The Kaypro 10

A hard-disk CP/M portable with a large software bundle and a small price

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Kaypro's hard-disk portable computer, the Kaypro 10, like its siblings, the Kaypro II and 4, is not a technologically innovative machine. Kaypro has taken existing single-board computer and Winchester hard-disk technology, combined with a monitor, keyboard, and floppy-disk drive and wrapped it all up in a simple bent-metal case.

On another score, though, the Kaypro 10 is very innovative. The equipment and power delivered for the price are outstanding. At $2795 the Kaypro 10 costs less than many stand-alone hard-disk drives. And along with its 10-megabyte hard-disk drive comes a sturdy and serviceable CP/M microcomputer, a high-quality, built-in terminal, and an astonishingly large software bundle (see photo 1).

So, while the Kaypro 10 may have little to teach us about electrical engineering or systems programming, and nothing to teach about aesthetics or ergonomics, it offers many lessons about what kind of value is available for a limited budget.

Hard Disk or 16 Bits?

The appearance of this hard-disk computer with software for under $3000 will present many computer buyers with a dilemma: will they get better performance from an 8-bit machine with a hard-disk drive or a comparably priced 16-bit machine with floppy disks?

The answer, of course, will depend on the principal purposes for which the computer will be used. Large spreadsheet applications, graphics work, high-precision computation, and heavy statistical analysis will likely be served better by the expandable RAM (random-access read/write memory) resources of a 16-bit machine.

But if you're doing a lot of word processing or database management, you'll probably find that the 8-bit machine with the hard disk is faster and more convenient than the 16-bit machine with only floppy disks.

A reliable hard-disk computer system like the Kaypro 10 is a joy to work on if you're used to floppy-disk-only systems. The advantages are speed and capacity. The Kaypro 10 reads and writes material to and from the hard disk at a rate two to four times faster than the floppy disk. Programs run faster and records are found more quickly (see table 1).

The difference in capacity adds up principally to great advantages in convenience. Working with the 10, I found I could keep all my current projects on the hard disk along with all the tools I needed to do the work, such as word processors, spelling checkers, compilers, and database programs. I could switch easily and quickly among projects and tools. Floppy-disk handling, and the subsequent likelihood of damaging disks, was cut to a small fraction of what it was on a floppy-disk-only system. I got a lot more done in the same time because I spent less time with the logistics of getting the right files onto the right floppy disks at the right moment.

For people doing a lot of database-management work, the added capacity of the hard disk may be not only con-

Photo 1: *The Kaypro 10 and its documentation. Even glancing through all the documentation for the extensive software bundle is a major chore.*

venient but necessary. It enables rapid access by more than one index to records that previously had to be stored on separate disks.

The Winchester

A Winchester-type fixed hard disk is what makes all of this possible in an inexpensive portable. The two-platter, 10-megabyte drive manufactured by Tandon is sealed in its own container and double shock-mounted inside the 10. The sealing of the drive protects it from a possibly dusty or moist environment. Because there is only one drive, which cannot practically be removed, the drive must be backed up by copying its contents to floppy disks. The floppy disks can then be removed and protected.

Safety

Included with the Kaypro 10 is a safety program that is an important part of the portability of the machine. The safety program must be run before the 10 is turned off. The program causes the hard-disk read/write heads to be withdrawn to a data-free "landing zone" where the heads can do no damage if they accidentally strike the disk surface during movement of the computer.

The 10 also automatically deselects the hard disk whenever it is not in use for more than a few seconds. While this probably slows the 10 down some on hard-disk access, it cuts the chances of damage to the disk if power is interrupted.

BASIC Benchmarks	Time (Seconds)	
	Kaypro 10	IBM PC XT
Disk Write (64K bytes)		
Floppy Disk	65	29
Winchester	15	8
Disk Read (64K bytes)		
Floppy Disk	17	23
Winchester	9	8

Table 1: *Disk read and write speed comparisons of the Kaypro 10 and the much more expensive IBM PC XT. The comparison mainly serves to highlight the slow speed of the Kaypro's floppy- and hard-disk write routines. The Kaypro test was made with Microsoft's BASIC-80, which is included with the 10. BYTE's benchmarks are listed in the January 1982 BYTE, page 54.*

Transporting the 10

Calling the 10 a portable is pushing the definition of portable. At 30 pounds, it's a hefty burden to carry for more than a block or so. Anyone doing that will also discover that the carrying handle is quite uncomfortable.

