on, you don't have to wait before getting back to work.

Multi-Kache is as impressive in its own way as TransWarp GS or the 10-MHz Rocket Chip. If you want to solve the Apple II speed problem completely, the Multi-Kache Card is the other half of the acceleration equation.

NO REASON TO WAIT

Acceleration technology for the Apple II has reached the point at which it's affordable for the average user. This lets you rejuvenate ▶

Cache As Cache Can

A hunter's *cache* is a place where he or she hides ammunition or food along the way. Your Apple II uses *cache memory* to hide programs or data it will need along its way to finishing a task. Getting a program or piece of data from a cache is quicker than going all the way back to the source, usually a disk.

In contrast, the slowest way to get information into your computer's central processing unit (CPU), or microprocessor (6502, 65C02, or 65816), is to load it from a floppy disk. (The *very* slowest way is from a cassette player—but nobody uses that anymore, although IIes still can.) Newer 3½-inch disks are faster than their bulky cousins, the 5¼-inch floppies; hard disks are the fastest of all.

But the quickest way of all to get information to the CPU is from the computer's random-access memory (RAM). The 6502 or 65C02 in an Apple IIe or IIc gets all the data and programs it needs from 64,896 bytes, or units of memory, abbreviated as 64K of RAM.

Some programs require more than 64K. To feed these memory hogs, the microprocessor gets information from a second block of 64K of RAM, called the *auxiliary bank*. Many popular programs, such as AppleWorks and Publish It!, require 128K. All Apple IIes and IIcs sold today come with those two banks of 64K, for a total of 128K.

You can add more than one bank of memory—memory-expansion cards such as Applied Engineering's RamWorks fit into an auxiliary slot on the IIe and can add megabytes of memory. AppleWorks needs only two banks (128K), but AppleWorks with TimeOut applications or AppleWorks 3.0 can fill much more. Remember, the quickest way to run a program is to run it from RAM. That's why AppleWorks loads as much of itself as it can into your computer's available memory.

That's the speed limit for the 6502 or 65C02 microprocessor. The only way to work faster than running every program from RAM is to install a faster microprocessor. The GS has a 65816, which is 2.6 times faster; TransWarp (3.6 times), Zip Chip (4–8 times), and Rocket Chip (5–10 times) use still faster microprocessors.

The trouble with installing a speedier microprocessor is that your RAM is probably too slow to keep up with it. TransWarp gets around this with an extra 256K (four banks of 64K) of "fast RAM" that its faster microprocessor can use.

TransWarp duplicates all the built-in software of your IIe—called *ROM*, for *read-only memory*—in two banks, and uses the other two to duplicate main and auxiliary memory. Because the Apple ROM is accelerated, TransWarp can speed up things like disk access, telecommunications, and printing, if the hardware involved uses *direct memory access* (DMA). That means that control of the machine is turned over to the device connected to the slot and that TransWarp won't accelerate the peripheral by much.

Zip Chip and Rocket Chip, on the other hand, don't add any RAM. Instead, each includes on the card itself a small "cache" of 16K of fast RAM that holds the most commonly used parts of programs for quick access. Caching lets Zip and Rocket accelerate more than two banks of extra RAM. They won't speed up DMA devices, though. That's probably not something to worry about, because the gains would be small anyway.

Caching isn't limited to Zip Chip and Rocket Chip. The GS operating-system software, GS/OS, includes a built-in caching program. It's a new desk accessory (NDA) that lets you designate as much as 32K of RAM as a cache to hold the most frequently used GS/OS commands. After you use a pull-down menu, for example, that portion of GS/OS is "cached" and the menu draws much faster the next time you open it.

Another option: Bill Basham's GS program *Diversi-Cache* (Diversified Software Research, 34880 Bunker Hill, Farmington, MI 48331, 313-553-9460, $35), a classic desk accessory (CDA), creates a cache as big as you need, and can stash as much material as you like from any program you choose, and from any disk except a hard drive. Whatever method you prefer, if you're on a productivity mission, caching some data is a good way to get it done faster.□   —Paul Statt

a machine that's grown tired or—in the case of the GS—tiring. The emergence of these products means more than running existing software faster, however. When a software developer is confident that you want and can afford an accelerator, you'll see more powerful software for your Apple II.

Which one should you buy? Among the IIe-style accelerators, Zip Chip has the price advantage, Rocket Chip the performance, and TransWarp the greatest reliability. (And at $169 it's now competitive with lower-priced chips.) TransWarp GS, the Multi-Kache Card, and the Floating Point Engine stand alone in their categories.

It's a great time for you to build a faster Apple. Acceleration is shaping up as the best thing for the II since the disk drive. Why let your machine walk when you can make it run?□

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