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SPECIAL REPORT:
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Vol. 3 No. 8 June 1984

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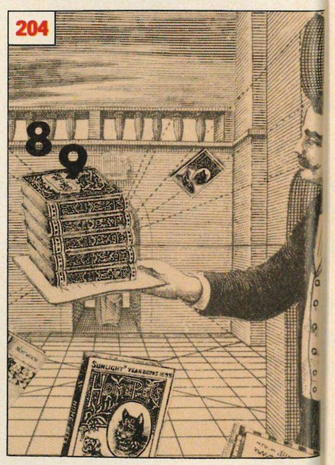

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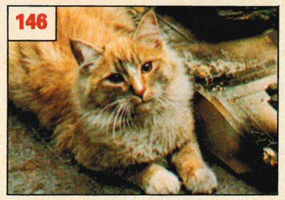

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Apple's portable IIc, photograph by Mike Blake

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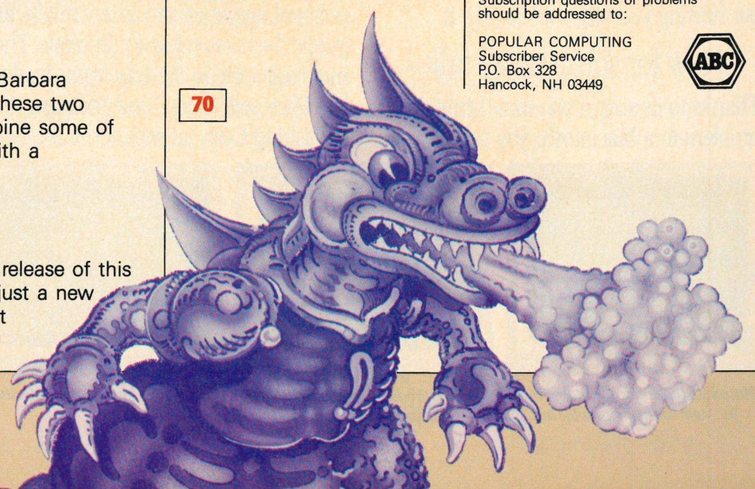


POPULAR COMPUTING
JUNE 1984

THE APPLE IIc

It marks the most dramatic change in the Apple II family and prepares Apple for a market battle with IBM

COVER STORY

by Paul Freiberger

Two years ago, Apple chairman Steve Jobs walked into engineer Peter Quinn's office. He slapped an Apple IIe main circuit board on Quinn's desk and plunked a low-profile keyboard at one end of it and a disk drive at the other. Jobs pointed to the assemblage of parts and declared, "*That* is a great product. Do you want to do it?"

Quinn quickly replied, "Sure, Steve, we're half done."

Actually, they weren't even half started. Apple had just introduced the IIe, an enhanced version of the Apple II. But Quinn realized that the work on that computer could be easily applied to the machine Jobs envisioned: a portable Apple II.

The Apple IIc was, as of this writing, scheduled to be unveiled April 24 in San Francisco at a computer dealer exposition with the theme "Apple Forever." The IIc is a 7½-pound computer with a single built-in 5¼-inch low-height disk drive and 128K bytes of RAM. It is an evolution of the Apple II family. Its price is $1295. (The monochrome monitor is an extra $199.)

The IIc marks the most dramatic change in the Apple II family—in both appearance and marketing—since Jobs and Apple co-founder Steve Wozniak built the first Apple computer in a garage over seven years ago. Technically it is impressive. Aesthetically, it reveals a new "design language" that will carry over into every Apple product. In fact, the IIc goes well beyond the Apple chairman's initial concept of the machine, and it sets Apple up for a head-to-head battle with IBM and its PCjr for the home computer dollar.

A New Variety for Apple

The technology of the IIc is interesting in that it reduces the Apple to a totable size while offering the capacity to handle more sophisticated software.

