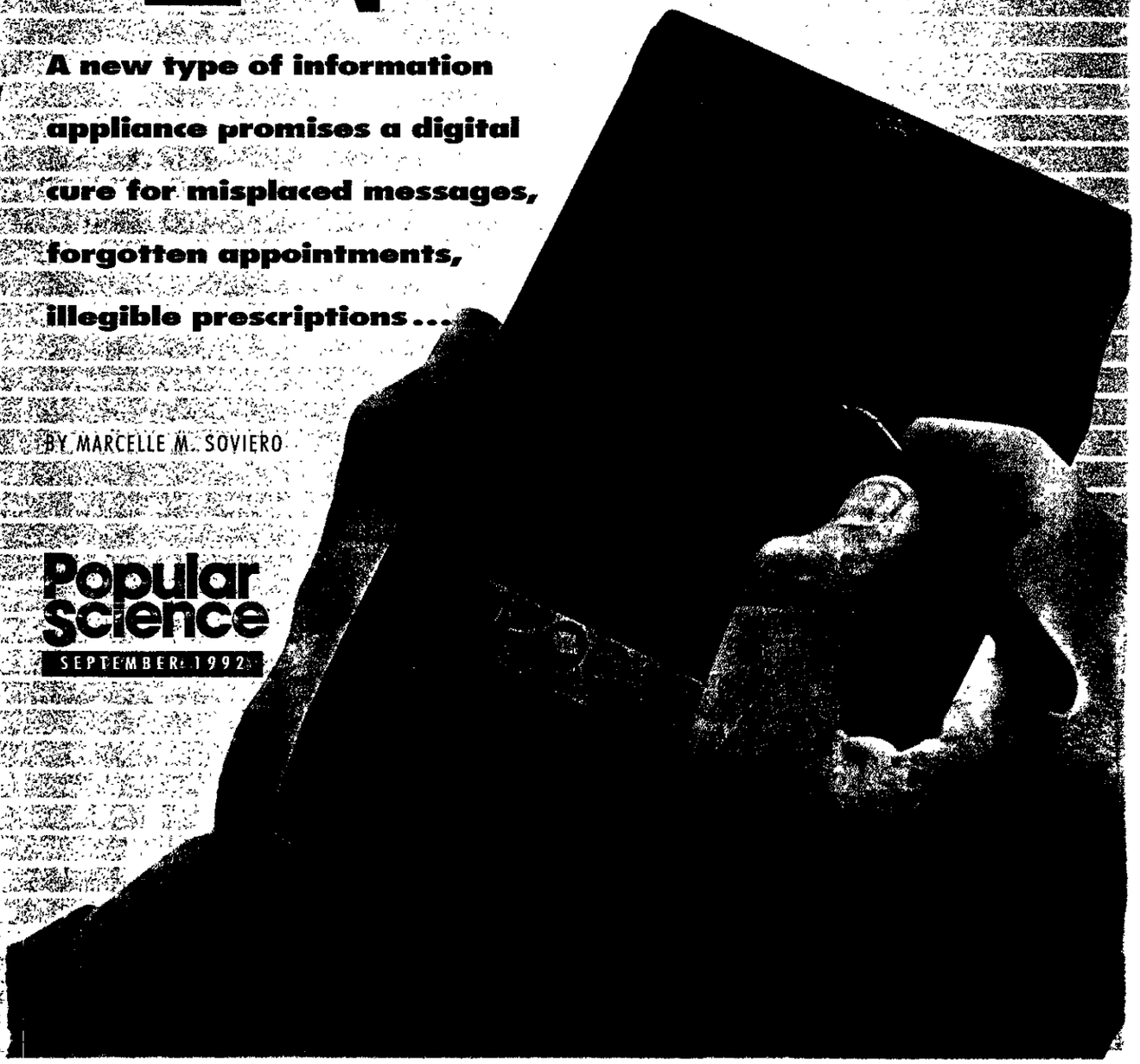
Your world according to Newton

A new type of information appliance promises a digital cure for misplaced messages, forgotten appointments, illegible prescriptions...