Nonetheless, the 10 folds up into a neat package that can be carried easily to a car parked nearby, or it can be moved from room to room. The 10 fits under most major-airliner seats—a popular benchmark for portability—as long as you avoid the window seats. You won't have any leg room left over, but it's much preferable to
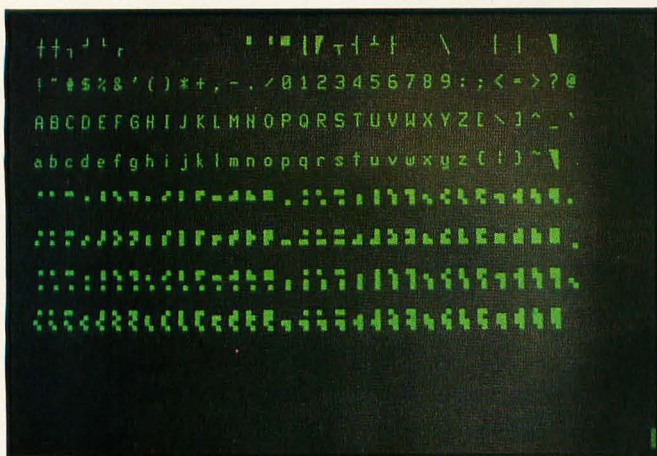
Photo 2: *The complete character set of the Kaypro 10. The 10 includes a good collection of graphics characters.*
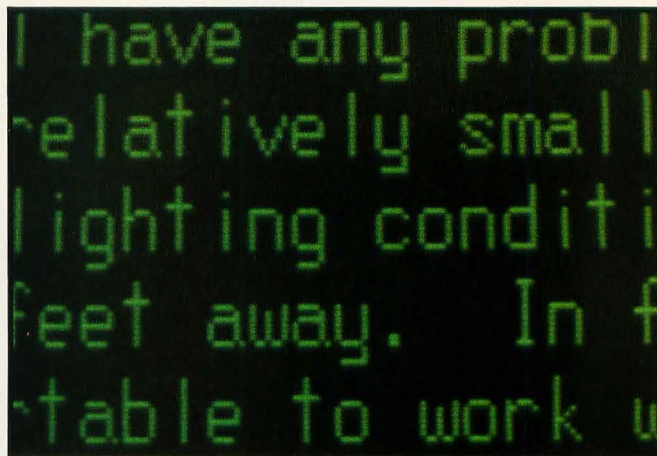

Photo 3: *A close up of the Kaypro 10's display. Note the very high resolution and the fact that character spacing is a bit uneven.*

checking the computer as luggage (a Kaypro technical-support hotline employee told me this would constitute abuse of the computer).

If you carry the Kaypro around much you should definitely get a cover of some sort for it. Even folded up for transport, all the Kaypro 10's ventilation slots are completely open to dust and moisture.

The 10 I tested survived my carrying it around from day to day with no difficulty at all. While I didn't deliberately drop it, I did bump it around some, and nothing went wrong. The machine also survived being shipped across the country twice without accumulating any bad spots on the hard disk in the process.

By this measure, Kaypro's shock-mounting system for the Winchester seems to be a success. Despite this, I have

one complaint: the *Kaypro 10 User's Guide* offers no guidelines at all on how to transport the machine safely or what kind of shocks it can be expected to survive. Presuming that the hard disk is vulnerable, I found this to be a distressing omission.

