

ADAM ARRIVES



Useful as soon as it's uncrated, Adam is an exciting package for the beginner or experienced computerist

By Charles P. Rubenstein

THOUGH almost too long ago to remember, Coleco's introduction of the Adam Family Computer System last summer had the same kind of impact as a 90%-off sale at a department store. After all, Coleco was offering an 80K computer with a high-speed digital tape drive, a daisy-wheel printer, and bundled software for the unheard of price of \$600! Normally, that amount could only buy the printer. And with the reputation that the company had built up with its enormously successful ColecoVision video game machine (whose cartridges are compatible with the computer), you just knew that Adam was something special. Now, after months of waiting and a couple of price increases (the latest suggested retail figure is \$750), Adam has emerged. Here's a hard look at this exciting package.

The Basic System. The Adam Family Computer System consists of a keyboard, a memory console with built-in digital data drive and ColecoVision cartridge port, a SmartWriter daisy-wheel letter-quality printer, connecting cables, adapters, and a pair of multi-function ColecoVision controllers. Also included in the basic package are three digital data packs (C-250 tape cassettes); SmartBASIC, "Buck Rogers Planet of Zoom," and a preformatted blank tape.

When you turn Adam on, it comes up as an electric typewriter. Press a key and it becomes a word processor. Load a tape and you can learn and use BASIC



The keyboard and two multi-function ColecoVision controllers.

or play true-to-life arcade games.

A Look Inside. The recipe for Adam's "central nervous system" goes something like this: take one Z80 microprocessor and 64K RAM, add a ColecoVision video controller and 16K of video RAM, and stir gently. Then fold in a "master" Motorola MC6801 single-chip microcomputer as a network controller. Finally, add three more MC6801s to govern the operation of the digital data drives, the printer, and the keyboard.

The MC6801s operate at a 1-MHz clock rate in a network arrangement that treats each of the peripherals (printer, tape drive, and keyboard) as a separate self-contained computer system.

Identification and communication among these intelligent peripherals is accomplished through the "master" network controller in communication with each unit's National LM339 quad comparator used as a port decoder. All

of this is orchestrated, as necessary, under the control of the Z80 microprocessor.

Adam's memory allocation is shown in Table I. There is the basic 64K RAM and an additional 16K of video RAM. The built-in word processor is contained in a 24K ROM and a general-purpose operating system takes up another 8K ROM. There is also 8K of ROM dedicated to peripheral control. Adding up the pieces, the basic system comes with 80K RAM and 40K ROM.

The Memory Console. Adam's memory console contains the Z80 microprocessor; a Coleco video controller; the master and tape-drive MC6801s; 80K of RAM; the 24K word-processor ROMs; a ColecoVision game-cartridge socket; an "Adamnet" 6-pin modular telephone plug connector; a 60-conductor edge-card expansion bus; an r-f modulator; and three card sockets (two 30-pin and one 44-pin edge-card connectors) for whatever the Coleco wizards decide

It achieves its operating goals and nothing is near it for the price

they want to come up with next.

The 19" × 13.75" × 4.25" memory console weighs in at about 9.5 lb with a single data drive. Unseen by the user is the completely r-f shielded computer and video-signal generator boards inside the console. Adam provides for a variety of audio/video outputs at the rear of the console. There is a standard (r-f) TV output through a phono plug which can be switched to channel 3 or 4 as desired. Another phono plug supplies video output signals for standard monitors, and a third yields both audio and video signals on a 7-pin DIN plug. On the right side of the console are two ports for the ColecoVision hand controllers, and an expansion slot. On the left side are a power and printer-output connector as well as the Adamnet connector. The keyboard cable connects to a 6-pin modular telephone plug on the front in the lower right-hand corner.

The digital data drives are conveniently poised for operation on the front left side of the console. One drive comes with the basic system while a second optional drive can be easily installed by the family user in about 10 minutes with a Phillips screwdriver. The drives are reasonably designed except that it is easy to insert a data pack in backwards due to inadequate labelling of the pack front. However, Adam "knows" that the pack is not in properly, and says so; but I perceive that the life of the drive may be reduced somewhat due to forcing the pack in. The doors seem a bit too flimsy and actually bow out when properly inserted data packs are in use. This is caused by spring-operated safety features that assure good data transfer. The drive is on whenever a tape is in it since the tape is constantly being stretched to keep it taut. This tends to heat the drive, and thus the pack. There is no indicator to tell you when the drive is running nor any mechanism to prevent the door from being opened while the pack is in use.