First, the IIc is very compact. Only 11½ by 12 inches and 2¼ inches thick, the IIc's size is the result of the unconventional research conducted by Robert Gemmell Jr., senior product designer at Apple. Gemmell wanted the IIc to fit inside any briefcase, so with ruler in hand, he went to a Sears store and measured the smallest briefcases he could find.

The layout of the IIc keyboard is slightly "flatter" than that of the IIe but otherwise similar. Yet the IIc keyboard has some innovations that actually increase the usefulness of the machine. For one, a switch at the back of the keyboard allows users to choose between the standard QWERTY and a Dvorak layout—a move that William Bowman, chairman of Spinnaker Software of Cambridge, Massachusetts, terms "farsighted." Apple has also moved the Reset key one more time, from the far right on the IIe to the far left on the IIc. In addition, the keys now have an auditory-tactile response. As you press a key, you hear a little click and notice a slight shudder from the key. Finally, beneath the keys is a plastic sheet, called a "splash pad," that protects the system from short-circuiting if liquid is accidentally spilled on the keyboard. It's the kind of detail that is often forgotten until circumstances demonstrate its need.

The computer has a new microprocessor called the 65C02 that, when compared to the 6502 in the IIe, has additional instructions to allow the development of faster, more efficient software. (Apple is considering an option that would upgrade current IIes to the new chip.) Custom large-scale-integration chips have helped Apple continue to lower the number of integrated-circuit chips in its machines—reducing the number of support chips from 31 in the IIe to only 21 in the IIc. Among the IIc's chips is one affectionately called the IWM (Integrated Woz Machine) because it incorporates disk controller logic designed by Steve Wozniak.

(Top) The flat panel of the IIc snaps in place behind the keyboard. (Bottom) The 9-inch monitor has a profile that resembles E.T.

Paul Freiberger is a West Coast editor of *Popular Computing*.

Photographs by Mike Blake

AT A GLANCE: Apple IIc

Manufacturer: Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014, (408) 996-1010

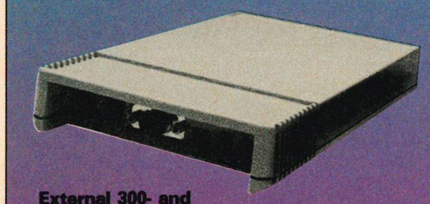
Uses: Home, education, and small business

Standard Features: 65C02 CMOS version of 6502 microprocessor; 128K bytes of RAM; 16K bytes of ROM including Applesoft BASIC and Mouse Text; 6-color graphics with 280 horizontal by 192 vertical resolution; 16-color graphics with 560 by 192 resolution; 5¼-inch half-height disk drive with 143K-byte capacity; two RS-232 serial ports; video expansion port; external disk port; 63-key keyboard, without function keys; user-selectable 40- and 80-column text modes; Dvorak alternate keyset switch; RF modulator, switchbox and 12-foot video cable to connect computer to TV; system disk; external AC/DC power adapter

Documentation: Manual with five disks that include six interactive tutorials: Keyboard Introduction, Apple at Play, Apple at Work, Introduction to Logo, Getting Down to BASIC, and The Inside Story

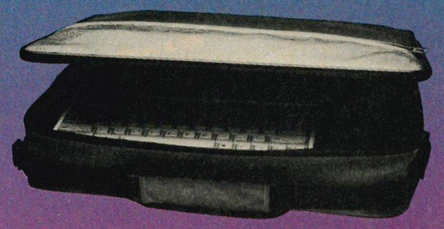
Options: (Some prices not available at press time) 9-inch monochrome monitor, $199; mouse, $99; joystick; second disk drive, $329; flat-panel LCD display (available in fall); Scribe printer; Imagewriter printer; carrying case, $39; 300-baud modem; 1200-baud modem; Logo; AppleWorks; Access II; Apple Education Classics; Applesoft tutorial and programmer's toolkit

Base List Price: $1295

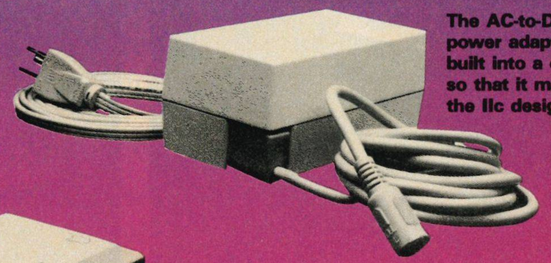


External 300- and 1200-baud modems are available for the IIc from Apple.

