A+

The #1 Apple II Magazine

ZIP CHIP: LIFE IN THE FAST LANE

SWITCHING BETWEEN TWO WORLDS
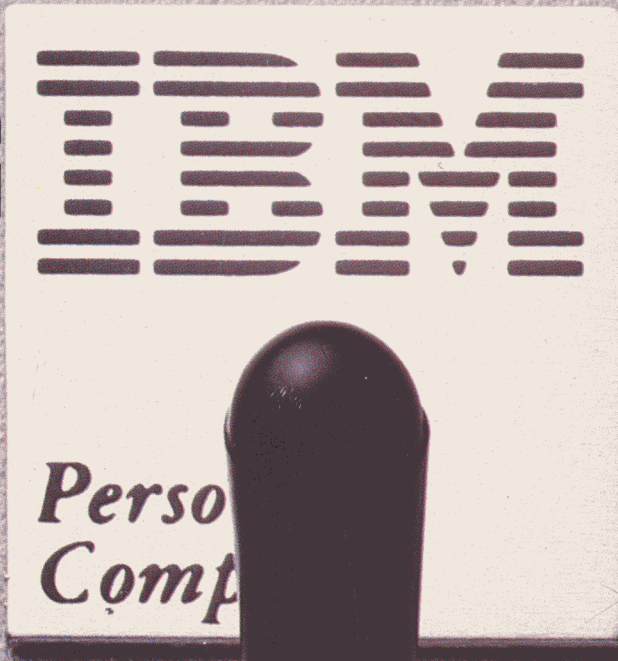
Bringing MS-DOS to the Apple II and Vice Versa

**PC TRANSPORTER
ENVOY BOARD
TRACKSTAR & CORDATA
MATCHPOINT-PC**

IBM

Perso
Comp

Apple IIe

KURTA TABLET
Graphics input
for the IIGS

**COMPUTER
VIRUSES**
An ounce of
prevention . . .

FINGERPRINT GSi
From screen to
printout with
a single touch

SWITCHING *between* TWO WORLDS

Most people who are new to computers are puzzled that the same 5¼-inch disk that contains a wealth of information for an Apple II is a blank piece of plastic to an IBM PC. Different program codes, different disk formats, different program interfaces: Why is it all so confusing and scattered? Why can't I run the best software for my needs, regardless of the system that I own? Those are hard questions to answer.

Such incompatibilities become roadblocks even to experienced computer users. Rather than try to deal with the differences between Apples and IBMs, most users prefer to stick with one or the other. The reality, however, is that both types of computers end up vying for the same user's attention—either in a classroom or in a situation in which someone has, say, an IBM clone at work and an Apple II at home.

Thanks to a few recent product introductions, Apple II users can more gracefully switch between these two worlds. Hardware and software engineers have created boards and programs that bridge the world of the PC and the world of the Apple. (For convenience, the term "PC" in the following group of articles refers to IBM PCs and compatibles.) Nowadays, the contenders aren't exactly in their respective corners. There are PC clones that can read both PC and Apple II disks, PCs that can run Apple II programs, Apples that can read PC disks, and Apples that can run PC programs. Although setting up any of these systems may involve some effort, the payoff is that you have access to files and programs from both worlds—and that increases your ability to handle and communicate information.

Of course, the simplest way to have that access is to have multiple systems. I am blessed with a Macintosh II, a PC-compatible, and an Apple IIGS, all on a single desk. There isn't much else on that desk, of course: There's no room left. Nor can I get data files from one system to another unless I send them through a modem or serial cable. I have an army of computing power without any central command or communications.

This issue of *A+* looks at several ways to switch-hit—to have the features of two systems in one:

• The **PC Transporter** is a PC-compatible computer on a single add-in

board. Plug it into your Apple II, and you can run PC software and trade files with your Apple.

•The **Envoy** is a PC-compatible disk controller. Plug it into an Apple and attach a PC-compatible floppy-disk drive, and your Apple can read PC disks.

•The **Trackstar** is an Apple II-compatible computer on a single add-in board. Plug it into a PC (or, in the near future, into a PS/2), and you
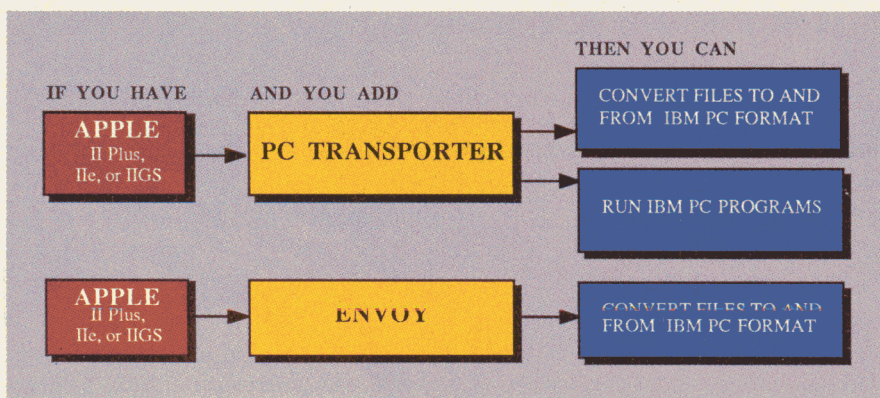
that embodied all of the traits I like: the IIGS software and graphics, the Mac software and interface, the PC software and expandability. Then I wouldn't have to fit three keyboards onto a single desk, to have so many monitors that my workroom looks like a TV director's studio, to have so many cooling fans running that I can't hear the stereo. But with computer families so different in architecture and abilities,

back to report that my skepticism has evaporated. At the very least, these products offer fairly painless compatibility with the PC world; for reading other people's files; or for making disks you can send to friends, colleagues, and customers with PCs. If you already have a PC alongside your Apple, get an Envoy (if you work mainly on the Apple side) or a MatchPoint-PC (if you work mainly on the PC side). They're about the same price and have similar features, allowing you to swap files between systems.

If you can afford to spend more, get a Trackstar (if the PC is your main attraction) or a PC Transporter (to center on the Apple) for both data and *program* compatibility. Again, the prices for the base systems are similar, and both offer nearly full compatibility in running programs from the other system. A minimum two-way system looks like the Cordata clone: a plain-vanilla PC with basic Apple compatibility from the Trackstar board. A more expensive, and more powerful, system is a IIGS with a PC Transporter: a top-of-the-line Apple II with a fast PC added to it.