BY MARCELLE M. SOVIERO



Popular Science
SEPTEMBER 1992

NEWTON: THE INFORMATION TASKMASTER

Newton's intelligent software makes the device more akin to an assistant than an electronic organizer or a personal computer. Newton learns key phrases such as "fax this," or "remind me of that," and makes simple assumptions to assist you with such tasks. For example, say you jot down a letter to Larry, followed by the phrase "format this." Newton will select a business form letter from memory and automatically format the letter with Larry's address pulled from your electronic address book. Now you want to fax the letter? Hook Newton up to a fax machine write "fax this to Larry" on the screen, and the device will automatically churn out a fax cover letter, fill in the appropriate cover information, pull up Larry's fax number, and send the fax.

Seven icon buttons located along the bottom of the notepad screen issue commands when you touch them with the electronic stylus. Each button triggers different functions, such as the calendar and phone book. While the actual buttons may change before the product is sold, at present they are: Who, What, When, Find, Format, Send, and Assist. Press "Who" to access your address book; "What" opens up your to-do list; "When," your calender; "Find" checks for messages; "Format" turns notes into a business letter; "Send" faxes a letter to a colleague. Confused? Press "Assist" for help.

Touch a certain day or week on the calender with the pen, and that day or week will be highlighted and enlarged to full-screen-size for easier viewing. Draw a square, then scribble out one corner, and that corner is instantly erased. Or write 2 + 4 =, and the answer instantly appears on the screen.

K. DANIEL CLARK

You're thinking that this little black box called Newton doesn't look like much. Well, looks can be deceiving. This seemingly plain-Jane gadget may be the breakthrough information device of the decade: It's only a prototype right now, yet Newton's designers at Apple Computer can't help but gush about plans for an entire family of so-called Personal Digital Assistants (PDAs) that will someday be as ubiquitous as radios and televisions—only far more powerful, interactive, and useful.

At a glitzy unveiling in Chicago earlier this year, John Sculley, Apple's chairman, slipped one from his coat pocket as if uncovering a precious gem. The lights dimmed and a drumroll snapped to a finish as Sculley attempted to define the world according to Newton.

"The big idea is that it's not a tool, it's an assistant," he says. "A tool is a lawn mower. An assistant is when you hire someone else to cut the grass."

As a digital aide-de-camp, Newton represents Apple's boldest technological innovation since the company redefined the idea of the personal computer with its revolutionary Macintosh eight years ago. Wrapping advanced hardware and sophisticated software in a portable package that presumably anyone can use and appreciate—*without* a stack of instruction manuals—Newton is at once the electronic answer to the informationally overheated '90s, and a potential two-way access point for the digital era that looms beyond.

Don't mistake the fledgling PDA with a general-purpose pen-based computer or a super-high-end pocket organizer, although Apple's PDA is obviously a successor to

both. The heart of Newton is its ability to recognize printed handwriting and graphics, organize that information, and communicate it to others. Apple's PDA is remarkably user-friendly—as simple to use as a pen and paper. Instead of jotting down reminders on yellow sticky notes, or writing grocery lists, phone messages, and business appointments elsewhere, Apple's PDA is designed to centralize all of this information and store it in one place.

Everything you write on a PDA screen is stored independently in a collection of data. Newton organizes these seemingly disparate pieces of information—and makes them much more accessible. By storing data in this way, Newton lets you look up, say, everything related to your income taxes or everything that relates to Bob Greene. It can associate "Bob" in your PDA calendar with "Bob" in the machine's address book. Information can also be customized: For instance, if you want to add a space for birthdays in your electronic address book, you can do so just as you would on paper.

Apple's PDA can be upgraded with plug-in "smart" and memory cards. These might convert a PDA notepad into a reference library, a travel navigator, a language translator, a receiver for paging-type messages, or an electronic copy of *War and Peace*, for example. Apple has formed the Personal Interactive Electronics division, or "Apple Pie," to develop PDAs and other gadgets for the digital age of the future.

PDAs will have a built-in facsimile and data modem. Apple has teamed up with SkyTel, which runs a satellite paging network, so that a PDA equipped with a special integrated-circuit (IC) card could receive electronic mail from almost anywhere on the globe.

