Issue # 1
PREMIERE

Hi-Res MAGAZINE™

The Complete Magazine for the Atari VCS & Computer Users

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Inside

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Atari, Inc.
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(An unauthorized company history)

Oh, Those *%#! Error Messages

Bringing Home the Arcade Game Craze

Programming columns:
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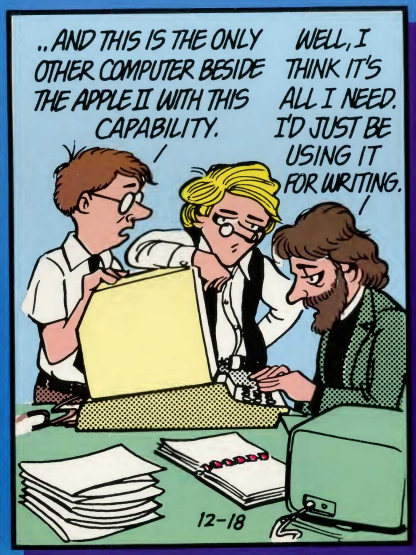
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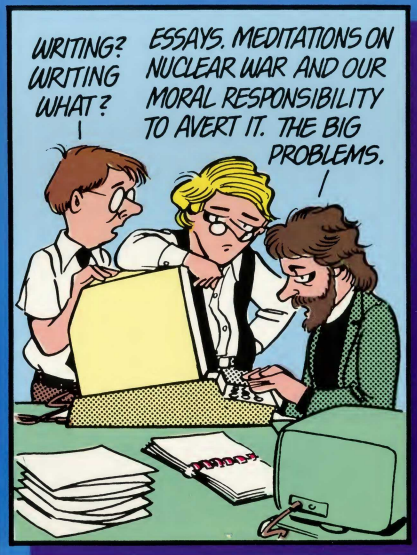
12-18


WRITING? WRITING WHAT?
ESSAYS. MEDITATIONS ON NUCLEAR WAR AND OUR MORAL RESPONSIBILITY TO AVERT IT. THE BIG PROBLEMS.

by Garry Trudeau

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Look what we have in store for your Atari.

Arti Haroutunian has done it again.

The mind behind our first Atari® success, *Kid Grid,* has just dreamed up another one: *Juice!*

And if you don't think that's electrifying, consider what the experts are saying.

Electronic Fun with Computers and Games says that *Kid Grid* "may sound like kid stuff, but it isn't. Even on the slowest setting ...the game is quick enough to challenge almost anyone."

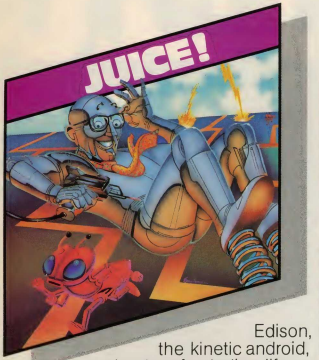
That's right. And that's not all.

Electronic Games calls the Kid "Hypnotic, appealing, fast-moving arcade action of the highest calibre, ...one of the most compulsive, utterly addictive contests in the world of computer gaming."

We couldn't agree more.

What will the critics say about *Juice!?* Will they like its colorful graphics, superior sound effects, charming characters and challenging play patterns?

Why wait around to find out?



Edison, the kinetic android, leads a frustrating life.

All he wants to do is build his circuit boards and go with the flow. But things keep getting in the way.

Nohms—a negative influence—bug him constantly. Flash, the lightning dolt, disconnects everything in his path.

And the cunning Killerwatt is out to fry poor Edison's brains.

You'll get a charge out of this one. And a few jolts, too!

(Requires 32K memory. Suggested retail $29.95)

Connecting the dots on our colorful grid should be easy, right?

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Squashface, Thuggy, Muggy and Moose are their names. And *you* are their game. And what's more, they're faster than you are.