The C-250 digital data pack cassette tapes are preformatted to hold about 500K (253 2K blocks) of data or, as advertised, about 250 double-spaced pages of text. To give some feel for what this means, the complete four-level "Buck



Memory console with data drives and game cartridge socket.

Rogers Planet of Zoom" program is about 144K long. There are no true specifications for the drives or pack other than the supposed access time of 19.2 kilobytes/second. I found that this number is of no great consequence since a considerably longer time is spent checking the directory, finding and loading the program, and then executing it (i.e., 56K of SmartBASIC loads in about 68 seconds).

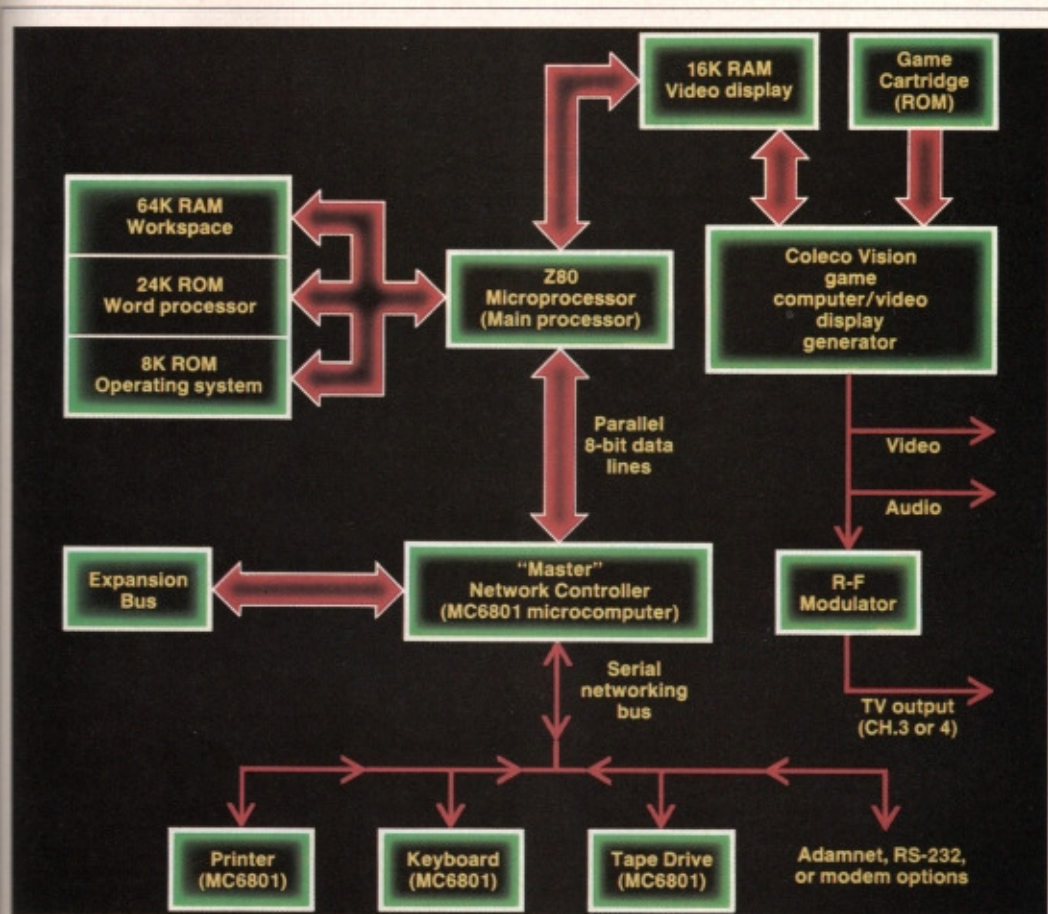
The Keyboard. Adam's keyboard is networked and controlled, as are all of its peripheral devices, by an r-f-shielded, Motorola MC6801 single-chip microcomputer and LM339 quad comparator device decoder. The keyboard unit is housed in a rugged beige and brown plastic case, and attached to the memory console by means of a 6-wire, modular telephone-type connector. Its 75 keys are the full-travel, tactile-feedback type designed for both the more brutal among us, and our young children. The keys are ruggedly built, yet they let you

know when you have pressed them properly. Their initial feel, to individuals familiar with more conventional typewriter and terminal keys, leaves something to be desired. In fact, they feel quite tinny. However, after using the keyboard a while, you become accustomed to it.