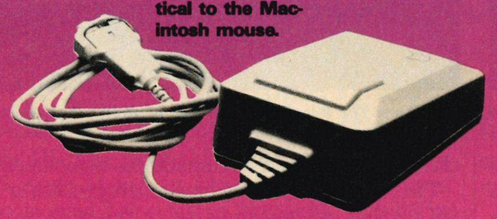
A padded case to carry the IIc and the flat panel is available separately.



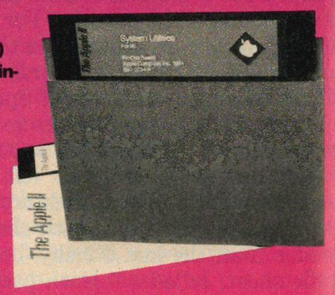
The AC-to-DC power adapter is built into a case so that it matches the IIc design.



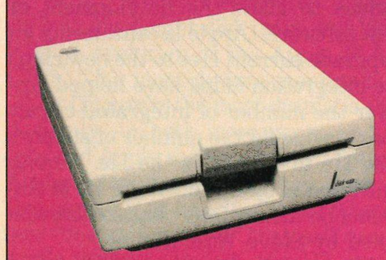
The IIc mouse has a single button and is almost identical to the Macintosh mouse.

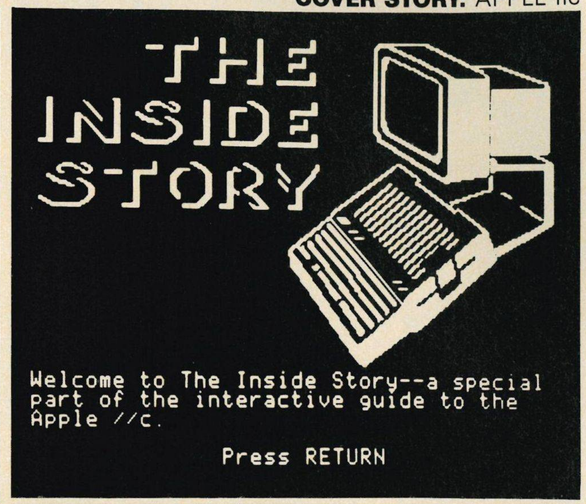


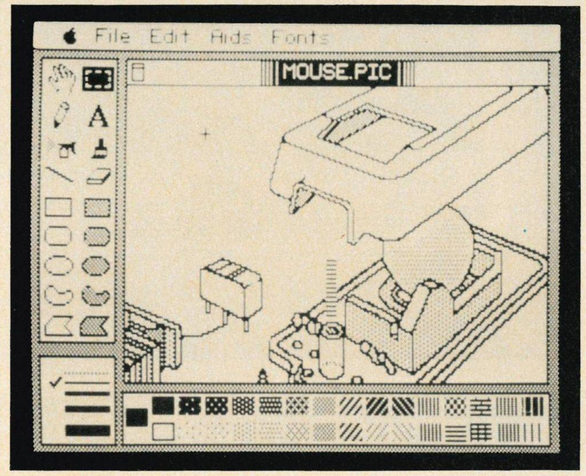
The operating system (ProDOS) and utilities are included with the hardware.



The IIc supports a second 5¼-inch disk drive with a storage capacity of 143K bytes.







The Apple IIc supports what Apple calls "double-high" resolution (560- by 192-pixel) graphics as well as the normal 280 by 192 resolution. Although this graphics feature has been available on the Apple IIe, many programmers have not taken advantage of it because it uses a large chunk of memory—a problem when a computer has only 64K bytes of RAM. But according to Bill Gates, chairman of Microsoft, the IIc's standard 128K-byte RAM is likely to give software writers a prod to develop programs that exploit the higher resolution.