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So keep your eyes peeled for the mysterious question mark and don't slow down at corners!

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SUPERS

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Its sports games are so lifelike you could end up with sore muscles and a hoarse throat.

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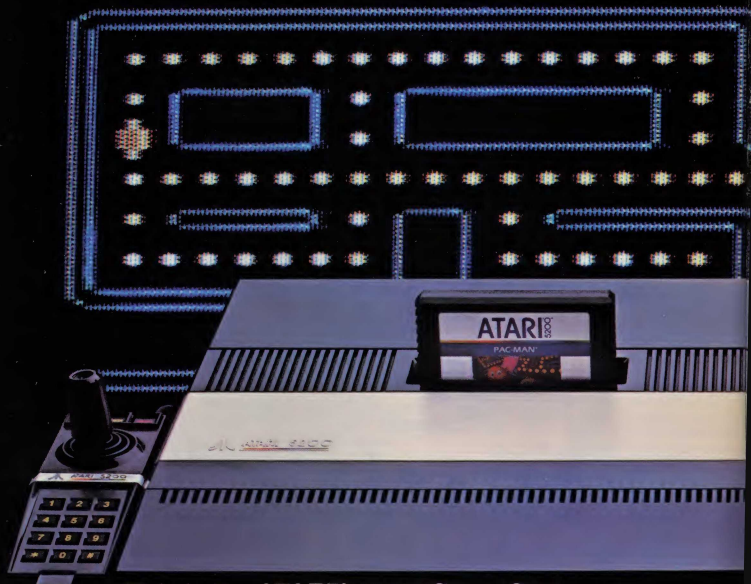
Its arcade-quality cartridges can't be played on any other system, not even with an adaptor.

Hits like PAC-MAN,[1] Centipede,[2]™ Galaxian,[3] Star Raiders,[4]™ Missile Command,[5]™ Football and Soccer are here now. Others like Pole



This is the ATARI® 5200™ SuperSystem. The most versatile, controllable and enjoyable video game system you can buy.

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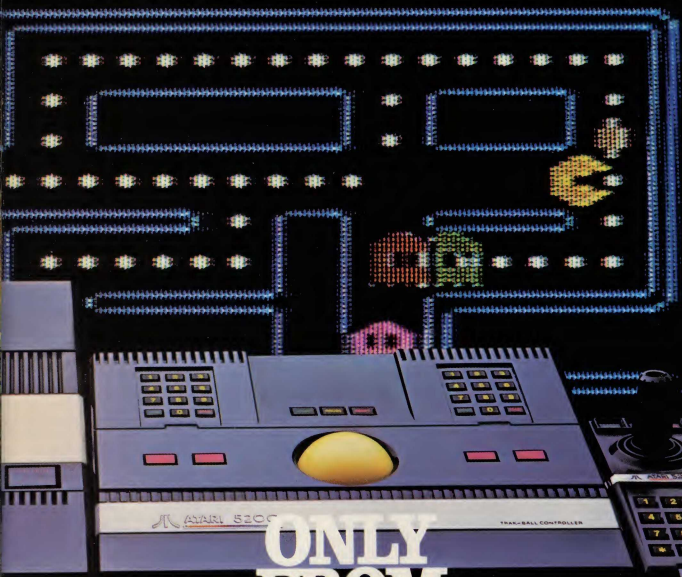
SYSTEM

Position,[3] Dig Dug,[TM4] Kangaroo,[TM5] Jungle Hunt,[6] Tennis, and Baseball are coming soon.

Its controllers have the only 360° joysticks on the market. A 12-position keypad. Plus start, reset, and the only pause button, all conveniently right in your hand.

Coming soon is a TRAK-BALL™ controller. An adaptor for ATARI 2600™ games. Even cartridges with human-sounding voice.

Compare the ATARI 5200™ with anything else and you'll see why we call it the Super-System. Because that's exactly what it is.