IF YOU HAVE — **APPLE** II Plus, IIe, or IIGS — AND YOU ADD — **PC TRANSPORTER** — THEN YOU CAN — CONVERT FILES TO AND FROM IBM PC FORMAT / RUN IBM PC PROGRAMS

IF YOU HAVE — **APPLE** II Plus, IIe, or IIGS — AND YOU ADD — **ENVOY** — THEN YOU CAN — CONVERT FILES TO AND FROM IBM PC FORMAT

can run Apple software. Cordata's WPC Bridge is a variation on this theme—a PC-compatible that comes with a Trackstar board already in place: It can run both PC and Apple software.

•The **MatchPoint-PC** board is an Apple-compatible disk controller for the PC. Plug that in, and your PC drive can read both PC disks and Apple disks.

could there really be any substance to the links? Even if they worked, were they practical? Coprocessors are often complex, finicky creatures that aren't 100% compatible and run more slowly than a separate computer system would. What's more, I don't want all sorts of cables running from here to there, driving me nuts with installation difficulties. Nor do I want

None of these systems will bring you up to the state of the art on both sides. That is, you can't run 286/386-generation software on the PC Transporter, nor can you run IIGS software on the Trackstar. Nor can they be as flexible and completely compatible (both in hardware and software) as separate Apple and IBM computers. They can save your investment in data and programs, save some desk space, stretch the useful life of an older II, and let a IIGS owner say, "Sure, I can run that Lotus file for you, as soon as I finish this game." ✚
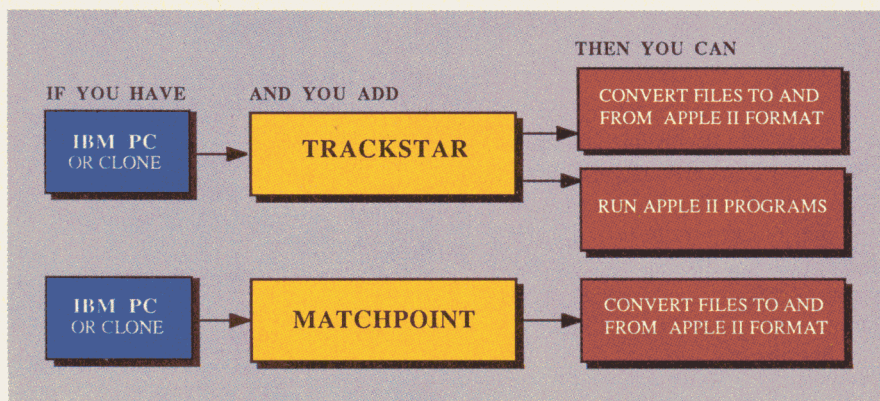
Phillip Robinson has written for BYTE, InfoWorld, *and other computer publications, specializing in the MS–DOS world; is the author of several books; and contributes a weekly computer column to the* San Jose Mercury News.

IF YOU HAVE — **IBM PC OR CLONE** — AND YOU ADD — **TRACKSTAR** — THEN YOU CAN — CONVERT FILES TO AND FROM APPLE II FORMAT / RUN APPLE II PROGRAMS

IF YOU HAVE — **IBM PC OR CLONE** — AND YOU ADD — **MATCHPOINT** — THEN YOU CAN — CONVERT FILES TO AND FROM APPLE II FORMAT

I have to admit that I had a big dollop of skepticism about these crossover products. If I could, I'd be thrilled to have a single computer

"enhancements" to my system to bother in any way my current software and hardware.

After testing these systems, I'm

BY PHILLIP ROBINSON

A plug-in card that lets
you switch to MS-DOS
software on an Apple II

PC TRANSPORTER

The first time I saw the crude text of IBM's monochrome-display adapter mode appear on my IIGS screen, I laughed. It seemed just plain silly to leap back in time from the GS's graphic interface to the Teletype-style text of the first IBM PC.

At the same time, though, I was impressed. The folks from The Engineering Department (who designed the PC Transporter card) and Applied Engineering (who are selling and supporting the card) had worked through some awesome technical barriers to get that simple MS-DOS message on the screen. (MS-DOS is the IBM world's standard operating system.) After all, they hadn't just thrown together one more PC compatible from cheap subsystems—CPU board, disk drives, video-adapter card, and MS-DOS. That's so easy to do nowadays that junior colleges and bookstores offer classes in building your own compatible computer.

Instead, The Engineering Department had stuffed an entire PC-compatible onto a single Apple II expansion card, including CPU, RAM, disk controller, I/O emulator, and video adapter. This compact PC doesn't just have to run MS-DOS software—it has to run it while accepting input from an Apple mouse and keyboard and sending output to an Apple video display, serial port, and parallel port. And it does all of that without disturbing the Apple's ability to run plain old Apple software. It even has facilities for translating text files between Apple and PC formats and for storing PC files on Apple disks.