The keyboard is composed of a 54-key standard alphanumeric keyboard (includes TAB, CONTROL, SHIFT, and LOCK keys); a set of 6 "smart keys" labelled I, II, III, IV, V, and VI above the standard area; a set of 10 function keys for use with the word processor; and five cursor-control keys.

The SmartWriter Printer. Another peripheral means yet another MC6801 networked into Adam's central nervous system. However, the printer is more than just another smart peripheral. For beating inside the bowels of this cleverly designed daisy-wheel is the system power supply.

The SmartWriter constitutes, at the



Block diagram of Adam's "central nervous system."

very least, a major breakthrough in cost-effective packaging. Here, included with the complete Adam computer system is a 10-character-per-second letter-quality, bidirectional daisy-wheel printer whose cost should be what the entire system is being sold for. Yes, it is a bit noisier than the dot-matrix printers that retail around \$400; yes, the construction is not as rugged as you might want; and yes, it is a bit difficult to insert and adjust paper in the platen. But—the sound level of this printer is only slightly higher than an IBM Selectric, or other daisy-wheel printer (probably because of its plastic shell construction); And its cost, if available separately, would probably be under \$200!

Of course, when compared with printers costing much more, there are some problems with the design of the printer. The line cord and power cable both are connected in the center rear of the printer making the use of fan-fold paper a bit sloppy. The daisy-wheel mechanism is exposed to little hands

and inquisitive fingers. And, as a result of the internal *system* power supply, the printer "hums," the left side of the paper platen (above the power transformer) gets warm (about 3°C above room temperature), and the rear upper-right-hand corner of the top of the printer gets hot (about 15°C above room temperature).

As is often the case with inexpensive daisy-wheel printers, the letters often get printed on an ever-so-slight angle. On testing the printer speed and word-processor abilities, I found an even greater problem which may be related only to fan-fold paper. The printer sometimes inserts a space(s) between lines. I printed out 53 lines of copy, and the printer inserted seven random line spaces! Repeating this test four times resulted in a total of 24 random line spaces. The speed at which this was accomplished was a respectable 10.73 characters/second. A 9-line screen, printing from within the word processor, was printed in about a minute, at a

rate of 9.79 cps. As an aside, built into Adam is an irreversible CTRL P command which will attempt to print everything currently on the screen. This can be helpful when writing BASIC programs when you do not wish to have only a listing of the program, but rather the results, etc., as well.

The ColecoVision Controllers. There are two multi-function ColecoVision controllers. One can be placed in a cradle on the right side of the keyboard and serve as a joystick cursor controller and as a number pad. This is not as nice a feature as it may seem because the number pad is an exposed membrane type, which I found harder to use than the standard number keys on the regular keyboard.

Each controller has a disk-topped joystick handle that needs a full 0.25" travel to turn on the internal switch elements. This tends to make for slower, sloppier, and more tiresome game playing, yet allows even the heavy handed

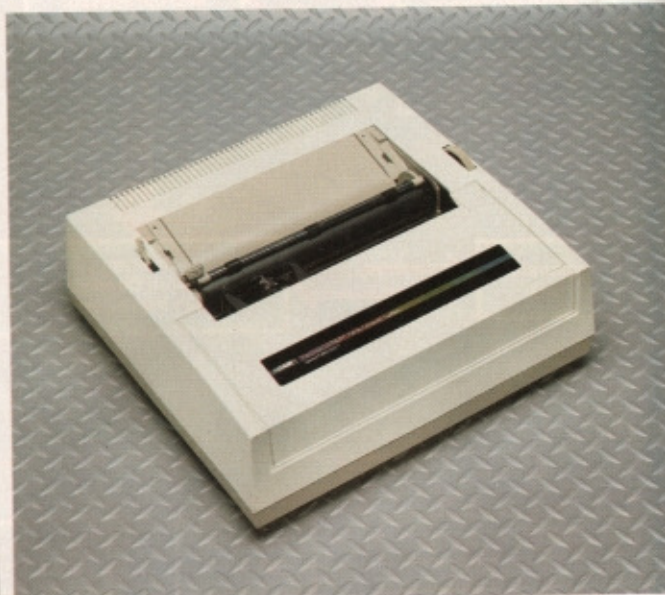
Adam's ability to do more than one thing at a time is called multitasking

