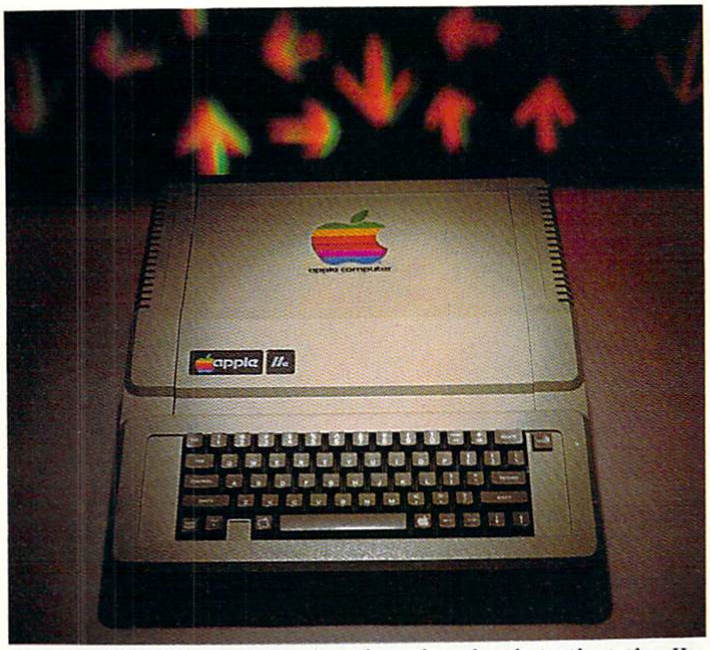
with 128K. The IIe's screen display is 40 characters across, but this, too, is commonly expanded to 80 columns. The Apple's expandability is no coincidence: It comes with eight expansion slots that can be used to improve the internal workings of the machine. For this reason, Apple expects to keep selling the IIe—despite the introduction of the new IIc—to serious "hackers" who want to configure the computer to their own needs.

This "open architecture," however, is one of the main drawbacks of the IIe for many users. Parallel and serial interfaces aren't included. To add a printer or modem, therefore, you must buy one or two interface cards, which cost from $150 to $200. This means that an Apple IIe system costs substantially more than a comparable Atari 800XL or Commodore 64 system, though not more than a



comparable PC*jr* system. Another drawback is that the IIe has limited sound (one primitive sound channel) and color capability. This can somewhat lessen the impact of entertainment software.

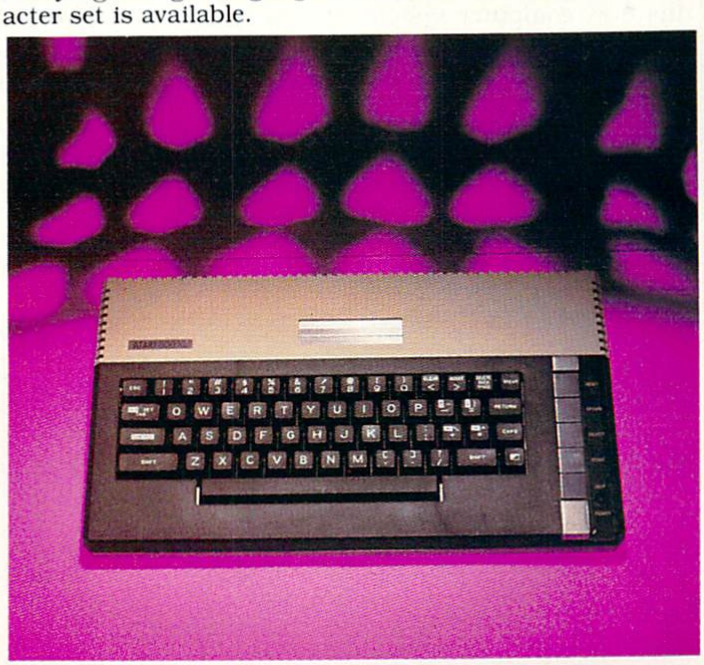
Nonetheless, the Apple IIe is an extremely flexible computer, good for virtually any task. It's a reliable workhorse that rarely requires repairs. It's not state-of-the-art technology, but because so many third-party manufacturers support it with innovative products, the machine will grow with your needs.