Setting Up

My introduction to the PC Transporter wasn't smooth. I had read John Markoff's article in last September's *A+*, so I knew about the board. I also knew that a standard PC-compatible computer was
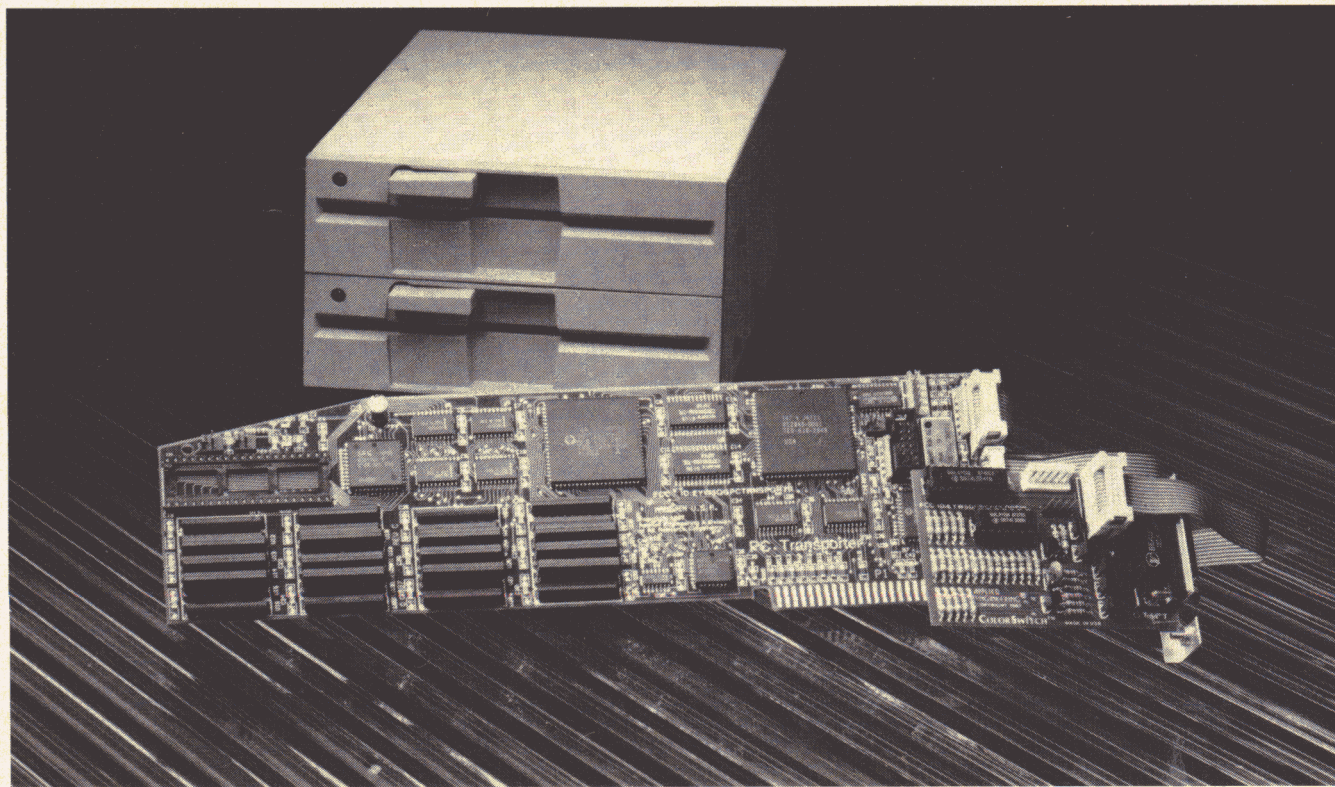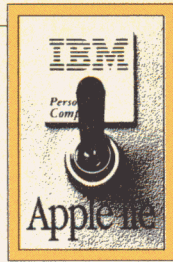
available for about the same price as the PC Transporter and a disk drive. (You need at least one PC-compatible disk drive to use the Transporter. If you have a II Plus, you also need a PC-compatible keyboard.) That knowledge made me wonder why anyone would want to stuff PC abilities into their II when they could just have a stand-alone PC instead.

Then, when I received my Transporter, I had trouble installing it. Oh, the instructions were good—a manual full of pictures and diagrams, as well as a VHS videotape of the installation process—but I was confused by the variety of schemes necessary to accommodate the different models of the II. I plugged in one connector upside down, even though the manual assured me there was only one way it would go. (Fortunately, I discovered this mistake before turning the system on.) I wrestled with other connectors that intercepted Apple II signals and fed them through the PC Transporter.

When I called for help from AE's tech-support line, I couldn't get through. Eighteen calls on five different days came up with a busy signal or a ring that no one answered. I have since spoken to another PC Transporter user who got through on the second call, so I'm not sure why I had such a hard time. Whatever the reason, I eventually figured out that I hadn't reset my IIGS's Control Panel slot assignments, and when I made the proper moves there, my PC Transporter came to life. My IIGS was back together, and the only change in appearance was that a dual 5¼-inch floppy-disk-drive system was sitting beside it, underneath my Apple 3.5 drive.

With the PC Transporter installed, Apple software ran just as it had before. When I slipped the PC Transporter disk into the 3.5-inch drive, however, and booted from it or chose its main application, the

The PC Transporter lets you run both Apple and MS-DOS software on a single system, using the same peripherals.

Transporter card woke up, counted its RAM, and looked for an MS-DOS disk in the 5¼-inch floppy drive. I gave it an MS-DOS disk from my PC, and I was up and running. You can jump to a configuration utility at this point by pressing the Caps Lock key twice while holding down the Shift key. From there, you can reboot MS-DOS; boot ProDOS; or reconfigure the Transporter's disk, I/O, and memory settings.

Compatibility

If you stay in MS-DOS, the PC Transporter operates as a standard PC clone. (In my case, the 768K of RAM on the board turned it into a clone with 640K of PC RAM.) Well, not quite standard. All the programs I tried—WordPerfect, WordStar, Lotus 1-2-3, Microsoft Works, the Norton Utilities, even RAM-resident utilities such as SideKick and SuperKey—ran. Applied Engineering admits, however, that certain copy-protected games and telecommunications programs operating at more than 1200 bps do not work.

On the programs I tried out, the displays were crystal clear on the Apple monitor, and the commands to manipulate files and start programs flew without a glitch. Well, they flew after I figured out the keyboard. As you know if you've ever used an IBM PC, many PC programs lean heavily on the *F* function keys, something an Apple keyboard doesn't have. You also use other keys, such as Break, that the Apple doesn't sport—keys that are important on a PC.

You can attach a standard PC-compatible keyboard to the Transporter, but I didn't want to make the switch (on an Apple II Plus, I would have been forced to, though), because I wanted to be able to run Apple software as well as MS-DOS programs.

One of the big advantages of buying a Transporter is the ability to run both types of software—Apple and MS-DOS—on a single system, using the same peripherals and occupying a minimum of desk space. (The 768K of RAM the Transporter can hold automatically becomes a RAMdisk in ProDOS, so you are buying not only PC compatibility but also lots more RAM for your Apple II programs.) So I had to dig through the Transporter manual to find the key equivalents. You can get any PC key or key combination on the Apple keyboard. The manual has explanations of the keys to use and a graphic map that illustrates them. The configuration utility also has an on-screen map that shows the key functions.