"Moving information around and sharing ideas is what Newton is all about," says Sculley. "Telecommunications are as important to Newton as graphics were to the initial Mac."

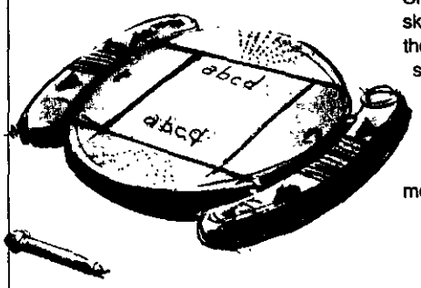
Newton machines can also communicate easily with other data devices either by infrared signals or by outboard fax/modems. The device's electronic "in-box" can contain electronic-mail messages, and the electronic "out-box" can store outgoing information, such as a fax being held until it is sent at a certain time. With the push of a button you can send or receive information to or from other PDAs or Newton-compatible devices. You can unplug and re-plug Newton without destroying a network. Traveling Software, a portable communications software company in Bothell, Wash., is supplying software for Newton that permits data exchanges between PDAs and personal computers.

Hewlett-Packard's palmtop computer, the 95LX, already has blazed the wireless data communications path through a link with Motorola's so-called newstream receiver. Metriplex, a communications company in Cambridge, Mass., has announced a leasing program for a 95LX, the Motorola receiver, and Metriplex's own DataPulse software that enables you to receive and automatically track financial data.

Newton is the inaugural manifestation of a technological concept that Apple has been hinting about since the '80s. Four years ago Sculley introduced Apple's Knowledge Navigator concept in a video produced by *Star Wars* creator George Lucas. The Navigator featured, among other things, a built-in "digital assistant"—represented by a face on the screen—that took notes, gave messages, and answered questions through spoken commands. The best computer never built conducted research in distant databases on its own and displayed full

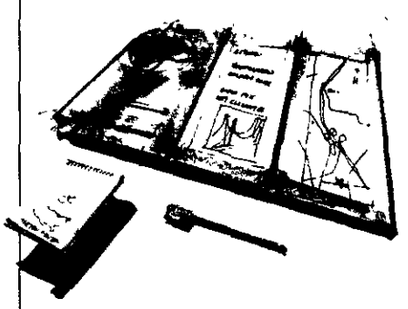
FOUR FUTURE FACES OF NEWTON

SPELL AND STORE



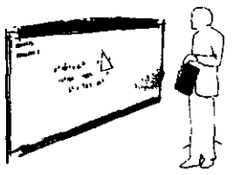
Children could learn to sketch and write while the Newton draw-and-spell corrects spelling along the way. Games, lessons, or a child's drawings could be stored in memory.

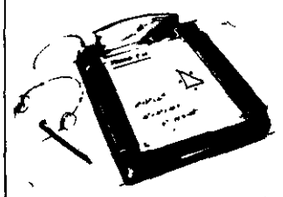
LET YOUR FINGERS DO THE TALKING



The Newton facsimile/phone could store your entire phone list or print the name and number of a caller immediately. If the person you are talking to has a Newton fax/phone you could share notes, or fax them.