person to play without destroying the unit. The two pushbuttons on either side of the controller are used for speed, fire, etc. control. In addition to being used as an accessory number pad, the diode-matrix encoded touch-tone number keypad can be used with games.

Resident Software. About five seconds after the system power is turned on, Adam awakes, ready for use as an electronic typewriter with video display. The user receives an immediate response to a keypress. Short notes, letters, or whatever can be typed with the ease of using any electronic typewriter.

To use the SmartWriter word processor, you merely press the WP "smart key" in the upper left-hand corner. This brings you to the resident (24K ROM) line-editing WP mode. The basic screen format is the same, but this time there is a scale on the left side of the screen that indicates where you are on a page. There is no indication of what line you are on other than this, although the top horizontal scale shows what column you are in. The WP has a large number of features. Perhaps the most dramatic and user-friendly aspect of it is Coleco's use of definable keys. These six keys with Roman numerals are double-size and are defined for the user interactively at the bottom of the word-processor screen.

The word-processor screen is divided into two distinct areas: a display of the last 8 lines and the line that is being edited or entered. Each line is composed of a 35-character first "line" and a 25-character second "line" for a total of 60 characters (default) per full printed line (72 characters maximum). If you want to print out the nine lines displayed, you press the PRINT button in the upper right-hand corner of the keyboard. You will be "asked" to press one of the smart keys. You can print an underlined (hilited) section of the screen, the work space (entire file), or the screen only on either fan-fold or individual sheets of paper. Once you decide, you press smart-key V to do the printing. When the printing is done, Adam returns automatically to the primary screen for more work.



The daisy-wheel printer houses the system power supply.

Cassette Software. Nearly anytime you wish, you may insert a digital data pack into drive 1 and push the reset switch located atop the memory console to load in software. Included with Adam are two software cassettes: SmartBASIC (an Applesoft BASIC-like high-level language), and "Buck Rogers Planet of Zoom," a multilevel, multiscreen, arcade extravaganza.

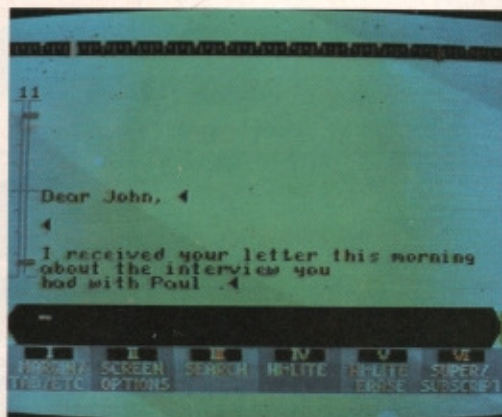
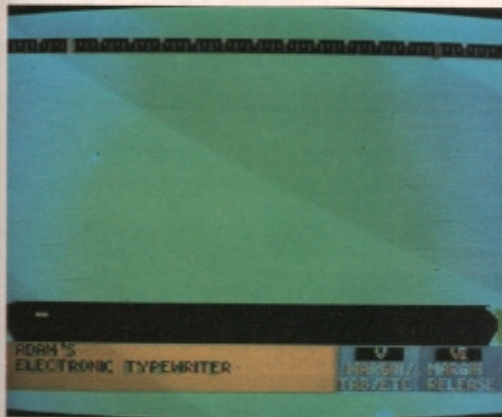
SmartBASIC. Coleco SmartBASIC, which takes about 68 seconds to load, is compatible with Applesoft BASIC.

What this means is that the standard commands used for Applesoft generally can be used with Adam. For example, to list a program on the printer, you would type PR#1 and LIST, rather than using a command such as LLIST. However, PEEKS and POKES of memory locations are not the same between Adam and Apple. Thus, if you were to copy a program written for an Apple computer that included these particular commands, it wouldn't necessarily work with Adam.