Once I knew the keys, I was able to slide around within my MS-DOS programs fairly easily. Printing worked fine—the Transporter automatically converted my MS-DOS printing messages to Apple messages and directed them to a waiting ImageWriter II. Even the Apple mouse was usable, as the Transporter lets you emulate the multiple-button MSC Technologies or Microsoft mice, using certain key combinations along with the Apple mouse.

Performance

To test performance, I ran the PC Labs benchmark tests, which *A +*'s sister publication *PC Magazine* uses to evaluate the speed of IBM and compatible systems. The PC Labs benchmarks showed that Applied Engineering isn't far off the mark when it claims that the Transporter is three times faster than an IBM PC. The actual speed difference depends on the program and the operation. A simple Do Nothing loop

PC TRANSPORTER:
TIPS FROM AN APPLE EXPERT

I've been reviewing Apple II and Macintosh software for many years. When I first saw an ad for Applied Engineering's PC Transporter, my reaction was, "Who would need that, other than a business with both IBM PCs and Apple computers?"

Then, after a bit more thought, I had myself convinced that I, too, could make use of such a device to turn my Apple IIGS into a PC-compatible computer. After all, a modest amount of software comes out for the IBM PC a little while before the Apple II and/or Macintosh versions debut. In this way, I thought, I might be able to get ahead of the game and be able to see software that I would be reviewing, before it actually became available for Apple machines. So in went my order for a 640K PC Transporter and one of Applied Engineering's IBM-style 5¼-inch disk drives.

In a few days, I was staring at the boxes. Just a few minutes after that, I was watching Applied Engineering's VHS installation videotape. Thanks to the videotape and the step-by-step instructions in the manual, the hardware installation was a breeze. (This is one man's opinion—for another viewpoint on hardware installation, see the accompanying Transporter article by Phillip Robinson.) Putting in the ColorSwitch PC board was the only difficult part of the installation. You have to attach it directly to one of the IIGS's built-in mounting holes. Quarters are tight, and it's simply not that easy to fit large hands back there. But, once the mechanics were out of the way, I just had to plug the Transporter into a slot and connect the cables from the ColorSwitch to the Transporter and monitor. The entire hardware assembly took me less than 20 min-

utes, not including the time I spent watching the tape.

With a false sense of security, I blithely moved on to the software-installation section. Luckily, I did not have as much trouble getting through to Applied Engineering as Phillip Robinson did, or else my Transporter would still not be running today.

The problem lay in the MS-tifying, MS-erable world of MS-DOS and in trying to understand how to access some of the software that comes with the Transporter. I think that if you have a wide experience with MS-DOS machines, this step is not too difficult. I don't have such experience, and I found it almost impossible to follow the manual's explanation of the ins and outs of installing this software. Do yourself a favor and buy a book on how to use MS-DOS commands.

Here are a few things that were not obvious to me—if you go the Transporter route, perhaps they will save you from having to make as many phone calls to Applied Engineering as I had to.

Do not install your hard disk as "drive C:" until you have completed your software installation. The Transporter allows the Apple's hard disk (in my case a 40Mb Sider) to hold a length-configured file called MSDOSVOL that the Transporter "sees" as drive C:. Incorrectly, I manually configured the Transporter via its Control Panel screen to recognize my Sider and to place an empty MSDOSVOL on it as the Transporter's section of my hard disk.

Big, big, big mistake. What I should have done was to go step by step through the manual and run the automatic configuration first, because the automatic configuration realizes that all the Transport-

er's MS-DOS files and utilities are preinstalled in an MSDOSVOL file on an included 3.5-inch disk. In other words, the auto-configure program temporarily sets up MSDOSVOL on the included 3.5-inch disk as a "hard disk" or drive C:. By setting up my hard disk as a hard disk before letting the Transporter automatically, and temporarily, set up the 3.5-inch disk as a hard-disk drive, I effectively masked all the Transporter's MS-DOS files from myself! All I could see was that I had a 3.5-inch disk with some ProDOS files, but I could not see the MS-DOS files hidden in the MSDOSVOL area.

Once Applied Engineering's patient support staff got the solution to this problem across to me, things went more quickly. All in all, you can avoid many problems by never getting ahead of yourself in the manual. All the information is in the manual, and anyone but an MS-DOS expert must go step by step or become as lost as I was for a few days.

Does the Transporter work for me? Yes! I have already used it to "preview" several programs that will shortly be available on the Apple II and/or Mac. It will, I think, have saved me many hours of frantic effort to meet deadlines once those programs appear. I have yet to find any program—business, game, or educational—that I cannot run on this system. With the caveat that you should pay absolute, strict attention to the rather complex manual, I highly recommend the Transporter to those who have a use for such a product. ✛

Neil Shapiro, a longtime Apple user, is the sysop of the MAUG section on CompuServe.

was 1.9 times faster on the Transporter than on a 4.77-MHz original-style PC, whereas an Integer Multiply Loop was 3.6 times as fast. Other speed ratios ranged from 2.1 to 2.5 times PC speed, or .4 to .9 times PC-AT speed. (The IBM PC-AT is a high-end model, almost twice as fast as the regular PC.)

Disk tests were also impressive, with the Transporter reading and writing some files in as little as half the time a PC needed. The average CPU improvement was around 2.3 times PC speed—effected mainly because the Transporter uses a NEC V30 chip instead of the slower 8088 in the PC. The ubiquitous Norton Utilities Speed Index test showed the Transporter as having 3.7 times the speed of a standard PC. These performance differences also showed up when I was using application software, but again the improvements were not uniform. In Borland International's Quattro, for instance, I did not see as much speed improvement as I did in Lotus 1-2-3.

Switching Files and Formats

A Transporter utility can translate ASCII files from MS-DOS for-

Average CPU improvement with PC Transporter was around 2.3 times PC speed.

mat to ProDOS format, and the Transporter is able to make a volume on a ProDOS diskette or hard disk for storing MS-DOS files. If you buy a Transporter, you get the ability to move MS-DOS files to the Apple system, and vice versa, so you don't have to also go out and get an Envoy or MatchPoint-PC system (described elsewhere in this set of cover stories) to get disk-file compatibility. You can even have your system read 3.5-inch MS-DOS disks in an Apple 3.5 drive.