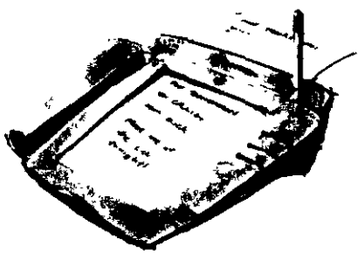
ELECTRONIC MAPS AND MORE



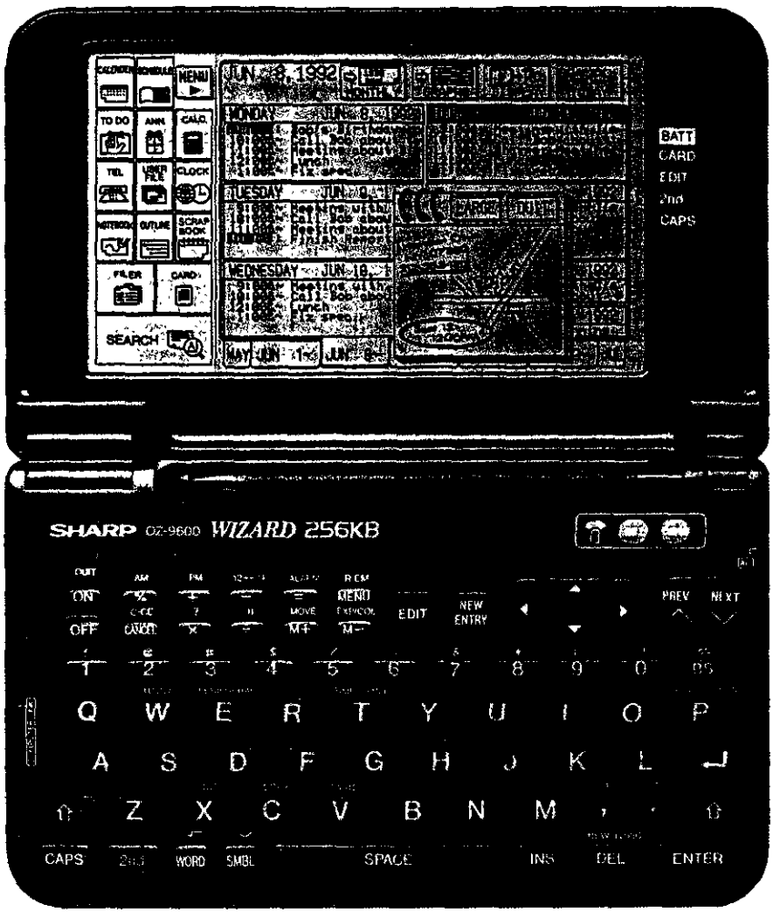


Mating Newton technology with global-positioning satellites could enable you to find your location anywhere in the world. Inserting memory cards for particular regions would let you explore specific streets, restaurants, or museums.

ROOM WITH A VIEW



In classrooms equipped with Newton boards and desks, teachers could save notes or bring up stored lessons on the board, while students view them on their desk screens via wireless networks.



Sharp is introducing its pen-based OZ-9600 (above) in the United States and the more-expensive PV-F1 Action Manager in Japan, a separate pen-input machine that accepts function cards designed for the company's Wizard electronic organizers.

multimedia capabilities and a built-in videophone.

Apple's first PDA model, priced at "less than $1,000," should arrive in stores early next year at a time when emerging electronics technologies promise exciting new options. Digital technology, with its ability to store and retrieve massive amounts of data, offers new opportunities for both accessing information and interacting with other people. The communications industry is rapidly expanding wireless networks and boosting the capacities of wire telephone links. Sculley stresses that widespread digital-communications networks will be as important to creating a new industry of PDAs in the 1990s as the IC was in launching personal computers in the late 1970s. PDAs would enable you to transmit and receive fax messages and serve as data terminals for other text, voice, and even video information such as picture-phone communications.

You will eventually find other choices in stores too. Apple has licensed Newton technology to Sharp Consumer Electronics in Japan. Sharp will offer its own models, in addition to making PDAs for Apple. Apple has also teamed up with Toshiba to produce special PDAs capable of playing CD-ROMs, which add advanced graphics, video, and audio capabilities ["Multimedia," Dec. '91]. Sharp has added a pen as well as other amenities, including a touch-screen and wireless communications to its line of Wizard electronic organizers ["Electronics Newsfront," Jan. '89]. The OZ-9600 will be available late this year or in early 1993 for between $600 and $700. The model can transfer information to a computer or another Wizard without cables or wired connections as long as both machines are within sight of each other. While the OZ-9600 stores anything you write on the screen directly, its sister model, the PV-F1 Action Manager, has character-recognition capabilities that translate crude printing into computer characters. The PV-F1 costs about $1,000 in Japan.

In addition, Tandy Corp. in Fort Worth, Texas, and Casio Computer Co. in Tokyo are jointly developing Personal Information Processors for next year with a target price of about $500. These devices will be similar to PDAs but will have less horsepower and longer battery life, claims Tandy. Casio and Tandy are adapting GeoWork's GEOS, an existing graphical operating system already used in personal computers, to the upcoming lightweight devices. Additional details on this so-called PIP are yet to come.