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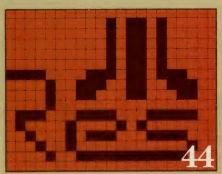

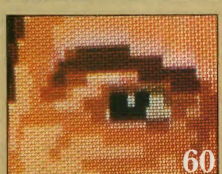

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The Complete Magazine for the Atari VCS & Computer Users

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First off, it really is a system. A family of ATARI 5200™ SuperSystem components designed together to perform together.

Which is what any video gamer should look for. It's also an exclusive system. You can't play its high-resolution, arcade-speed 5200™ Super Games on anything else, not even with an adaptor.

And what's coming includes the most popular games, like Joust[1] and Pole Position,[2] now in the arcades.

ATARI 5200™ SUPERSYSTEM

It comes with a powerful 16K RAM (memory) built in. Which is 10 times more intelligent than Intellivision.™

It generates 256 colors, compared with Colecovision's 16. And 320 lines of graphic resolution, a good 25% sharper than Colecovision.™

Its circuitry reads signals fast. So with 5200 arcade cartridges, nothing gets lost in translation. Including game speed.

What's more, the controllers actually feel good in your hand. With solid joysticks, not clumsy little disks.

And the action is full-circle, 360° Instead of 16 or 8 positions like other joysticks.

There are left- and right-handed fire buttons. A 12-digit keypad. Plus start and reset all in your hand.

There's even a pause button, in case the phone rings. And it rings a lot when you have an ATARI 5200 SuperSystem.

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If you know video games, you know what TRAK-BALL is. The fastest controller in the arcades.

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This handy device gives you the best of both worlds.

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Speaking of video games, that's exactly what some ATARI 5200 games will do.

Generate a human-sounding voice in response to gameplay.

To guide you. To warn you. Maybe even to scare you a little.

Adding a whole new dimension of video game realism and fun.

ATARI 5200™ SUPER GAMES

Centipede,™ Vanguard,[5] PAC-MAN,[6] Galaxian, Qix,[7] Star Raiders,™ Football, Baseball, Soccer, and Tennis are here now.

Pole Position, Joust, Moon Patrol,[1] Jungle Hunt,[8] Tempest,™ Battlezone,[9] Dig Dug,™[9] Xevious,[9] and Pengo[10] are coming soon.

With 5200 graphics, gameplay and sound, in cartridges that no other system, nor their adaptors, can play.

And they're the hottest games now in arcades.

Choose Colecovision or Intellivision and you'll never play them at home.

It's that simple.

So think ahead to the games you'll want to play.

We're pretty certain which system you'll want to buy.

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Hi-Res MAGAZINE™

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Dear Reader,

Welcome to the new world of *HI-RES* Magazine! We hope to entertain, educate, inform and initiate new concepts for the Atari computer and video game user.

We'll work hard to gather the,desires and needs of our readers, namely YOU, and transpose them each month into a truly High Resolution Magazine.

Your input and advice are priceless to our future and to our success. All letters and comments will be taken seriously. Wherever possible we will share your ideas and comments with the rest of the readership.

This magazine has been in the planning stages for many months. It is our showcase and a place from which to build. We'll be improving it in the coming months.

When you purchased this magazine, you became part of the *HI-RES* family. We're hoping that you like us enough to subscribe. We look forward each month to sharing all the exciting new developments coming from Atari and the many software and hardware manufacturers whose products complement your system.

Thank you in advance for your support.