You cannot read MS-DOS disks in an Apple UniDisk 3.5 disk drive,

however. In fact, the manual warns that using a UniDisk can ruin the Transporter hardware. I didn't test this assertion, for obvious reasons.

Pros and Cons

I wasn't laughing anymore when I finished testing the Transporter. I quickly memorized the most common PC-key equivalents and was running many of my MS-DOS programs on the Apple screen. This setup showed several advantages. I did like saving desk space by having both systems in one box, I appreciated the Transporter's doubling or tripling of PC speed, and I made use of the ability to transfer ASCII files from one format to the other. If I were moving to the PC world for the first time, I would also be thrilled to stay in touch with my Apple peripherals. Who wants to have two dot-matrix printers side by side just because they don't speak exactly the same computer language? Not me.

Still, I wasn't convinced that the Transporter was the best way to go if you wanted PC compatibility. This system has some serious disadvantages. If I had been unaccustomed to hardware "enhance-

Whatever you do, don't snicker at the coprocessor idea, as I did.

ment'' (the art of stringing cables and reconfiguring drivers), the Transporter's variety of configuration options and my difficulty in reaching customer support would have been reason enough to stick to a local "clone" store and a traditional PC-compatible.

Also, as an experienced MS-DOS user, I'm already addicted to the world of high-density 5¼-inch floppies. The Transporter cannot handle them or the new 1.44Mb 3.5-inch floppies. An even more important worry is that I'm used to slots for upgrade processor, memory, and I/O boards. I want to be able to move to 80286 and 80386 chips, add expanded memory, and put in new video-display cards if I need them for CAD or paint programs. The Transporter can accept an 8087 math coprocessor chip but has no provision for add-on boards or processor upgrades.

The standard MS-DOS machine in business today is an AT running at 8, 10, or even 12 MHz. It's not easy to find a PC clone that runs at a mere 4.77 MHz, the speed all Transporter comparisons assume. The Transporter doesn't hold a candle to these machines and doesn't hold out any hope for running OS/2, the multitasking operating system that is just vaporware now but could become important as soon as next year. As far as the display goes, the Transporter's emulation of CGA video is impressive, but EGA is quickly becoming the standard for PCs, and VGA is starting to look like the next standard.

I haven't really come up with *the* advice for all situations. If you want to run only a few MS-DOS programs and don't have expectations beyond CGA displays and original PC speed, the Transporter

can give you a compact means for putting those functions on your desk, along with more RAM for your Apple and PC file-transfer capability. If you are already attuned to AT speeds and plan to run some MS-DOS programs for a fair stretch of time, the Transporter may seem a little cramped and plodding. It is also a bit expensive, especially if you start adding up all the peripherals and extras. You'll spend something like $609 for the 640K version, $399 for the dual drives, $49 for an installation kit—or $1057 total (even more if you're working on a II Plus instead of a IIe or IIGS, because you'll need an IBM keyboard). For that money, you can buy a 10-MHz IBM PC-XT-compatible with a 20Mb hard-disk drive that would be almost as fast as the Transporter and would have much greater memory, if a somewhat less impressive display. Of course, that scheme wouldn't buy the extra RAM for an Apple II, and you'd still need to spend a couple hundred for PC/Apple disk-transfer ability.

If you hunger for a speedy PC with expanded memory and great graphics to run big spreadsheets, databases, or CAD programs, and you are already contemplating OS/2, forget the Transporter and buy a cheap AT-compatible. Whatever you do, though, don't snicker at the coprocessor idea, as I did. This PC compatibility is for real and gives you a viable option for switching between two worlds. ✦

VITAL STATISTICS

PC TRANSPORTER
A plug-in card that lets you run MS-DOS (IBM PC) software on an Apple II and its peripherals

CPU: Apple II Plus, IIe, or IIGS
OPERATING SYSTEM: ProDOS and PC-DOS or MS-DOS, Version 2.0 or greater (must be purchased separately)
DISK DRIVES: at least one PC-compatible disk drive (5¼- or 3.5-inch)
OTHER: PC-compatible keyboard (for use with an Apple II Plus)
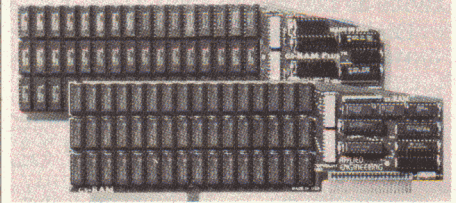**COPY PROTECTION:** no
MOUSE: AppleMouse emulates IBM mouse
LIST PRICE: with 384K of RAM (256K in IBM mode), $489; with 768K RAM (640K in IBM mode), $609; IIGS installation kit, $49; IIe/II Plus installation kit, $39; IBM-style keyboard, $139; single PC-compatible drive, $269; dual PC-compatible drives, $399

Applied Engineering
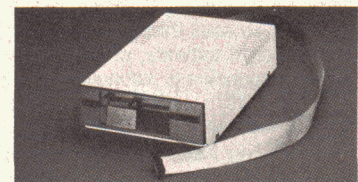*P.O. Box 5100*
Dallas, TX 75011
(214) 241-6060

*Converting IBM files into
Apple format and back again*

ENVOY

A funny thing happened on the way to creating disk-drive diagnostic software. Some of the folks at ASKY, a company that makes programs to quickly test a dozen technical aspects of disk-drive performance, decided they'd put their encyclopedic knowledge of disk drives to work on what seemed a minor production quandary. Rather than buy expensive, dedicated disk-duplication machines, ASKY wanted to use inexpensive Apple II computers to duplicate disks for both Apple and IBM systems. So, they created a disk-controller board for the Apple II that could handle PC-compatible floppy-disk drives.

Not realizing how exciting that development would be to people moving from one environment to the other—such as engineers with an IBM at work and an Apple at home—they innocently mentioned the new controller to a users' group. The reaction was potent enough that the firm decided to offer the controller as a commercial product.