The new Apple also gives users the choice between a 40- and an 80-column text mode, which can be selected from a switch next to the Reset key. Apple retained the 40-column display because so much software has been designed for it and because an 80-column display is fuzzy on a TV screen. An RF modulator that can connect the IIc to a television set is included with the system. And Apple is also offering an optional 9-inch monochrome monitor for the IIc, which has a profile that somewhat resembles E.T.

But the greatest technological breakthrough of the machine is its optional flat-panel display, which Apple promises will be available this fall. Developed by the Japanese company Sharp, the flat panel is an LCD (liquid crystal display) that supports a full 24 lines by 80 columns of text and displays the Apple IIc's high-resolution graphics. I observed a prototype flat panel working with the IIc and found it to be more readable than other flat panels currently being sold.

According to Gates of Microsoft, the flat panel will make the IIc "the most carryable machine in the marketplace." And the computer can be used in a variety of places. According to Quinn, it will operate within a range of 7 to 24 volts DC. The computer was especially built to take the voltage variations of a car battery, "So if you're in your RV or speedboat, you can just plug it into the cigarette lighter," Quinn adds.

The machine has ports for a mouse or joystick, a modem, the flat panel or RGB (red, green, blue) monitor, a monochrome monitor, and a second disk drive. Previous Apple II computers have required add-on cards to obtain many of the external ports. The IIc has no slots for further hardware which, according to Apple, makes the machine appear less intimidating to first-time users. This closed hardware architecture prevents direct access to the system bus, limiting the system's expansibility. The inability to add cards is a particular drawback to the new machine because so many Apple II users have a Z80 card that allows them to use CP/M software. This limitation may be the IIc's greatest fault.

Software Support

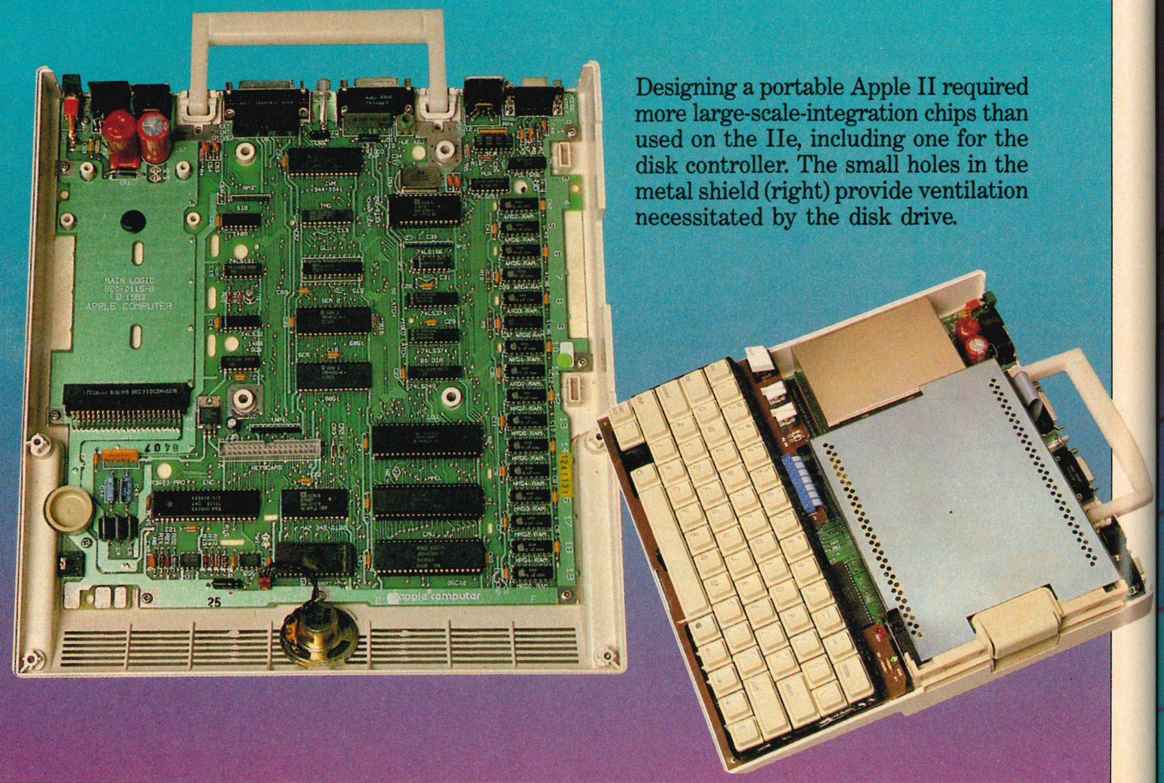
The success of any new computer depends on software availability. The IIc comes with Apple's new ProDOS (Professional Disk Operating System), which offers hierarchical files and is compatible with both the previous Apple II's DOS 3.3 and the Apple III's SOS (Sophisticated Operating System). According to Quinn, the new computer is compatible with 90 to 95 percent of the software written for the IIe. The main differences stem from Apple's modification of the IIc's ROM to include Mouse Text, which provides mouse-controlled icons much like those used in the Macintosh.

