

ELECTRONIC FUN with COMPUTERS & GAMES

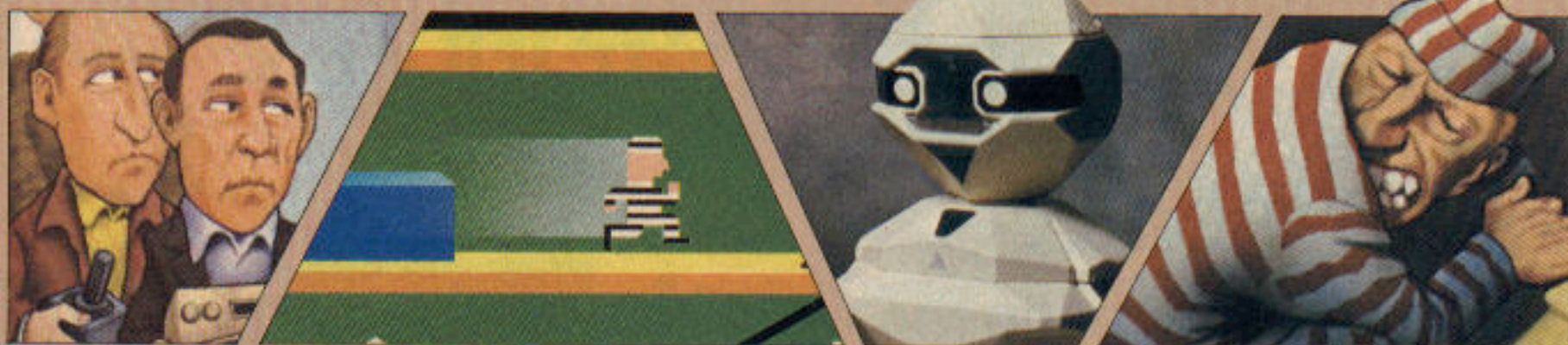
INVASION OF THE ANDROBOTS!

It's NOT a game

TEST REPORT:
Intellivision II

April Fool
Contest!





ELECTRONIC FUN with COMPUTERS & GAMES

Special Reports

- A GAME IS BORN** *By David Tuller* This article answers the embarrassing question: Where do arcade games come from? **36**
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- OFF THE DEATEN TRAKBALL DEPT. HEY! WHAT ABOUT US?** *By Randi Hacker* They shoot horses, don't they? And they shoot gophers and other wildlife but they don't shoot owls or skunks or goldfish. Why? Read about the animals that games forgot **67**
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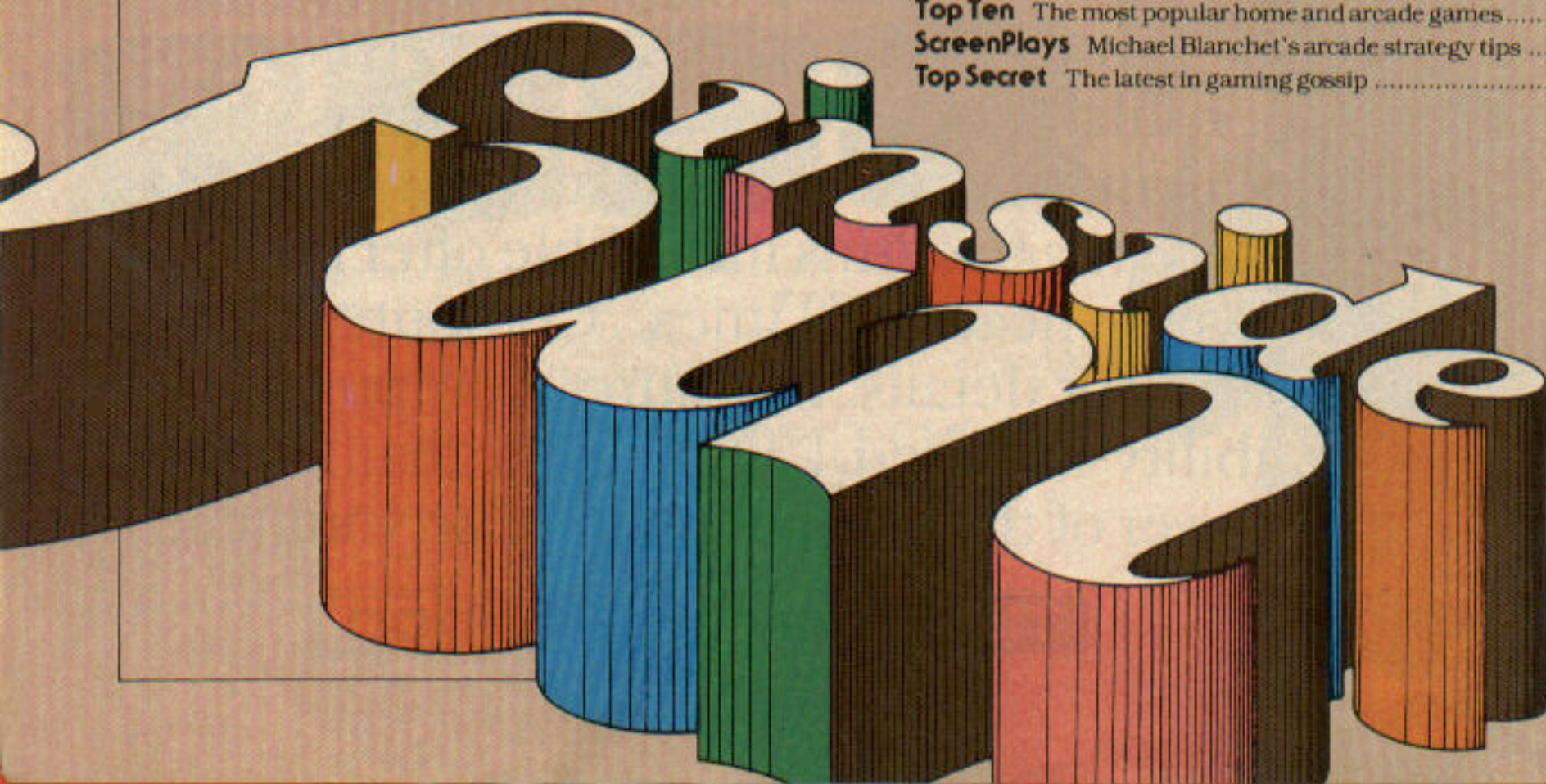
- GAME WORKOUT: INTELLIVISION II: THE SEQUEL** *By Michael Blanchet* The next generation of master Components from Mattel gives you better games, more peripherals and backwards/forwards compatibility **30**
- COMPUTER WORKOUT: YIPPEE T-I-A!** *By Jules Gilder* The eyes of Texas Instruments are upon you. An in-depth report of the TI 99/4A, the userfriendly computer from the Lone Star State **76**