The Display

The folks at Kaypro have certainly packed a beautiful monitor into this metal box. The 9-inch non-glare screen holds a full 25 rows (only 24 easily available to the user) and 80 columns of very clear green-phosphor characters. The characters are composed of 14 dots vertically by 7 horizontally, with 3 of the 14 vertical dots used as true descenders (see photo 2). The screen's resolution is much better than the Kaypro II's and the characters are a lot

At a Glance

Name
Kaypro 10

Manufacturer
Kaypro Inc. (formerly Non-Linear Systems)
533 Stevens Ave.
Solana Beach, CA 92075
(619) 755-1134

Dimensions
19 by 17 by 9 inches (when closed for transport); 30 pounds

Components
Processor: 4-MHz Z80; Memory: 64K bytes RAM; Display: built-in, high-resolution 9-inch green-phosphor; 80 by 25 display with underline, reverse-video, half-intensity, blinking, or in combination. Graphics Format: 160- by 100-pixel graphics-plus-character graphics. Keyboard: 75 full-ASCII keys in Selectric-style layout; 14-key numeric keypad and 4-key cursor vector pad double as user-definable function keys

Mass storage
1 shock-mounted 10-megabyte (8944K bytes available) fixed hard-disk drive subdivided into two logical drives; 1 half-height double-sided, double-density 390K-byte floppy-disk drive

Interfaces
1 Centronics-type parallel printer port; 2 RS-232C serial ports; 1 light-pen port

Software
CP/M version 2.2 with enhancements for easier employment of user areas. Word Processors: Wordstar version 3.3, Perfect Writer version 1.20. Spreadsheets: Perfect Calc version 1.10, Chang Lab's Microplan. Spelling Checkers: The Word Plus, Perfect Speller. Database: Perfect Filer. Programming Languages: Microsoft BASIC, CBASIC, and Topaz Programming's S-BASIC. Communications: Superterm, a smart-terminal program with XMODEM protocol option. MUFBAR disk-backup system. Assorted games

Options
Kaylink mainframe-to-microcomputer synchronous communications package. Kaynet networking system. Contact Kaypro for prices and availability

Documentation
Kaypro 10 User's Guide, approximately 150 pages, from Kaypro. Manuals for all software items (except games). Reference cards for Wordstar and all the Perfect Software. A current copy of Kaypro's magazine *Profiles*

Price
$2795

more readable than the II's (see photo 3).

I don't think most people will have any problems reading this display, despite its relatively small size. It was quite readable under a variety of lighting conditions and at distances from very close to 5 feet away. In fact, I found this screen to be a lot more comfortable to work with for extended periods than many 12-inch monitors on nonportable computers.

The only advantage these larger, separate monitors have over the Kaypro's is that some may be easily adjusted for height and angle. Adjusting the Kaypro's monitor position or angle involves moving the whole machine laterally and propping things under it. It would have been nice if Kaypro had provided an adjustable stand to compensate for users' preferences and working conditions.

The 10's monitor is versatile as well as readable. It offers reverse video, half-intensity, underlining, blinking, and any combination of these video effects. Most of the 10's users won't see much of this versatility, though; only a small number of the programs included with the 10 make use of even the reverse video.

The reverse-video effect was very irritating to my eyes when it occupied more than a tiny portion of the screen. Unfortunately, Kaypro chose to make Wordstar's menus and status line appear in reverse video. The result is a glaring screen that makes it hard to concentrate on the text at hand. I was able to solve this problem by patching Wordstar to use half-intensity type rather than reverse video for its menus. Users who don't know how to patch Wordstar and don't have a sympathetic dealer won't be so lucky.

There shouldn't be any trouble getting applications software that will operate acceptably on the 10's screen because Kaypro imitated the popular Lear-Siegler ADM-3A methods for clearing the screen and addressing the cursor. Getting commercial software to use the previously mentioned video effects, though, will require some extra work on either the user's or the software vendor's part, because Kaypro went its own way in determining the codes to invoke these features.

Graphics

Ultrahigh resolution for text does not mean high resolution for graphics. The 10 offers bit-mapped pixel (picture element) graphics, but the resolution is only 160 by 100 pixels. These plump pixels can be used for bar charts if there aren't too many bars and there certainly will be a few games written to make use of them. But my guess is that there won't be a whole lot of use made of the 10's pixel graphics by applications programmers. If you're thinking of purchasing the 10 rather than another computer because of the 10's graphics, you should think again unless you're only after a taste of graphics programming.