> **THE IIc's *ROM includes Mouse Text, which provides mouse-controlled icons like those in the Macintosh***

Several independent developers confirm Apple's claim of near-total compatibility. "They're virtually identical," says Tim Gill, chairman and head programmer of Quark in Denver, Colorado. Gill says his company plans to offer all its software for the IIc, including its popular Word Juggler word processor.

Apple has been testing third-party software and informing those software companies if their programs are not compatible. But the modifications caused by the ROM changes are not complex. Microsoft and Software Publishing, for example, have modified a few of their

AN INSIDE LOOK AT THE APPLE IIc



Designing a portable Apple II required more large-scale-integration chips than used on the IIe, including one for the disk controller. The small holes in the metal shield (right) provide ventilation necessitated by the disk drive.

popular applications programs for the IIc, and each says the changes were easy to make. Bill Gates says that Microsoft plans an enhanced version of its Multiplan spreadsheet program that will take advantage of the IIc's ProDOS, mouse, and 128K bytes of RAM. Gates believes that "Apple is evolving properly, with compatibility."

Apple has announced several third-party programs devised for the IIc, and the company says many others will follow. In addition to Multiplan and Software Publishing's PFS line, the list includes programs from Xerox Education Publications, Spinnaker Software, The Learning Company, Broderbund, Odesta, and Datasoft. Many of these utilize the mouse option, which, according to Bowman of Spinnaker Software, "is a more natural pointing device than a joystick." Currently, dozens of other companies are developing software and peripherals for the IIc, including a battery pack and a hard disk.

A New "Design Language"

At least as interesting as the technology of the IIc are its new design language, which gives us a peek at the Apple of tomorrow, and its extensive market research, which led to unexpected findings about the first-time buyer's goals in a machine.

Two years ago, Steve Jobs initiated a global search for an industrial designer and found Hartmut Esslinger of West Germany, whose credits include the Sony Walkman. The objective, as Robert Gemmell Jr. puts it, was to develop "a visual and physical language. We wanted to take the macho out of computing."

According to Apple, the IIc is only an example of this design language, not an exact blueprint for future products. Like the IIe, the IIc has no function keys "to keep things as simple as possible," says Gemmell. Simplicity of setup was the goal in providing icons to identify each port on the back. In the future Apple will have icons on its cables so that anyone can easily match them up.

The IIc system is the result of Apple's research into popular taste in computers. According to Apple's Sue Berman, the company ran about eight different market research studies, more than for any other Apple product. The company also conducted "focus groups," gatherings of computer users where products were offered for observation, discussion, and criticism.

Apple learned that the buyer's initial experience at home with a computer was critical. "A lot of people didn't realize you need to buy software," Berman says; "They just thought you go home with the thing." Apple also examined the length of time it took to set up the IIe and was dismayed to find that it required two or three hours. The new owners soon became impatient.