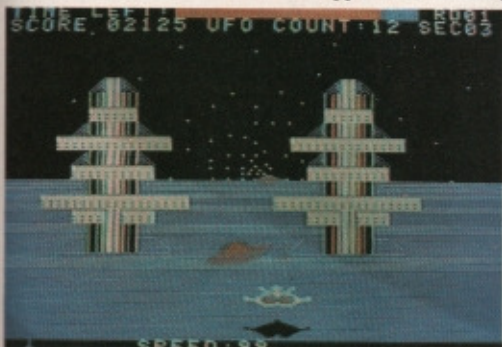
I calculate the SmartBASIC program, which claims to have 225 blocks of memory left in the directory, to be 28 blocks, or about 56 kilobytes long! This seems to be rather large for a cassette-based program, so I guess the Z80 machine language requires quite a bit of code to duplicate the 6502-coded Applesoft BASIC. However, since most disk-based BASICs are 16K or smaller, I suspect that SmartBASIC includes much of the RAM space for video mapping in the graphics mode.

TABLE I—COLECO ADAM MEMORY ALLOCATION

64K	Open Work Space
16K	Video Memory
24K	Word Processor ROMs
8K	Operating System ROM
2K	Keyboard Computer ROM
2K	Tape Drive Computer ROM
2K	Printer Computer ROM
2K	(Master) Network Computer ROM
64K	(Optional memory expansion)



Adam's electronic typewriter mode (left) and word-processor mode (right).



"Buck Rogers Planet of Zoom" takes advantage of Adam's excellent graphics.

Most standard BASIC commands are usually parsed (decoded) in an area rather low in memory. Adam uses the area between 288 and 1152 decimal for these. Again, as is customary, Adam uses the area on top of the BASIC command listing (between 1152 and 1504 decimal) for the error message listing.

Adam's SmartBASIC graphics comes in four varieties, pure Text (24 lines of 36 characters) low-resolution (GR) graphics (40 × 40), hi-resolution (HGR) graphics (256 × 160) with four lines of text, or pure hi-resolution (HGR2) graphics (280 × 192). In its hi-resolution mode, the screen memory alone requires over 52 kilobytes of infor-

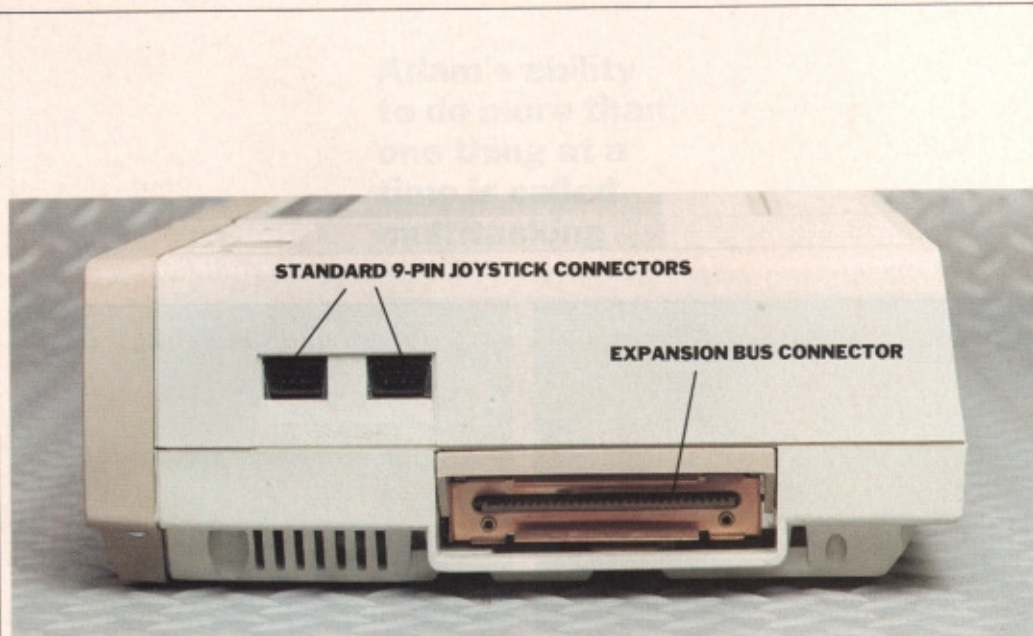
mation for each display screen.