The 10 also offers a good set of graphics characters that should prove marvelous for drawing up sharp menus or such. The graphics characters aren't documented in the manual, but Kaypro includes the source code for the

Circle 368 on inquiry card.

10's menus, all of which make use of the special characters. (You'll have to hunt for these, though, as the *User's Guide* doesn't tell you where to look.)

The Keyboard

The 10's detached keyboard covers the monitor and floppy-disk-drive opening when the machine is packaged for travel. In use, the keyboard is connected to the back of the computer by a curly cord similar to the one that connects most telephones with their handsets (in fact, the modular jacks and connectors are exactly the same). The cord allows you about 3 feet of play without stretching it too far, so I had no trouble finding a comfortable place to put it for typing.

The touch of the keyboard is smooth and consistent, but extremely light. Even though I am accustomed to light keyboards (I use a Kaypro II), I still make a lot more errors than usual when working with the 10. Presumably, if you type only on this keyboard you'll get used to the light feel, but it might be difficult to switch back and forth between the 10 and other keyboards.

The keys themselves are well designed and conveniently arranged; for instance, the Return and Shift keys are large and placed where most touch-typists expect them. The keyboard makes a noise that sounds like a cross between a squeak and a click when keys are pressed or when they repeat. The sound is not adjustable, but the manual does tell you how to turn it off.

All the keys repeat when held down for more than a fraction of a second—unless you are holding down the Control key at the same time. Control characters don't repeat. I found that to be quite a problem, particularly when using Wordstar and Perfect Writer, until I learned how to use the function-key facility to put frequently used control characters on the numeric keypad, where they can repeat. This worked well, but it would have been better if the control characters repeated when used normally.

The function-key facility is one of the nicest but also most poorly documented of the 10's facilities. Each of the 14 keys on the numeric keypad and the four additional cursor-control keys can be redefined to produce the equivalent of up to four keystrokes when pressed. A program, Config.com, included to accomplish this redefinition is well designed and also lets you change the default printer port and the data-transmission rates of both serial ports. The problem is that there is only a brief and very incomplete mention of this important program in the *User's Guide*. Many users will never discover that they have function keys.

The Operating System

When using nearly 10 megabytes of storage, it's critically important to be able to subdivide the directory so that the whole multiscreen mess doesn't appear every time you ask for a directory. CP/M versions 2.0 and later (the Kaypro's is 2.2) solve this problem by allowing each drive to be logically broken into as many as 16 user areas. Each of these user areas is invisible to each other area, even
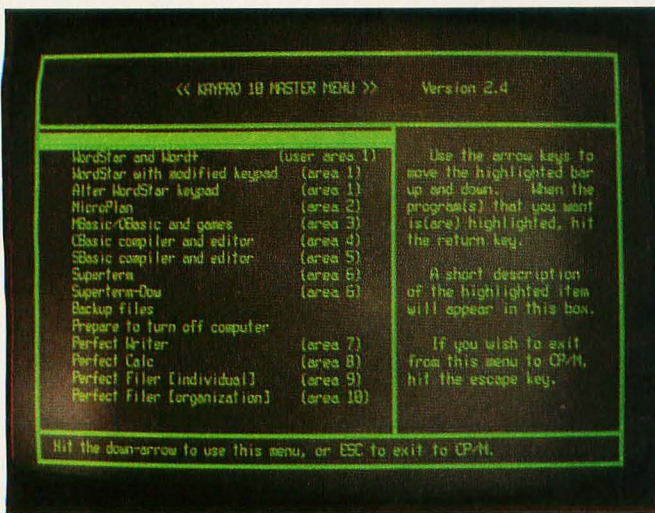
Photo 4: *The Kaypro 10's main menu.*

though they take up space on the same disk. Size of user areas is flexible; each could potentially contain nothing or utilize the entire disk.

Kaypro made a couple of modifications to the CP/M's CCP (console command processor) that make a world of difference in the usefulness of the user-area feature. The modified CCP displays the current user area along with the current drive letter whenever it prompts the user for a command line. So the usual CP/M A > prompt is replaced with A0 >, A1 >, ..., A15 >, depending on which user area you're logged to. Also, whenever a command file is asked for that can't be found in the current user area, the CCP searches user area zero for the program. This means you can place most of your utilities in user area zero and they'll be available no matter what area you're logged to. (Unfortunately, programs like Wordstar can't find their overlays in different user areas, so there are still problems.) These little changes save a lot of time and trouble in day-to-day work.