CONTINUED ON PAGE 190

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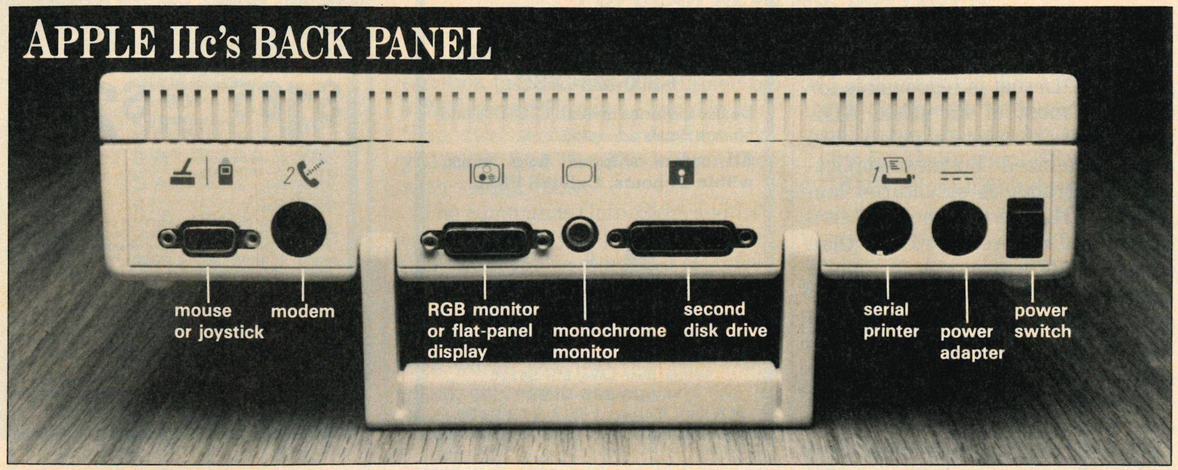

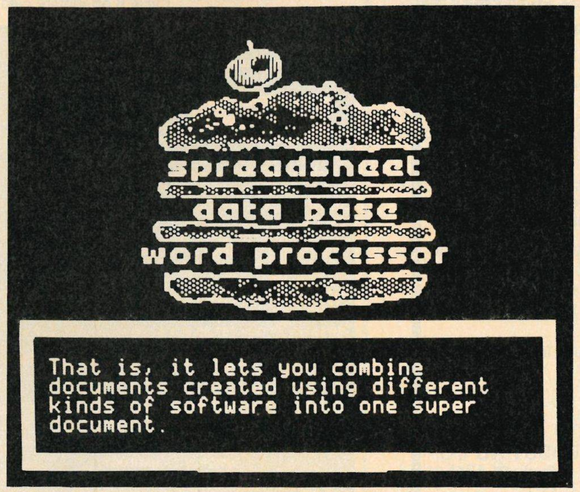

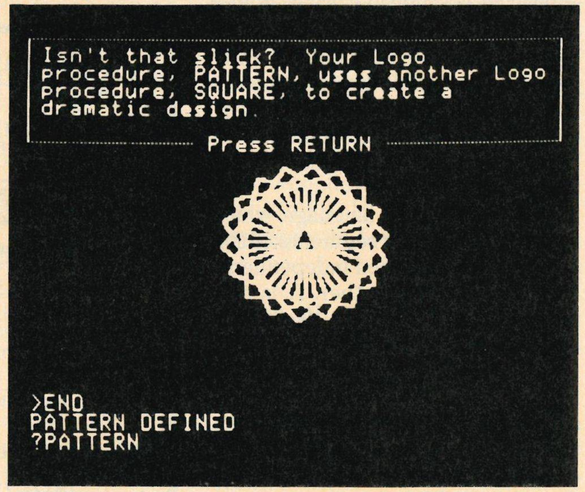

INTERACTIVE *tutorials offer hands-on training in applications and programming languages*

CONTINUED FROM PAGE 100

"Our own instructions were contradictory," Berman says. "They kept using this word over and over again—they wanted to *operate* the machine." The IIc overcomes this problem in that all protocols are built in and users need only insert the cables to get started.