Sincerely yours,

Anthony (Tony) J. Nicholson
Publisher

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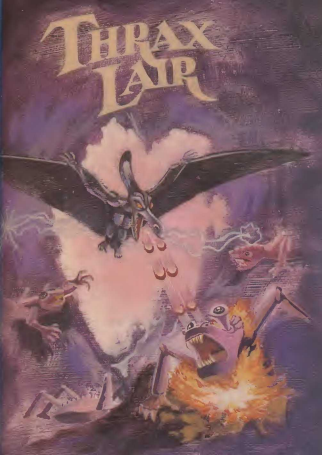

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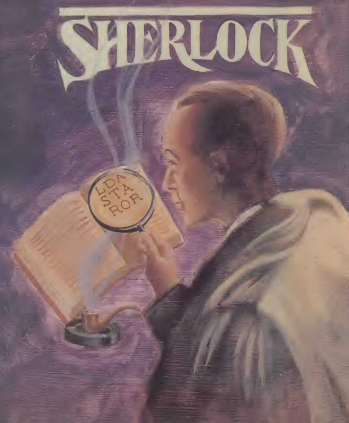

THRAX LAIR An exciting arcade game requiring lightning reflexes and a cool head. Great animation and fast action. 16K on Atari* disk and cassette, soon on Commodore 64+ disk and cassette. ***$29.95***

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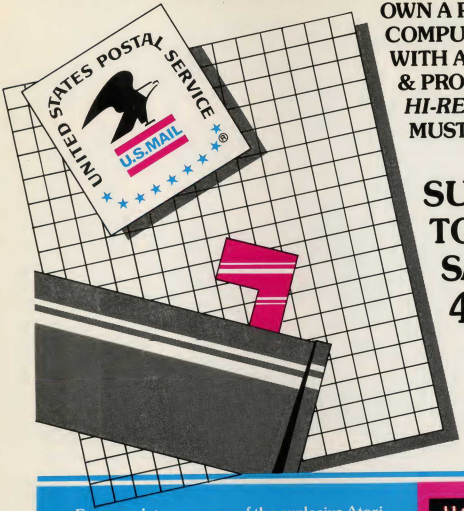

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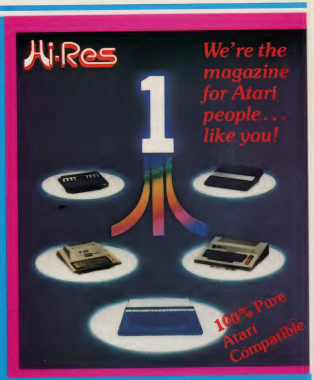

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In This Issue

A new magazine in a crowded field like home computing likes to know that it has met its readers' expectations.

We need to hear from you. You're looking at the newest Atari-specific magazine on the market. *Hi-Res* will tell you what's going on inside the corporate walls of Atari, offer you the best in reader-written software, answer your questions about programming and provide candid software reviews, as well as some entertaining features.

If you enjoy *Hi-Res* as much as we enjoyed bringing it to you, let us know. We need your participation. At *Hi-Res*, the editors are looking for the best reader-written software in the areas of home finance, business, education and entertainment. We've written a guide for aspiring authors that will help you to prepare your work for submission. The guide is yours for the price of a self-addressed, stamped business envelope.

Our premiere issue features software from two Orlando programmers, Dan Horn and Pat Henderson, who will introduce readers to a scrolling color banner program and a sound editor. Banner creation with an Atari allows you to put text on the screen without using a print statement.

"Zounds Sounds!" explores the voice and distortion levels of an Atari controlled from a joystick. With its range of tones, you can find just the sound effect for a program that you're creating.

Inside *Hi-Res* you'll meet Arcade Eric, a fictitious video prodigy and game reviewing mercenary called in to bridge a generation gap while he takes a comic look at *Journey Escape*.

Hi-Res west coast editor, Steve Harding offers his own explanations of Atari's cryptic error code messages. Steve is just one of the *Hi-Res* regulars who has served Atari Corporation itself. Add to that list, columnists Bill Haslacher, Robert Peck and Tim McGuinness.

Lloyd Prentice, the founding editor of *Computer Classroom News*, will be reviewing educational programs each month for *Hi-Res*.