Since no memory map is supplied with any of the manuals, you will have to wait for information analyzing the memory contents, BASIC pointers, etc. For example, the Apple uses a PEEK (-16336) to initiate sound.

We all hear the pretty music and fun sounds of the Buck Rogers game. But how do we create our own sounds? And where are the collision and graphics registers? Also, there is no information on creating those beautiful background screens. Is there a simpler (other than byte-by-byte memory mapping) technique to create HiRes screens? How can we enter our own Z80 machine lan-

guage programs? How can we hook up the outside world to Adam's network of computers? These questions cannot be answered without proper support material.

"Buck Rogers Planet of Zoom." Included with the basic system is the arcade game, "Buck Rogers Planet of Zoom." The game takes about one minute to load, but it should be noted that this is not just a one-shot cassette loading. All during play, the cassette loads and the screens are changed. This ability to do more than one thing at a time is called multitasking. While the interactive arcade game plays, the tape



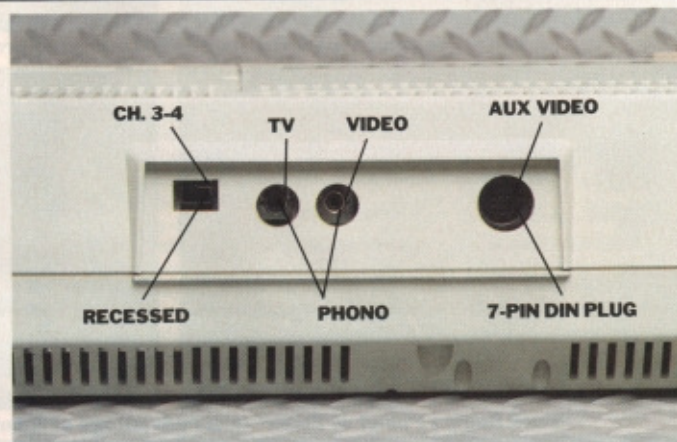
Right side of memory console with two joystick connectors and an expansion slot.

drive feeds information into the memory banks to describe the game's next screens and moves.

Adam's graphics are excellent and game play is realistic (even at the easier-than-arcade difficulty levels) and very challenging. The only disappointment is the game controller. It is relatively slow to respond, and it is quite difficult to keep controlling speed with the left button (how about a speed lock?) and fire with right button.

Comments. I found the Adam Family Computer system to be very satisfactory for its intended use. The word processor is adequate, although not comparable to professional packages such as WordStar. Though the SmartWriter printer is not meant for heavy-duty work, it does offer letter-quality print. One strong point of the system is its compatibility with ColecoVision video game cartridges. This assures quality entertainment for video-game enthusiasts. In fact, the system itself may be purchased as an add-on to the ColecoVision video game console for a suggested retail price of about \$600.

Coleco intends to support Adam with additional peripheral devices. These will include a telephone modem, an RS-232 adapter, an additional 64K of RAM, and even a 3.25" CP/M-compatible floppy-disk system with 80-column converter card. Also in the works is an Adamnet, which will allow the interconnection of several Adam's for



Rear of memory console showing display outputs.

networking the already networked Adam.

Conclusion. Coleco has finally arrived with Adam. Adam is designed to be as familiar to the first-time user, as it is powerful enough for the experienced computerist for home applications. It is conceived as a complete system with nothing (other than a TV set) necessary for immediate and long-term use. It is user-gentle and user-friendly. It is useful from the moment it is uncrated and begins its life as an electric typewriter, through to word processing as a serious

application, and the Planet of Zoom arcade game for family entertainment. It seems to have the upward compatibility necessary to entice the experienced hacker, and the ruggedness to resist the inquisitive 2-year-old. The machine appears to have more than satisfied its "English" language operation goals, and nothing is near it for the price. I do think that a few design and programming bugs need to be fixed, and more powerful and technical manuals are needed. But, overall, I recommend Adam—for your family, your kids, and you. ◇