But users must still learn how to control their computer with software, and Apple's research showed that buyers become frustrated plowing through a fat manual. So Apple bundled the IIc with a 125-page introductory guide that works with six interactive tutorials on floppy disks, offering hands-on training.

Apple says its tutorials are extensive enough to keep someone busy for 12 hours. They teach the use of the machine as an entertainment center through Apple at Play (which includes the game Space Quarks) and as a practical tool through Apple at Work (which introduces AppleWorks, an integrated word-processing and filing program). The tutorials also offer introductions to the Logo and BASIC languages. Programming is generally not considered a beginner's application, but, Berman says, "We found overwhelming evidence that there was a tremendous curiosity about programming. People thought that it was a part of computer literacy and that they had to have some exposure to it."

The IIc is Apple's first computer addressed to a broad consumer audience. As such, it represents the impact of Apple's new president, John Sculley. Formerly a Pepsi Cola executive, Sculley is known for his mass-marketing touch. The box the IIc comes in is one vehicle for the new merchandising. It features a full-color photo of a young woman holding a IIc and is reminiscent of a soft-drink advertising campaign.

Apparently the only feature of the computer selected without concern for popular appeal is its name: IIc (c for compact). During development the machine had a

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number of colorful code names. It was the Zelda, the P/Hido, Lolly, Chelsy, Jason, and the Elf. For a while it was even called the Moby, with respect to its color but not its size.

The Competition

The IIc will clearly be vying with the PCjr, but it will almost certainly draw potential customers away from the rest of the Apple line as well, particularly from the IIe. With its low price and extra memory it has just about everything a IIe buyer wants except the ability to add expansion cards. Apple projects that 55 percent of IIc purchases will go into the home with the rest divided equally between offices and schools. Indeed, Apple hopes that its IIe, Macintosh, and Lisa will preside over education and business.

More important, as its exposition theme "Apple Forever" suggests, the IIc exemplifies Apple's confidence in the II family, thus assuring its prolonged life. Apple's emphasis on continuity is aimed right at IBM.

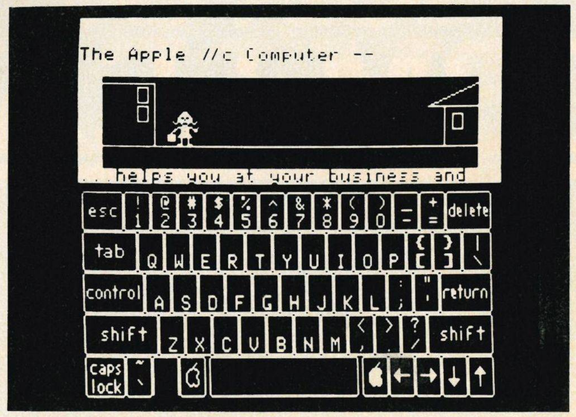
The IIc, though conceived long before the introduction of the PCjr, resembles it in several ways. They are both small, aimed at the consumer market, and, when comparably equipped, priced around $1300. They also share similar drawbacks. Neither has a battery pack, which would be especially useful for a portable device. Both machines offer limited expansibility. The companies argue, perhaps correctly, that consumers are not going to tinker around with the machines as IIe and PC owners do. Although Apple has attempted to offset the lack of plug-in card slots by including many IIe options, CP/M compatibility is missing. In defense, Apple's Larson says that the IIe remains available for users who need an Apple and CP/M.

Moreover, until the flat panel and battery pack are available, the IIc is not a truly portable computer. Of course, you can use the 9-inch monitor in your office, then detach the computer, take it home, and plug it into the TV. This need to have a display at your destination restricts portability but not nearly so much as the need for a battery pack. Apple seems content to wait for a third-party vendor to supply this single item that excludes the IIc as a truly portable computer.

However, no machine is perfect, and the shortcomings of the PCjr appear more significant. Its biggest and oddest flaw is the keyboard, which seems almost intended to irritate the user with its rubber keys that resemble "Chiclets." And the PCjr's available software base for home use is dwarfed by that for the Apple IIc.