Hard-disk Backup

Hard-disk backup should be easy and reliable. Winchester drives may be more reliable than floppy disks, but they still make errors. With the capacity of a hard disk, a directory error or a hard-disk failure can make a real mess.

Fortunately, Kaypro has included a quite workable hard-disk backup system with the 10. The MUFBAR (multi-floppy backup and recovery) system will back up anything, from an entire user area to individual files, from the hard disk onto floppy disks.

MUFBAR will automatically break up very large files onto multiple floppy disks if necessary. This capacity is an important one if you're thinking of keeping a large database on the 10. This backup program also gives you the ability to "stamp" backup disks with a note about the time and contents of the backup.

What the program won't do is tell you which files need backing up. As provided by Kaypro, CP/M offers no facility for marking files that have been changed so that just the changed files may be backed up. This means that either you'll have to keep a list of what files have been altered since the last backup or you'll have to back up all the files every time. Because the hard disk contains the equivalent of about 23 floppy disks, the latter would be a burdensome task.

In an environment where several people use the machine and each can't be disciplined to keep records of files changed, a floppy-disk backup system could mean courting disaster, no matter how convenient the backup program is. Such users would be well advised to look for a hard-disk computer with a better backup system, even though it is likely to be a far more expensive system than the 10.

Menus

The Kaypro 10 includes a set of menus extensive enough that many users may be able to completely avoid learning CP/M if they wish.

The master menu (see photo 4), which automatically runs when the 10 is turned on (this auto-load feature may be turned off easily by running a program called Nomenu.com), enables you to run any of the major programs provided with the Kaypro. All you have to do is move the cursor to the program desired and press the Return key. Brief explanations of what each program can do are provided in an information area on the right side of the menu. The explanations change depending on where you have positioned the cursor.

The main menu chains into a set of subsidiary menus in cases where there are more decisions to be made. These special-purpose menus follow exactly the format of the main menu. All are quick to use and intelligible.

I liked these menus a lot better than any of the other menu systems I've seen on inexpensive microcomputers. The reason the Kaypro menus worked, though, didn't have as much to do with the menu design as with the hard disk. Most microcomputer menu systems break down because all the applications you might want to run are not available on the same disk. Thus, the menus lead you through disk changes in a way that necessarily leaves room for errors the menu system can't deal with well. This problem goes away when the menu can immediately run the desired application.

The hard disk also eases up the space constraints that hinder the designers of a menu system. The 100 or so kilobytes an adequate menu system might require is a big sacrifice on smaller-capacity, floppy-disk-only computers.

The 10's menus, though generally very useful, do have some annoying flaws: chief among these is that there are some important omissions from the menus. For example, the hard-disk backup system is completely menu-driven, except for the fact that you can't format a floppy disk from the menu. So backing up disks requires you to leave the menu system. Anything that makes the backing-up process harder or more confusing is a real problem.

Also, there is no easy way for you to customize the
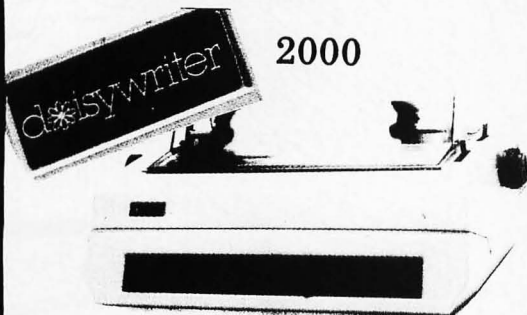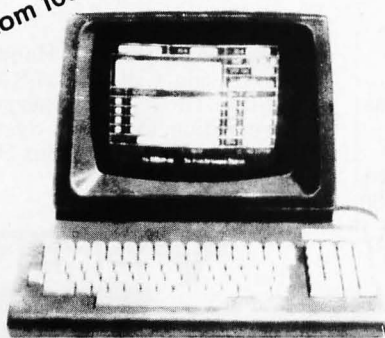
menus. Kaypro provides the S-BASIC source code for the menus, but this isn't enough. Customization should be possible without having to program. It certainly shouldn't require having to program in an unusual hybrid language available only with the Kaypro 10.