Richard Shaffer, a veteran industry analyst who has been tracking the new gadgets, believes the differences between Newton machines, other organizers, and pen-input computers lie almost exclusively in the concept behind the product. "A lot of people are sort of throwing hardware out here and seeing what people will buy," he says. "The thing about Newton is it has the same kind of 'gosh-that's-great appeal' that makes shoppers lust after gadgets in Sharper Image catalogs and stores. By making the machine look and feel like a notepad, people will immediately get the idea of it, and that's part of the appeal."

Paul Saffo, a research fellow at the Institute of the Future in Menlo Park, Calif., classifies Apple's PDA as an information appliance. "It's a new product category that combines the information richness we associate with computers with the low cost, convenience, ease of use, and ultra-portability associated with consumer electronics," he says. "Things acceptable in the computing environment are utterly unacceptable in information appliances, such as having to switch applications or remember file names."

This new product category requires a fresh outlook and perhaps should be viewed from its interface, such as a write-on screen, inward, and not as a collection of technologies, which is how the personal computer is viewed. Acceptance of personal computers lies in how software transforms them from general-purpose machines to tools with specific features and capabilities. "The success of these new appliances lies in how the pieces work together," says Saffo.

A significant difference between Newton devices and current electronic organizers or personal computers is that Newton technology uses a 32-bit ARM 610 RISC (reduced-instruction-set-computing) processor. This specially designed chip packs the performance of personal

computers equipped with the most powerful microprocessors. The RISC chip, which consumes the equivalent energy of a small flashlight, enables the Newton machine to perform a number of simple instructions, such as those needed to quickly recognize your printing ["Next-Generation PCs," April]. RISC chips are currently used in high-speed workstations for scientific and engineering applications. Four AAA batteries are expected to power the Newton-based notepad for an estimated eight hours.

To expand its functions, Apple's one-pound notepad has a PCMCIA (Personal Computer Memory Card International Association) 2.0 card slot for memory and smart-card applications ["New Breed Notebooks," April]. The machine also has a high-performance 32-bit electronic bus, or shared path for data. These IC cards, which offer between 1 and 20 megabytes of memory expansion—as much as some hard-disk drives—let you plug in prerecorded packages, such as electronic books. Data from cards can also be transferred into your personal computer.

Random House, another of Apple's selected partners, will create book titles for the cards. In the future, IC cards could make it possible for Newton to understand foreign languages. While the first-generation Newton will recognize only print and graphics, "technologies can be plugged in as they arise, such as cursive recognizers, so the machine will understand cursive writing eventually as well," explains Larry Tesler, vice president of Apple's advanced products group.