But there remain the three big initials. IBM's reputation and its deep coffers suffice to give the PCjr high relief in the marketplace. And IBM is by no means bound to perpetuate the PCjr in its present form. "There are a lot of questions that, with the keyboard and the price, IBM may have to do more," says Bill Gates. "They're very committed to the Jr. They just have to get the formula right."

This contest could be one of the most interesting in the history of the industry. IBM, of course, is a colossus, capable of putting immense resources behind any product it issues. Yet the PCjr may test this power. Since its announcement last November, it has met with subdued and even baffled response, and movement off the shelves and into consumers' homes has not been brisk. Following the PCjr's announcement, Apple IIe sales skyrocketed. With the IIc, Apple offers an alternative to both the PCjr and the slightly higher-priced IIe. If the IIc were a true portable, that choice would be a lot clearer. But once again, price/performance questions confound the consumer. And you can bet that both companies will escalate their battle for your home computer dollar. □



Apple Presents Apple—an introduction to the IIc.

NEW APPLE PRINTER

The IIc is being introduced simultaneously with a new printer, the Scribe, which will be available for all Apple products. At $299, the Scribe may be very useful for people who only occasionally need to print out hard copy. It uses thermal transfer technology with a hard-copy result superior to most dot-matrix printouts, prints on any kind of paper and does so in color—impressive for a printer priced so low.

The cables of the Scribe come out of the side, so they don't get in the way of the paper; a paper holder below the printer reduces the space needed to operate the device. However, the Scribe's ribbons are expensive, so it would prove costly to users who need a great deal of printout.

IBM too unveiled a printer with its PCjr, called the Compact. At $175, it is cheaper than the Scribe, but its output is of poorer quality. It has a 5 by 8 matrix, which means you can see every dot on a printed character. As a result, it is useless for anyone who wants quality copies. Though both printers employ forms of thermal technology, the Compact requires a special coated paper, slightly more expensive than regular paper. And the Compact has no color capability. Of course, both the Scribe and the Compact are options, and buyers of the IIc or the PCjr need not accept either one.

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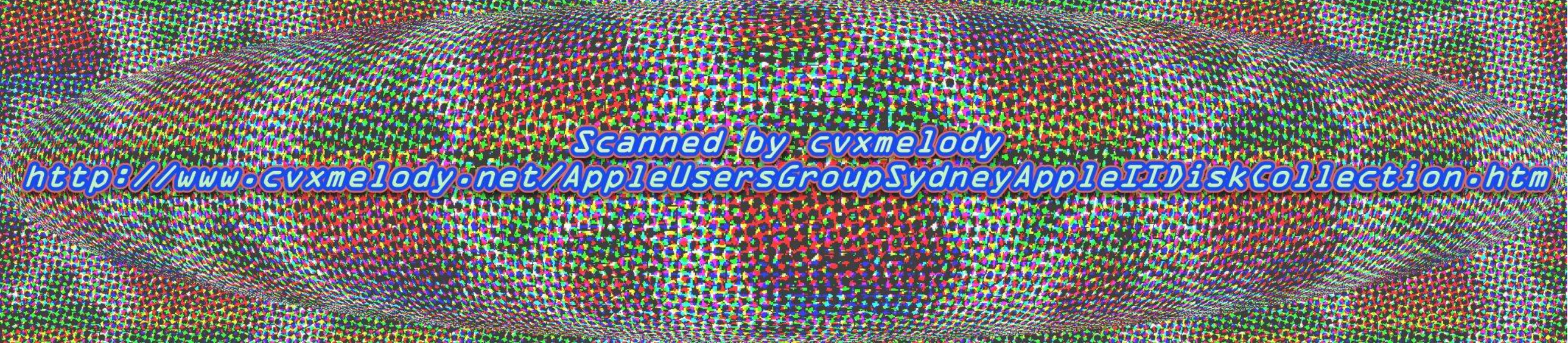
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