ATARI 800XL

The 800XL, an enhanced and sportier version of the Atari 800, is a fine general-purpose machine. Though its large software library (over 2,000 programs) is game-heavy, there is plenty of productivity software available—including *VisiCalc*, the well-known spreadsheet program, and *Letter Perfect*, a fine word-processing program.

This 64K machine's highlights are its superb graphics and sound capabilities, which can make game-playing and/or programming a real joy. The 800XL can display 16 colors or 128 "hues" (chosen from a palette of 256 hues) at any one time. Its eight "player missiles," which are the same as sprites, allow programmers to create good animated effects. These, of course, have been put to good use in video games. Unfortunately, Atari has provided very little instruction on BASIC programming along with its computer, suggesting instead that you go out and buy a book from someone else.

The keyboard is easy to use, with five special function keys along its right side that can simplify program operation. The keys are large and well-spaced, though not fully sculpted. The keyboard has 29 graphics keys. For those studying foreign languages, a special international character set is available.



Atari offers a disk drive ($415), but those sold by third-party manufacturers are probably a better value. The Atari disk drive has limited storage capacity (127K). Drives from Indus, Rana, and Trak receive kudos from Atari fans. If you want a cassette recorder rather than a disk drive, you'll have to buy Atari's. The Atari Touch Tablet ($89), which allows the user to draw pictures, is a superb device.

The Atari 1030 modem ($139) is also a very good deal, as is the 1027 letter-quality printer ($349). Connecting most non-Atari printers to the 800XL requires an interface unit. Two exceptions are printers from Axiom and Star Micronics, which sell cables with their printers that will connect directly to the computer. (The Trak disk drive has a parallel printer attachment built in.)

ATARI 600XL

For about $100 less than the 800XL, Atari sells the 600XL. It comes with 16K and can be hooked only to a TV set, not a monitor. Atari sells a "word-processing" package that includes the 600XL, the 1027 letter-quality printer, and the reasonably powerful *AtariWriter* word-processing program ($760). Since *AtariWriter* is a cartridge, it leaves all of the 600XL's 16K memory free for the user, and that's enough for much home word processing. However, the maximum screen display is only 40 characters across. The 600XL, which is virtually identical to the 800XL in appearance and has the same sound and graphics capability, can be turned into an 800XL with a memory expansion module.

COLECO ADAM

ADAM comes with built-in word processing, two joysticks, a letter-quality printer, and a fast tape drive for storage, all for under $750. That makes it a system with enormous promise. But, so far, the promise has yet to be fulfilled.

The first problem is the tape storage device, called a "digital data drive," which resembles a cassette deck but is almost as fast as a disk drive. It's a totally new storage format. Thus far, except for the ColecoVision cartridge games, which run on the ADAM, very little software is available. Second, some users have complained of minor, but annoying, problems—such as "glitches" in the screen

display, and occasional printer failures.

The keyboard is perhaps the strongest component of this 80K computer system. Key spacing and action are professional. There are 10 command keys (PRINT, STORE, etc.) that work with the built-in *SmartWRITER* word processor, and six function keys.

The screen image—when it's working properly—is good, but not exceptional. *SmartWRITER*, which displays 36 characters on a line, is adequate for most household use. Coleco promises an 80-column converter but, as with any 80-column display, it'll look better with a monitor. When attached to a monitor, the ADAM needs a special cable to output sound.

The printer is of flimsy construction, and extremely noisy. It houses the power supply, so if it breaks, you can't use the computer at all. It may be a consolation to note that Coleco now offers a 6-month warranty on ADAM, twice the industry standard.

While there is little software available, ADAM's SmartBASIC is closely compatible with Applesoft BASIC. This means that a wealth of program listings have been published. SmartBASIC is not built in; you have to load a digital tape. Once SmartBASIC is loaded, only 26K of ADAM's 80K memory is left for you to use.

Coleco says it will market a disk drive, a 64K memory expander, a 300-baud modem, and a digital data drive, as well as develop a wide range of software. But when these products will be available and how much they will cost is unclear at this writing.