Documentation

It's helpful that the menu programs that Kaypro provides to move you around the hard disk are so good, because the *Kaypro 10 User's Guide* provided with the machine is a positive hindrance.

This manual must be rated unacceptable for several reasons. Its description of the organization of the 10's software bundle is not only incomplete, but very often incorrect. Vital information on system software utilities is missing or also incomplete. Very important documentation, such as the description of the hard-disk backup utility, is stuck in the back, without so much as a note at the beginning of the manual to indicate it's there. There is no index.

The information presented in the manual also fluctuates between user-friendly and cryptic. The first few pages of the manual constitute a very gentle ''shake hands with your Kaypro 10'' introduction, complete with simple illustrations. They are followed by explanations of a few important CP/M utilities rendered in such a way that only someone already familiar with CP/M stands much chance of understanding them. This sudden change in tone is characteristic of the manual as a whole. The *Kaypro 10 User's Guide* will satisfy neither new nor accomplished users.

The *User's Guide* is only one of a small shelf's worth of manuals that come with the 10. Most of the other manuals are for one or more of the many programs bundled with the machine. All of these manuals (even Digital Research's improved CP/M manuals) are much better than the Kaypro manual.

One very welcome piece of documentation included with the 10 I reviewed was the second issue of *Profiles*, a slick magazine published by Kaypro for Kaypro owners (*Profiles*, POB N, Del Mar, CA 92014). Many outfits offering software and hardware add-ons specifically designed for the Kaypro have ads in *Profiles* that are enlightening.

Software

One of the advantages occasionally touted for the practice of bundling software with a computer is that it eliminates the problem of choice for the buyer new to the computer world. The manufacturer makes the software choices for the average user by making appropriate software part of the bundle purchased. Because the computer manufacturer usually has great buying and bargaining power, bundling also often provides a software package that would add up to more than the price of the computer system if each software item were purchased separately.

Kaypro apparently has tremendous buying and bargaining power. But while the company may have used

this power to provide great value, it hasn't exactly eased the novice's burden of choice.

Indeed, the Kaypro 10 comes bundled with an astounding quantity of software. Unfortunately, many a novice user will prefer to substitute the adjective "stupefying" for "astounding." There is far more software included with the 10 than anyone is likely to find useful.

Experienced computer users will likely be happy to make the appropriate choices between two word processors, two spelling checkers, two spreadsheets, two communication programs, and three versions of BASIC. But without guidance from a friend or dealer, people new to word processing will likely flounder trying to choose whether first to learn Wordstar or Perfect Writer. It would be very difficult to learn both at the same time. The same will hold for spreadsheet-users-to-be faced with both Perfect Calc and Chang Lab's Microplan or novice programmers confronted with M, C, and S BASIC.

To the well-guided user, though, the only problem with this over-bundling will be the embarrassment of riches. There are several first-rate, tremendously useful programs in the Kaypro's bundle.

While I can't possibly describe all the software in this review (most of it has been extensively reviewed on its own previously), a few items deserve particular note.

Word Processing

Micropro's Wordstar version 3.3 is a fine enhancement of an already excellent product. While users of version 3.0 will not notice any particular changes in Wordstar itself, the manual and installation program have been markedly improved. Wordstar's manual is no longer scandalously difficult to read and there is even a good tutorial booklet included. I wish that Wordstar had accomplished this without inserting so many self-congratulatory cartoons and text passages in the process, but the new manual still makes me feel much better about recommending Wordstar to new users.

The installation program can now be used to easily change such variables as the justification method and the degree of help displayed when the editor is first entered. Previously, only persons able to use the difficult patching facility were able to customize these features. (Yes, the patching facility still exists and is also much improved.)