Game Reviews

- HITS & MISSILES** *Fantastic Voyage, Turmoil, Coco Nuts, Orient Express, Gopher, Carnival, Smithereens, Amidar, Phoenix and Dragonfire.* Plus *Protector 2, Monster Maze, Caverns of Mars* and other computer games **54**

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COMPUTER WORKOUT

Yippee T-I-A!

Texas Instruments' TI 99/4A

WANTED: Personal computer system with full 16-color graphics capability and a high resolution 192-by-256 pixel display. Computer should contain a 16-bit microprocessor, and be able to address more than 64K of memory. Additional capabilities should include a built-in three-voice music synthesizer with one channel of white noise, optional voice output capability, a built-in BASIC programming language with 13-digit accuracy and a typewriter-like keyboard. Must be a popular system with a large number of games available. Computer should be able to accommodate extended BASIC, LOGO and UCSD Pascal. Price must be under \$200.

By Jules H. Gilder

Does the above "want ad" sound like it's straight out of someone's computer fantasy? Two years ago it would have been. Today, however, it's not fiction—the computer that meets all of these requirements is the TI 99/4A from Texas Instruments. While the 99/4A is a great machine for video gaming because of its excellent color graphics, sound and voice capabilities, you'll



probably have a few serious criticisms of it if you've had experience on other computers. On the one hand, the 99/4A has a lot of potential. On the other hand, it's not always accessible to the user. Nevertheless, in this past year, 99/4A computers have been selling like crazy, but it wasn't always so.

When Texas Instruments first introduced its home computer a few years ago, reaction to it was less

than ecstatic. Known then simply as the TI 99/4, the unit came bundled with a color monitor and sold for over \$1,200. In addition, the 99/4 had only a small keyboard with calculator-like pushbuttons.

The original 99/4 had one other very big disadvantage. If you wanted to add peripherals, you needed a table that was capable of expanding its length—the peripherals plugged into the side of the computer in a chain-like fashion. Each time you added something onto the computer, the width of the table would have to grow. Now the 99/4A has an expansion box that sits behind the computer and can hold most of the add-ons.

Brain Power

The microprocessor in the 99/4A is a TMS 9900, which is a 16-bit micro. This means that the micro has the ability to address a lot more memory than the more commonly used eight-bit devices. While the TI computer uses this to some advantage, it still has a lot of untapped brain power.