Disk-Drive Diplomacy

First shipped in late 1986, the Envoy controller plugs into an Apple II Plus, IIe, or IIGS slot and can then handle up to four 5¼- or 3.5-inch PC-compatible disk drives. (It can provide power to only one drive, so if you attach more drives, they must have their own power supplies.) Although it can work with any combination of 360K 5¼-inch drives, 360K 3.5-inch drives, and 720K 3.5-inch drives, it cannot handle high-density 1.2Mb 5¼-inch drives. According to the technical staff, these drives send information faster than the Apple II can swallow it.

ASKY sells Envoy as a subsystem too—that's what I looked at—that combines the controller card with a PC disk drive, power supply, and cable. Either the card or the subsystem comes with a one-year warranty, and ASKY has a 24-hour technical-support bulletin board as well as a standard technical-support telephone line.

Envoy's software lineup includes ProDOS, BASIC, a setup program, diagnostics (what a surprise!), and a file-transfer program, all on a standard Apple-format disk. These programs let you see what disk drives are available and let you read and write files on PC-format disks. Although you can move PC program files to the Apple, they cannot run on it. For that, you need a coprocessor such as the PC Transporter (see accompanying article). You can display a directory of the files on the disks and move files back and forth between your standard Apple drives and the PC drives connected to the Envoy. A utility called Stripper can make the conversion between MS-DOS ASCII files and Apple ASCII files for translating data from one system to the other. There are no other specific transfer utilities for spreadsheet or database files.

Fringe Benefits

Besides allowing you to read MS-DOS data on your Apple, Envoy gives you a lot of storage space for

BY PHILLIP ROBINSON
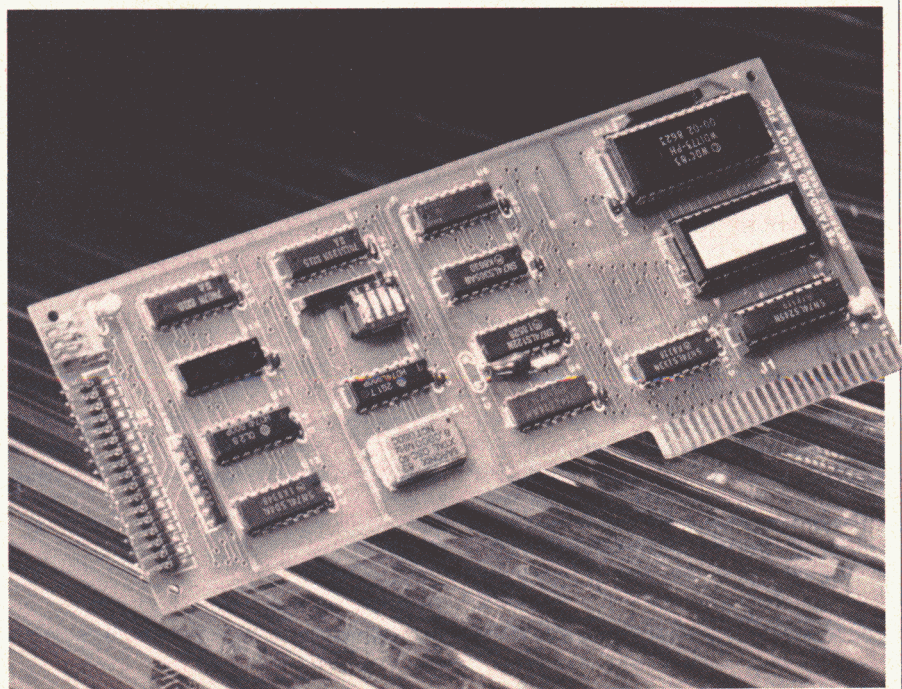
*Two ways to switch
to Apple II compatibility
on a PC or clone*

TRACKSTAR 128 *and* CORDATA WPC BRIDGE

If you have a reason to run both PC and Apple II software, you don't have to own two complete systems. Coprocessors can run software from another computer while taking advantage of the disk drives, monitor, and other peripherals of your main computer. One coprocessor option is the PC Transporter card (discussed elsewhere in this issue), which can run PC software on your Apple II. Another option is Diamond Computer Systems' Trackstar board, which performs the opposite task; it runs Apple software on a PC or compatible.

The Trackstar 128 occupies a single slot in a PC and is able to run nearly all Apple II software. It also comes bundled with a PC clone called the Cordata WPC Bridge. Although it boasts a high degree of compatibility with Apple II software, there are a few exceptions: The Trackstar cannot handle programs that employ the special features of the IIGS; it doesn't like telecommunications software; and there are a few other programs that give it indigestion, thanks to their copy-protection schemes. (Your best bet is to check with the manufacturer to ask if your favorite programs will run.)

Installation

The Trackstar board packs all of the main muscles of an Apple II onto a single board that fits into a standard PC expansion slot. It has a 65C02 CPU, 128K of RAM, an Apple DB-9 game port, and an Apple-compatible disk-drive port. The board comes with all the necessary cables for installation, as well as some software utilities for installation and file transfer. Physically installing the board is fairly simple: You open the PC, plug in the Trackstar, set one jumper on the Trackstar, reroute the video and disk-controller cables through the Trackstar, and close it all up again. If you have TEAC disk drives in your PC-compatible, you need to add a capacitor to them to allow Apple diskettes to boot on the PC. The right capacitors, as well as diagrams and step-by-step instructions on all of this, are in the Trackstar manual. For novice PC enhancers, the manual would profit from the addition of photographs to the diagrams. (I like Applied Engineering's idea of also including a videotape of the installation process with its PC Transporter board.)

Now you're ready for the software side. After starting the PC with MS-DOS, you run the main utility on the Trackstar diskette. It brings up a menu with two choices: normal initialization and high-compatibility initialization. I almost always used normal initialization. The high-compatibility option is for software that needs Apple's own version of Applesoft BASIC—the option asks you for an Apple DOS 3.3 System Master Disk, from which it can read the file called FPBASIC. The normal option has its own FPBASIC emulation program.

The next step is to put the Apple disk from which you want to boot into the appropriate disk drive—drive A or B on the PC or an external Apple drive that you have attached directly to the Trackstar board. The PC drives can read most Apple disks at this point—the only advantage of the external Apple drive is that it can read disks that use the half-track copy-protection scheme.