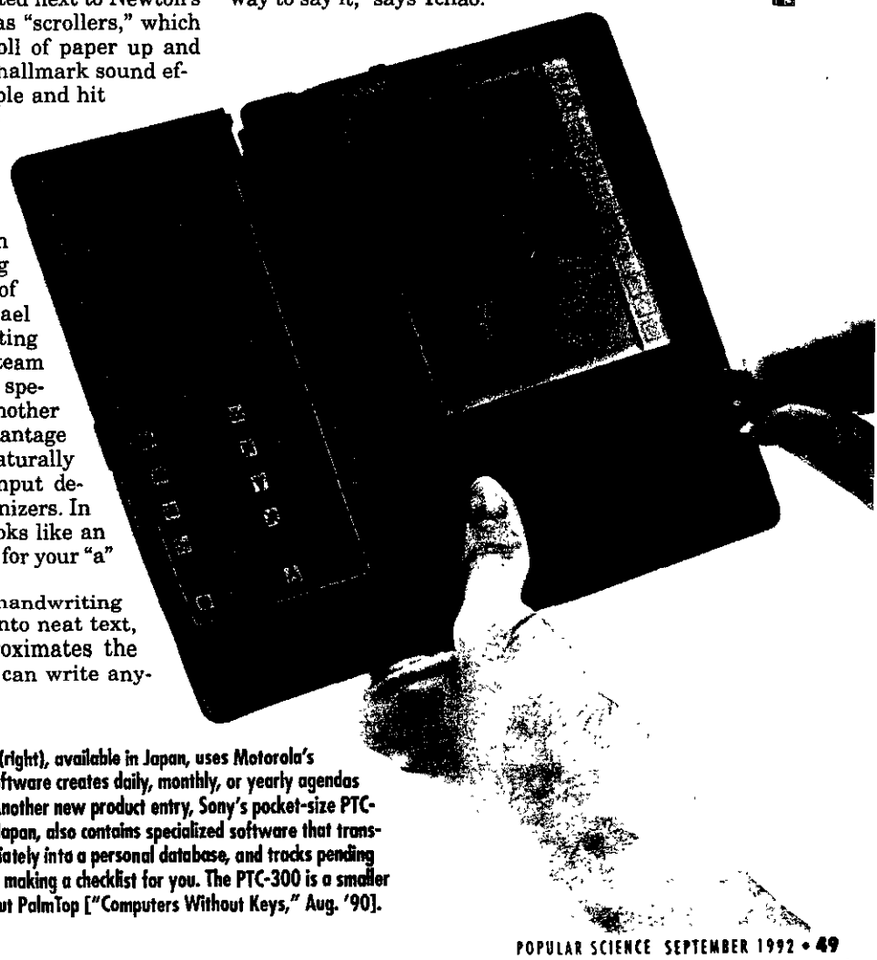
PDAs mimic reality: Arrows located next to Newton's on-screen control icons serve as "scrollers," which seem to move an electronic roll of paper up and down. Apple has added some of its hallmark sound effects as well: You hear paper crumple and hit the trash when you delete a document. Drawers open and close with a thunk when you file a document in Newton's electronic file cabinet.

Improved handwriting recognition also helps. Newton's handwriting recognition operates with groups of software "recognizers." Says Michael Tchao, manager of product marketing for the Newton group: "There are a team of recognizers, each with a different specialty. One team recognizes text, another graphics, or musical notes." The advantage here is that you can write more naturally than you could with current pen-input devices that don't use concurrent recognizers. In addition, if you write an "a" that looks like an "e," the notepad creates a recognizer for your "a" so it can be translated in the future.

The machine "cleans up" your handwriting and graphics, transforming them into neat text, graphs, and charts. Newton approximates the size of your handwriting, and you can write anywhere on the notepad as rapidly as you like. Apple's PDA also recognizes the spatial relationship of items on a page, which is ideal for mathematical equations, time lines, and flow charts. If you prefer notes with a handwritten appearance or dislike perfectly parallel parallelograms, the cleanup feature can be overridden.

Text and graphics can be combined without opening menus or cutting and pasting, steps that are necessary on most graphically oriented computers. If you draw a map, you can then label the street, just as you would on a notepad. To create a document, simply draw a line under what you've written and it's saved and filed in memory. "Think of Newton's screen as a continuous scroll of paper," explains Tchao. "You tear off sheets with a line as you go."

Newton's intelligent assistance capabilities make the device a helper rather than simply an organizer because it learns how you work (see Newton: The Information Taskmaster). Scribble a reminder to yourself—say, "lunch with Bob, Monday" on the screen—and the device logs the correct date and time into its calendar memory. In the near future, Apple aims to customize the machines even further by selling unique software to make them more useful. "Any profession has a standard set of forms. A doctor's Newton would look different from a lawyer's Newton," says Tchao. For instance, a doctor's Newton might be prescription-based, while a lawyer's Newton would contain legal documents. Artists, landscapers, architects, or anyone who is graphically oriented could make use of floor plans or blueprints stored in the device. "If a picture tells a thousand words, this is a great way to say it," says Tchao. MS



Sony Corp.'s PTC-300 PalmTop (right), available in Japan, uses Motorola's MC68000 processor. System software creates daily, monthly, or yearly agendas that track your appointments. Another new product entry, Sony's pocket-size PTC-300 computer, just released in Japan, also contains specialized software that transfers entered information immediately into a personal database, and tracks pending and completed appointments by making a checklist for you. The PTC-300 is a smaller version of Sony's initial pen-input PalmTop ["Computers Without Keys," Aug. '90].