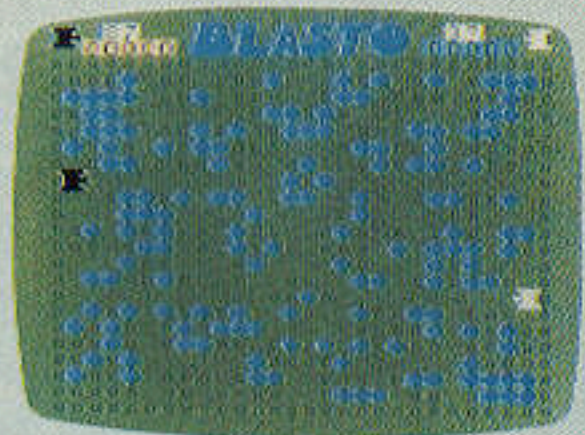
The 99/4A comes with 26K of internal ROM memory that contains the operating system and the BASIC language. The basic machine comes with 16K of RAM, but it is expandable up to 48K. As an extra plus, the TI 99/4A can accept program cartridges, called Command Modules, that have up to 30K of additional ROM memory. With so much memory available for game designers to work with, games for the TI 99/4A can be



TERRY TURTLE'S ADVENTURE



TUNNELS



BLASTO

quite sophisticated and have excellent graphics.

Designers of other computer games and computers should look at the way Texas Instruments designed its cartridge system. Its primary aim is to meet the needs of the user, rather than have the user meet its needs.

Most video games and computers that accept cartridges require the user to

turn the game off before plugging a cartridge in or pulling it out. The on/off switch, however, is one of the most unreliable parts of



The TI 99/4A computer has 16-color graphics capability and music and voice synthesizers.

any system; it's subject to early failure with frequent cartridge changes. The designers at TI decided that it shouldn't be necessary to force the user to turn the computer off, so they produced a system that will allow the switching of cartridges even with the power on.

Although the TI 99/4A is a programmable computer, it is really better as an educational tool and a

game machine than as a computer. This is because a lot of its graphics capabilities are not accessible to the owner/programmer and are only available through programs in Command Modules. How come? One reason is that there are no plotting commands available to the user.

TI BASIC, which comes with the 99/4A, has many of the familiar

BASIC commands in it, but it's missing many of the more useful ones. PEEK and POKE, for example, have been left out of TI BASIC, probably to keep programmers from wandering around the machine's internal memory thereby aiding in the protection of TI's Command Modules. Other missing commands are LEFT\$,

Continued on page 93



Above, three games from TI and some of the add-ons available from Milton Bradley including the Expander.

TI 99/4A

Continued from page 78

RIGHT\$ and ONERR, to name a few. Some of them, like SEG\$ (which is really MIDS) have been renamed for some unknown reason. So if you want to copy programs that have been published in computer magazines but designed for computers other than the TI 99/4A, you're going to have a tough time.

Space We Must

The lack of many of the standard BASIC commands is not the only problem with the 99/4A. TI BASIC is a very rigid language. Where most versions of BASIC will ignore the presence or absence of spaces, TI BASIC requires that all BASIC keywords be followed by a space and failure to do this will cause an error. It's true that some people prefer this rigid structure, but many programmers who have worked on other microcomputers do not. Another problem with the language is that it doesn't permit multiple statements per line, while almost every other microcomputer BASIC does. Finally, if your program requires the use of arrays, you are limited to only three dimensions. This can be a severe handicap. But many of the problems with TI BASIC have been eliminated with TI's Extended BASIC Command Module, which sells for about \$100.

MAX And MIN

On the plus side, TI has added some really nice features. To begin with, they have added MAX and MIN functions which can be used to determine the largest and smallest numbers of a set. They've also added the constant "pi" to the language. More exciting than anything else, however, is the fact that they have borrowed an idea from FORTRAN and incorporated it into their Extended BASIC—the concept of subroutines that can be called with a list of parameters. This makes it very easy to develop libraries of subroutines that can be put together to form programs—an

approach to programming that can reduce development time substantially.

Another excellent feature is that the user can redefine any of the 128 ASCII characters to produce any pattern desired. Each character consists of an 8-by-8 dot matrix whose elements can be selectively activated by the user. This helps make up for some of the shortcomings due to the lack of plotting commands, although not all of them.

There are plenty of peripherals available for the TI 99/4A. In fact, TI is currently offering 16 different add-ons for the machine. For storing your own programs written in BASIC you can use either a standard audio cassette recorder or you can purchase a disk system from TI. Up to three 5¼-inch drives can be connected, each with a storage capacity of 90K. Also available are an RS-232 interface, a modem, a memory expander, thermal and impact printers and a speech synthesizer module, to name just a few. TI has been one of the pioneers in the area of speech synthesis; their speech module is quite good and very easy to use.