Running Apple Software

Your Apple program should then start just as if you were booting the disk on an Apple IIe. When I experimented with the Trackstar, I didn't encounter any programs that wouldn't run. AppleWorks, MultiScribe, The Print Shop, and a host of other programs all ran, pre-

senting their work on the PC's display in 40-column, 80-column, low-res, hi-res, double-hi-res, or mixed graphics and text modes. ProDOS, DOS 3.2, DOS 3.3, and Apple Pascal programs seemed to work equally well. Diamond shows a study that says more than 75% of Apple programs run right from the PC's drive, and that 97% run when you use the high-compatibility option and an external Apple drive.
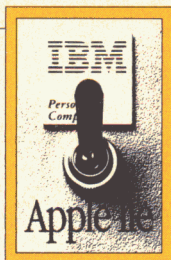
As far as data input is concerned, you can use the PC-compatible's keyboard (some keys are specifical-

work with it because they bypass the serial software.)

At any time you can leap back out of an Apple program to MS-DOS. If you press F1 and Esc on the PC's keyboard, a Help Menu appears. From there, you can reboot a disk, reset the entire system, disable the Apple II Plus mode, exit to MS-DOS, or define function keys. That last feature takes advantage of the PC keyboard's F1–F10 function keys. You can assign to them your own definitions, which are then on call as

you run Apple programs. When you leave the Trackstar Help menu for MS-DOS, you can choose to terminate Trackstar's software altogether, or you can leave it running in the background. If you keep it in the background, using 40K of the PC's RAM, you can call it up at any time by pressing Alt-Esc.

A separate utility program lets you configure the Trackstar board by setting the type of monitor, serial- and parallel-port ID, and disk-drive assignments. You can choose to boot Apple programs from either of two internal drives or from an external Apple drive. Yet another utility can translate ASCII text or binary files between the DOS 3.3 and MS-DOS formats.

I traveled to Diamond's facility to see the final stages of testing on the Trackstar Plus board. This new add-in card will be able to run in the IBM PS/2 Models 25 and 30;

Cordata's WPC Bridge
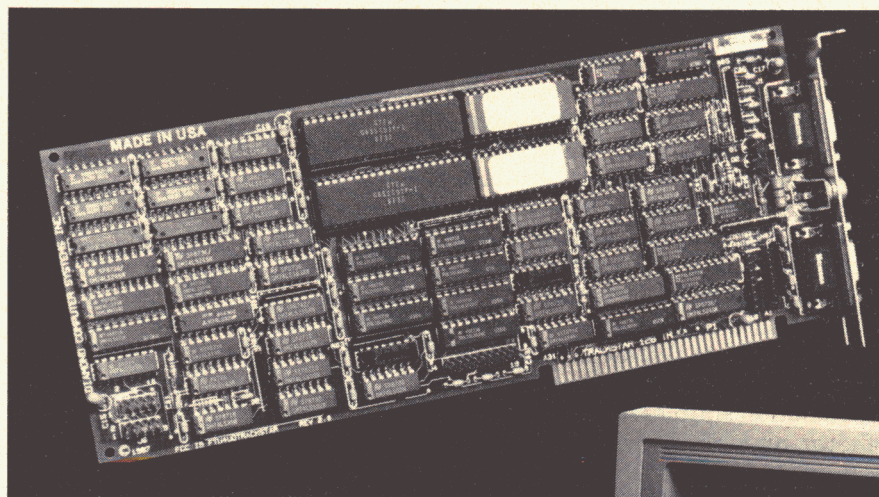
The Trackstar 128

ly mapped to special Apple keys, such as F9 as the open apple) and a joystick (the Trackstar has a 9-pin game port). Be careful when connecting the joystick: The connector looks just like the digital TTL RGB color output on the Trackstar card. (There's also a Composite Video Out connector on the edge of the board.) Regrettably, Trackstar does not work with a mouse.

For output, Trackstar emulates the standard parallel-printer interface card of an Apple through the printer port of the PC. It also provides a serial interface by emulating Apple serial communication in software and sending the information to and from the PC's serial port. (Unfortunately, most Apple II communications programs don't

will store Apple files on PC floppy disks, on a PC's hard disk, or on a PC network; and will have a 2-MHz mode that will give it twice the speed of a standard Apple. The Trackstar Plus will cost $395 and will include an Apple-compatible 5¼-inch disk drive.

A Two-in-One System

The Cordata WPC Bridge can save you the trouble of installing a Trackstar board: It's a PC-compatible computer with a Trackstar board already in place. The WPC combines the monitor and system box in a single enclosure, sort of like a big Mac (with a 12-inch monochrome display). At first I didn't like this design. The keyboard is detached, and the monitor tilts up and down a bit, but you are restricted in positioning and viewing. The compact design also makes insertion of additional boards a bit tricky: The expansion slots are sideways on the left side of the system box and are tucked in pretty tight.

After some experience with the system, though, I appreciated how its rugged construction and simple, one-piece approach would be convenient in a classroom, which is exactly where Cordata is aiming it (with educational discounts). The system comes with two 360K 5¼-inch floppy-disk drives, a monochrome display, a snap cover for the display, 512K of PC RAM, a PC-compatible CPU that can run at 4.77 MHz (standard PC speed) or 8 MHz, a CGA-compatible monochrome adapter (with 16 shades of green), a serial port, a parallel port, an AT-style keyboard, a clock/calendar, three slots, and a Trackstar 128 board. An 8087 math coprocessor and a 20Mb hard disk are optional additions.

I had only two reservations about the Trackstar and WPC. First, they don't accept a mouse, and I'm used to working with a mouse now on my IIGS. Second, they are not compatible with IIGS software. I'm a IIGS user and like the latest, most-graphic programs. If I were looking for a way to combine PC standard application training with traditional Apple education programs, however, the Trackstar would be worth evaluating. I would be very tempted to move to a PS/2 networked environment with the Trackstar Plus to get that higher speed and ability to handle hard-disk drives.

The Cordata WPC is well designed for the market and makes installation simpler, but unless you figure on a hefty education discount, it is overpriced. You would find it cheaper to buy your own PC-compatible and stuff it with a Trackstar. For the price of the undiscounted Cordata system, you could have an IBM PC-AT clone with a much faster processor and a hard-disk drive, plus the Trackstar Apple II compatibility. ✚

*Reading and writing
Apple II files in a PC
environment*

MATCHPOINT-PC

Say you've got application programs on both an Apple II and a PC and need to switch files between the two. Or maybe you've moved permanently from the world of one computer to the other and just want to bring your old files with you. Then all you really need is a way to read and write another disk format on your computer.