If you've given up on Wordstar as slow and awkward, you may be in for a pleasant surprise when you try it on the 10. First, the inherent speed of the hard disk allows it to run a lot more smoothly and quickly. There are no more agonizing pauses while program overlays or the next page of text loads from disk into memory. Second, Kaypro has implemented a function-key system that makes use of the redefinable numeric keypad keys to trim down several multikeystroke Wordstar commands to single keystrokes.

Perfect Writer provides an interesting and useful contrast to Wordstar. This Perfect Software product is not nearly the text-formatting tool that Wordstar is, but it is

a far better writing tool. Anyone who does (or wishes to do) a lot of actual writing at the keyboard should take a careful look at Perfect Writer.

Perfect Writer's principal advantage for writing is its ability to split the screen into two text windows. This feature allows me to work on one portion of text while having another portion in view (that portion may even be in another file). It often saves me from having to print out a draft just to be able to look at a piece of text while writing a reference to it. All this is great for writing and nearly indispensable for programming. Imagine being able to look at a function declaration while writing the function call.

Add to the split screen a very fast block-move feature, a deletion "undo" command, the capacity to have up to seven files open for editing (and passing text back and forth among them), and a good search-and-replace facility, and you have a very good editor.

What you don't have, though, is a very workable text formatter. Perfect Writer is not a "what you see is what you get" editor. This is not necessarily bad. When working on a long manuscript, I'd rather not do my formatting while I do my writing. Instead, I'd like to pass it through a formatting program, one that would do the hard work for me, when I finish. This is what Perfect Writer attempts to provide, but the program fails to allow even adequate formatting control. Only through a very awkward process of multiple formattings is it possible to avoid such formatting disasters as section headings alone at the bottom of pages. Getting a good format of a long (75 double-spaced pages) academic manuscript took me a good part of a day.

Spelling Checkers

Kaypro has provided what is, in my opinion, the crème de la crème of 8-bit spelling checkers: Oasis Software's The Word Plus. The Word Plus not only checks spelling against a 50,000 word dictionary, but shows suspected errors in context and suggests alternative spellings. The dictionary can be easily updated, and special-purpose supplementary dictionaries can be assembled. Best of all, though, The Word Plus consistently identifies fewer correctly spelled words as potentially misspelled than other checkers I've tried. This may, of course, just mean that the folks at Oasis Software and I share about the same vocabulary.

Perfect Speller runs a good bit faster than The Word Plus, but I found that it frequently missed my typographical errors. This spelling program is one of those that tries to make a small dictionary file seem big by using prefix/suffix rules to expand on it. If you don't mind having words like "whyed" and "whileor" in your correspondence, this might not bother you as much as it did me.

Spreadsheet Programs

One strong point in favor of the Perfect Software is that once you've learned one of the programs, the others are a lot easier to learn. This is because each member program of the Perfect series shares a similar command

structure. Typing Control-X 2 splits the screen in Perfect Calc as well as Perfect Writer. Such small advantages are not to be scoffed at when trying to find your way through a software bundle as extensive as the Kaypro 10's.

Perfect Calc was a lot easier to learn after learning Perfect Writer. It is a complicated spreadsheet program with a thick manual and a nearly useless Help function. It is also a very powerful spreadsheet, and the thick manual is a good one with lots of tutorial lessons.

Like Perfect Writer, Perfect Calc enables you to edit multiple files with free interchange of information between them (two of these spreadsheet files may even be on the screen at the same time). Perfect Calc also enables you to construct some very large spreadsheets because it uses the disk as a buffer to expand available memory. This works only poorly on a floppy-disk system: large spreadsheets become horribly slow spreadsheets. It works better on the 10, so much better that it seems to take spreadsheets right to the limit of what's possible on an 8-bit 64K-byte computer. Perhaps it takes them past the limit: Perfect Calc lost information more than once on large spreadsheets I built.

Microplan, also included with the 10, is Perfect Calc's opposite: it is simple to use, but not particularly sophisticated. Unfortunately, Microplan's manual is also the opposite of Perfect Calc's: instead of making a difficult program simpler, the Microplan manual makes a simple program more difficult.

Database

Anyone interested in keeping databases with the 10 should know that Perfect Filer may not meet your needs. While the program's preconfigured mailing-list databases worked very well and were easy to use, Perfect Filer proved aggravating when I tried to do much more.