Expandability

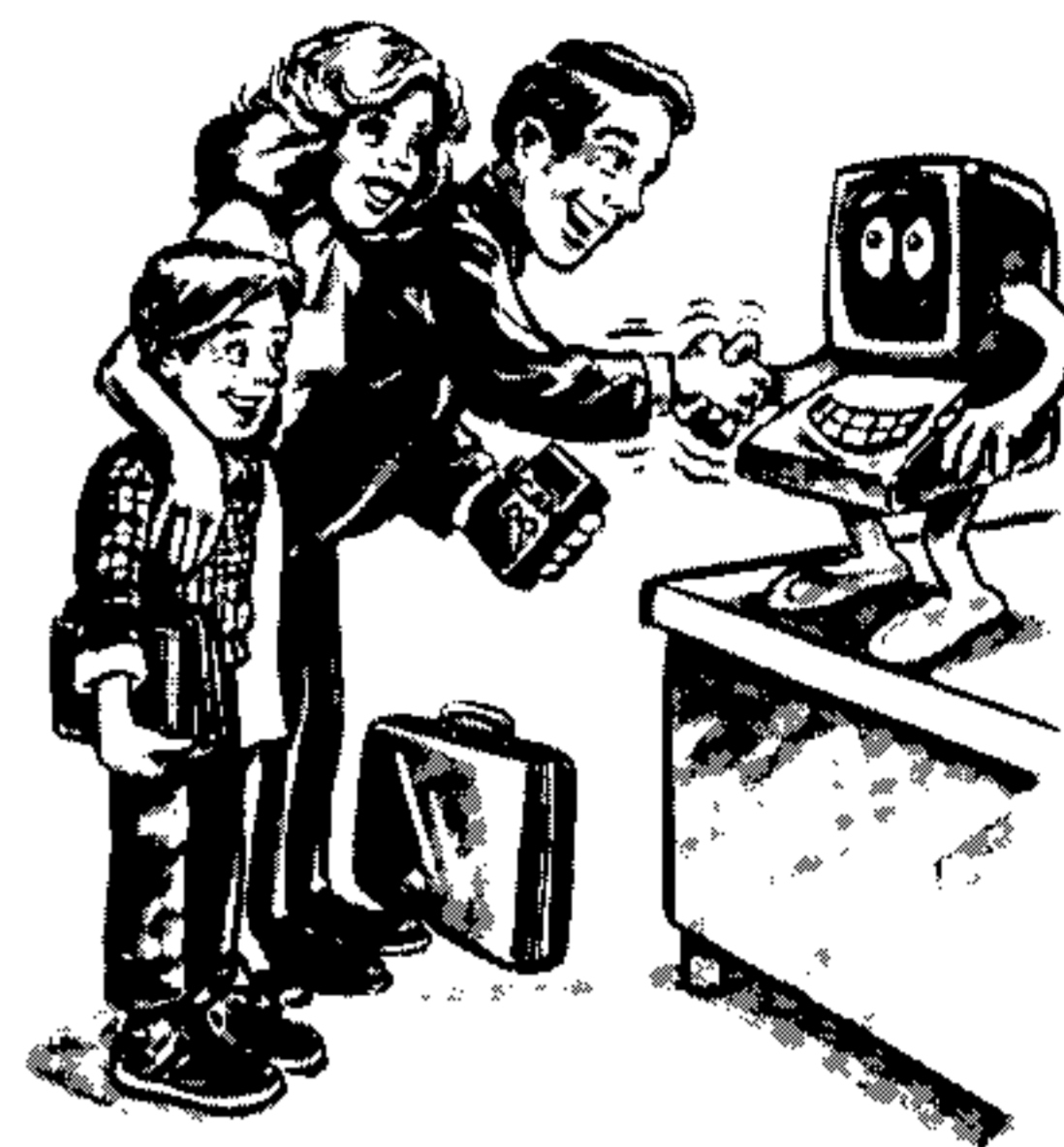
Expandability for the computer is not limited to hardware only; TI has also seen to it that a lot of software is available for the machine. In addition to the large number of game cartridges the company is producing—there are now some 280 to choose from—it has made available a lot of system software as well. For example, the TI machine was the first personal computer to offer the LOGO language for kids. In addition, PILOT and Pascal are also available.

All in all, TI has come a long way since the old 99/4. Last year alone, about 550,000 99/4A's were sold, and there doesn't seem to be any let-up. In fact, the biggest problem may be finding one in stock.

In the event that you do have trouble locating a store in your neighborhood that carries the TI, you can contact the company at PO Box 53, Lubbock, Texas 79408 or call (800) 741-2000. □

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