MatchPoint-PC is an add-in board for the IBM PC that confers on a PC's disk drive the ability to read and write Apple-format disks. You unplug the cable that connects your PC's floppy-disk drive and its disk controller, plug the Match-Point-PC board into one of the PC's slots, and plug the PC disk-controller cable into it. Then the Match-Point board's cable attaches to the disk drive. This connection is very easy to accomplish, even if you know little about computer anatomy. (You have to deal with only two possible connectors and two possible jumper-block positions on the MatchPoint board; and the manual explains them.) Then you close the system up and copy the MatchPoint software onto your system disk (I used an XT clone and a 386-based AT-compatible with a hard-disk drive).
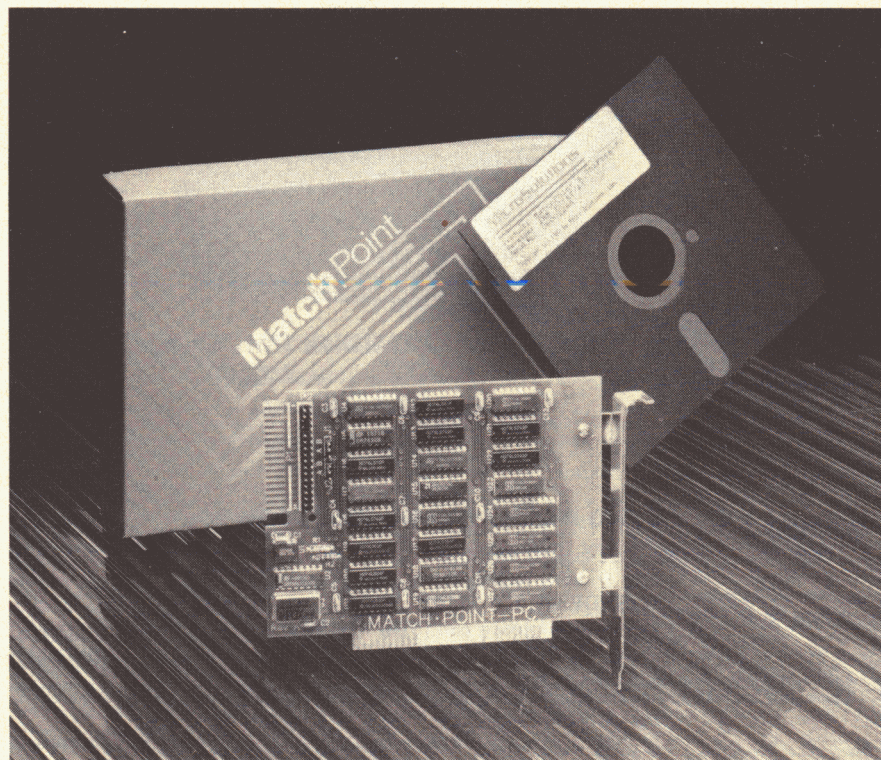
You run the MatchPoint main program, and you're ready to go (this program loads into the PC's memory as a RAM-resident utility, somewhat like Borland International's SideKick does). The first time you run the program, it walks you through a configuration process in which you answer several questions about what kind of disk

drive your PC uses and the desired Apple format (DOS 3.3 or ProDOS/ SOS). If you have trouble with configuration, installation, or file transfers, you can call MicroSolutions' tech support. I got through to the company on my first call, and the support person answered my question about text-file translation quickly and patiently.

After the installation, you can just ignore the new controller and go about your business. The PC floppy-disk drive still reads from and writes to PC-formatted disks, just as if nothing had changed. But when the time comes that you want to read from or write to an Apple-formatted disk, your PC is

ready to please with five new commands: Acopy, Adel, Adir, Ainit, and Atype. They work just like their related MS-DOS commands but are tailored to work with Apple DOS 3.3 and ProDOS disks.

Acopy copies disk files from one drive or directory to another, Atype displays the contents of a file, Adel deletes a file, and Adir displays a directory of a disk. Ainit, for formatting new disks, is the only command whose name doesn't directly match that of its MS-DOS counterpart. Each command has a variety of options for fine-tuning its effect. When working with the commands, you can use regular PC directory and sub-

directory commands, but you also need to follow some simple file-name conventions that the manual explains—MS-DOS and the Apple operating systems don't have exactly the same rules for naming files. Whether you're handling Apple or MS-DOS files, you can use the standard MS-DOS wild-card characters—such as * and ?—to represent unspecified letters in a filename. The commands do allow you to specify an Apple-disk volume number.

Acopy can specify that an Apple disk file is binary or text. This command can convert IBM ASCII to Apple ASCII and vice versa. You can move binary files to a PC disk but cannot run them on the PC unless you have an Apple II coprocessor board such as the Trackstar board (see "Trackstar 128 and Cordata WPC Bridge" in this issue). Acopy can also specify that a copy of a file is "locked" (read-only).

One Caution

I was able to create text files on both the PC and the Apple II and then read them on the other computer. I also was able to move an ASCII database file from the PC to
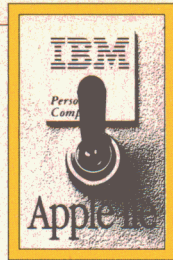
MatchPoint can be an inexpensive and direct way to reach out and touch the Apple II universe.

the AppleWorks database module successfully.

My only trouble came in trying to write on Apple disks with the high-density floppy-disk drive in the 386-based PC. Doing so corrupted the disk, which was no longer readable in the Apple II or sometimes even in the PC. The manual warns of this trouble, suggesting that you either stick to reading from (and not writing to) disks with such a drive or buy a 360K 5¼-inch drive to add to your

AT or compatible if you want to write on Apple disks.

More and more MS-DOS machines have high-density 5¼-inch disk drives and even 3.5-inch floppy drives, so the percentage of computers that can gain Apple II access through MatchPoint is falling. If you do have an MS-DOS system with a 360K drive, however, MatchPoint is an inexpensive and direct way to reach out and touch the Apple II universe. ✚