The Perfect Filer manual provided with the 10 was noticeably the weakest of the Perfect series. After warmly greeting me with easy tutorials when I wanted to do easy things, it coldly abandoned me the moment I wanted to do something other than create a sample database of current members of Congress. The problem was that I tended to make mistakes. Apparently the authors of the tutorials were not so error-prone, because an explanation of how to make corrections was not included.

Perfect Filer was just as poor on error handling. Its response to that likely database error, filling the disk, was to let me go on merrily making entries. (I tried this on a floppy disk, as I didn't have the time nor the patience to fill the hard disk with a mailing list.) The manual didn't explain error messages and the program's on-screen messages were cryptic at best, particularly when it didn't like my attempts at form-letter generation.

Floppy-disk Translation

While reviewing the 10, I had the opportunity to try out a wonderful $49.95 disk-format translation program from Micro Solutions.

Uniform, which is available in different forms for the Kaypro II, 4, and 10, enables you to read, write, and for-

mat 5¼-inch disks for a variety of different microcomputers. The version of Uniform for the Kaypro II can, of course, only translate single-sided disk formats; the versions for the 4 and the 10 can handle most of the major double-sided formats as well. Televideo, NEC, Osborne, Xerox, Epson, Otrona, Cromemco, Hewlett-Packard, Zenith, Morrow, and Radio Shack CP/M microcomputers are just a few of the many different machines listed on Uniform's easy to use menus.

Most impressive of all, Uniform on the 4 and 10 also provides a facility for translating CP/M and PC-DOS directory formats. This enables you to transfer data files between PC DOS 1.0 (160K bytes) and 1.1 (320K bytes) disk formats. I was able to use this feature to move a friend's Wordstar-format text files from NEC 8001 format disks to disks for use on an IBM PC in only a few quick steps.

Having Uniform on the 10 gives you a hard-disk computer that is data-compatible with the IBM for under half the price of the IBM PC XT. As PC format disks become the de facto standard for disk information exchange between microcomputers, this data compatibility will be very important. Some writers already are offered incentives by their publishers to furnish their prose on a PC-readable disk.

Revisions

The Kaypro 10 had been on the market about five months when I wrote this review. The machine I reviewed (a late November 1983 model) was very different in both the software bundle and implementation of the operating system from what *Kaypro* was shipping in July of 1983. The software bundle had gone through several major changes, the BIOS (basic input/output system) was in revision "F," and the monitor EPROM (erasable programmable read-only memory) and the hard-disk interface board had each been changed. Several system utilities for use with the hard disk had been revised to work with the new EPROM and interface.

The BIOS, EPROM, interface board, and utility changes were necessitated, a Kaypro spokesperson said, to rectify a problem that only a few machines might have: incorrectly reporting hard-disk errors. In addition to preventing inaccurate reports of read faults, the changes also appeared designed to prevent a possible hard-disk reset error, an independent comparison of the old and new interface card suggested.

Kaypro is shipping kits to all its dealers that are necessary to fix any 10s already sold that might have the hard-disk difficulties, and no charge will be made for the repairs whether in or out of warranty, the Kaypro spokesperson said.

Conclusion

The drawbacks of the Kaypro 10 are definitely overshadowed by its many advantages; for instance, the 9-inch, high-resolution, non-glare screen has the problem of inflexibility, yet is much more readable than the 12-inch (and larger) screens of many desktop computers. In addition, the software varies in quality—but there is a lot of it bundled with the system. And while the *User's Manual* is poorly organized and incomplete, the menu system and enhancements to CP/M will aid both novice and experienced CP/M users in mastering the tremendous storage capacity of the hard-disk drive. Furthermore, the floppy-disk backup may not meet the needs of all users, but on the other hand, the system's hard-disk drive has advantages in speed and convenience over comparably-priced, floppy-disk-only computers. Overall, the machine reviewed was reliable and fairly easy to transport. Despite a few rough spots, the Kaypro 10's many advantages make it an exceptional value for the money. It should be considered by anyone interested in hard-disk capacity or performance at an excellent price.■

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