If you already own ColecoVision, you can expand it into an ADAM with a $500 expansion module.

At present, the ADAM is best considered as a very reasonably priced word-processing system that offers many excellent video games and can be used for programming. Not until more software and hardware are released will the power of ADAM be realized.

COMMODORE 64

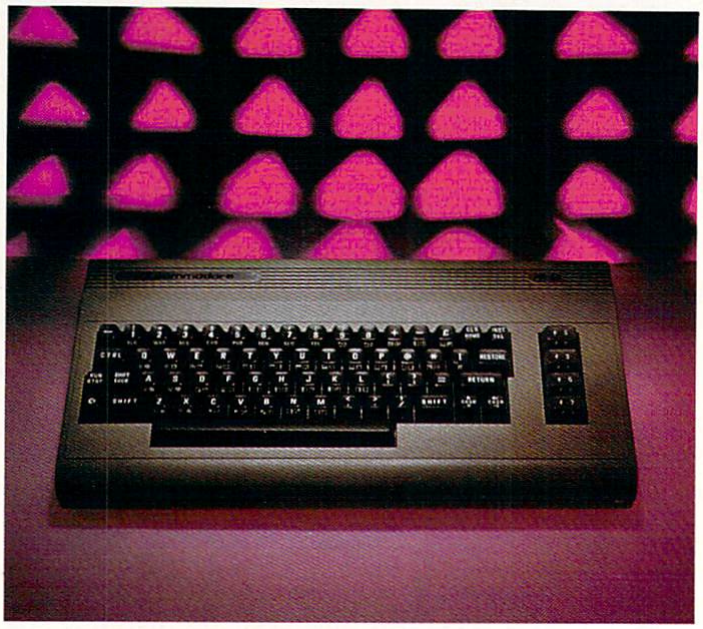
The Commodore 64, a 64K computer with some powerful features, is now the undisputed leader of the "low-end" computer market. It's hard to believe that just a year ago there was almost no software for it; now, there are over 1,000 programs on the market, well distributed in every application category. Even *Multiplan*, the hot-selling and powerful spreadsheet, is available for the 64.

The 64's attractions include superb sound and graphics. Its 16 colors and eight sprites give programmers wonderful graphics tools. The 64's sound is the most advanced of any home computer. The machine can be transformed into a sophisticated musical instrument, giving the user complete control over every aspect of sound. Some very powerful music software has been developed, most notably *MusiCalc*.

The 64 has a 40-character screen display. Add-on devices will expand this to 80 characters, but much software won't work with the 80-column cards on the market. The video display is good, but not great.

Now for the drawbacks. The keyboard has sculpted keys, but a "mushy" feel. The Commodore 1541 disk drive is somewhat unreliable and extremely slow. Programs can take what seems an eternity to load; although recently, third-party disk drives have been introduced. In the past, Commodore computers and peripherals reportedly were afflicted by high defect rates.

As for printers, if you want to use one not made by Commodore, you'll need a special interface, and it might not work with all Commodore software. Nor will it print out Commodore graphics. Finally, programming on the 64 is more difficult than on some other computers, and the manuals that come with the computer, while reasonably complete, are amongst the foggiest in the industry.



But the 64's strengths easily outweigh its limitations. Available for about $200 in many locations, the 64's power and advantages still make it an excellent buy. The computer has a lot of satisfied owners.

COMMODORE VIC-20

Now that Timex and Texas Instruments have left the home computer market, the VIC-20 stands as the only under-$100 computer worth considering for kids or casual adult users. The VIC-20 offers good flexibility and power for the price, and it can be expanded with a full line of peripherals.

The full-size, typewriterstyle keyboard is identical to that of the Commodore 64. It features four programmable function keys. The VIC's screen display is clear, but its 22-character line is extremely short, and not very well suited for word-processing. Letters have a stretched out look that can make large blocks of text hard to read.

The VIC's 5K memory may be expanded to 32K. Commodore also sells cartridges that offer special enhancements. The Super Expander, for example, provides memory specifically for high-resolution graphics. And, with eight colors and three sound channels, a crafty programmer can