Russ Wetmore, author of the popular *Preppie!* series will be leading advanced users on a tour of programming utilities and techniques. Evan Rosen and Steve Maguire, the authors of Valforth, begin their column on Forth programming. David Heller, author of *Space Knights* from Reston publishing introduces Dr. Schnorrer, a character who will explore the non-computing uses of the Atari.

We've included in this issue a Reader's Blue Pencil, and we'd like to collect your criticism and thoughts about our magazine. You'll find it on one of the tear-away cards bound into the book: Use it!

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Anthony J. Nicholson
CHAIRMAN OF THE BOARD
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Perspectives

Atari Transitions

Unless your power pack has wound down completely, you heard that Atari dropped 1700 hundred employees from their American manufacturing ranks. The rumor had been circulating for some time that the company would be doing business from an Oriental address.

The rest of the rumor is that the 2600 is already stockpiled in some noodle factory and that Atari is waiting to dump them onto the American market for $50 a piece.

The hang-up? Atari has to get its assemblyline to deliver two 5200s in a row to work.

The twelve million Atari 2600s currently in the market place seemed to auger well for the success of Atari's new keyboard interface. That is until the corporation scrapped the idea. Time, energy and financial resources went into the development and prototype production of Atari's add-on keyboard called the Graduate. The motive was to attract people to computing as cheaply as possible as well as take advantage of the large user-base of 2600's in the marketplace.

But Atari decided that it would be competing with itself, especially since the new 600XL is expected to enter the market discounted for less than $100.

The corporation felt so strongly about competing with its own Consumer Electronics Division, that it trashed the whole division along with the keyboard.

Bushnell Reaches Accord with Atari

Nolan Bushnell and Chuck E. Cheese of Pizza Time Theatre are sharing a slice with Atari, Inc.

Bushnell, founder of Atari and now chairman and chief executive officer of Pizza Time Theatre, licensed the consumer rights to his latest coin-operated video games to Atari. Bushnell will be developing the coin-ops through a subsidiary, Sente Technologies.

Bushnell was pushed out of Atari and the video games business shortly after Warner Communications acquired the Company in 1977. Bound by contract to stay away from the game field until after October, 1983, Bushnell got into trouble by announcing new video coin-op games that are going to set the industry on its microchips. Unfortunately, he made the announcement in April and Atari squawked that he reneged on his agreement.

Bushnell found himself in a lawsuit. But he's used to collecting in full from Warner. He settled the issue by granting them the home licensing rights to the forthcoming games. No value was placed on the licensing agreement, but Bushnell's last encounter with Warner scored him $15 million for the sale of his first company — Atari.

No word on what kind of video game Sente will develop, but chances are we will see increasing experiments with microchip controlled laser disks. Could mean a whole new kind of home video game hardware.

If This Is You, Phone Home: You're A Wanted Child

Neighborhood reprisals against coin-op parlors and the spill-over to the video game phenomenon apparently have Atari worried. And why not, their coin-op division is not only responsible for a hefty profit on its own, but also the creative juices flowing there bear even greater fruit in the home video market.

A Minneapolis firm at Atari's behest profiled a typical coin-operated game player. Two thousand people, male and female, 10 to 45 were interviewed by Custom Research, Inc. They found the average video game player is a well-adjusted teenager, who's socially active, enjoys sports and maintains a "B" average or above.

Then the good news gets really catty. "Players," said the study, are likely to be involved in group activities and team sports, while "non-players" are interested in individual activities such as reading or sewing.

According to Atari the purpose of the study is to "shape future product development," but it appears just as likely that it was done to defend the idea of coin-op parlors and home video games against the growing accusation that they result in teenagers who can neither sew nor read!

The Piggyback

Entex Industries loves Atari's latest decision. So does Spectravision. Both are makers of keyboard add-ons for the huge 2600 market.

With Atari's latest decision not to proceed with their introduction of the Graduate keyboard add-on, smaller competitors have the market to themselves.

Both keyboards attach to the 2600 through that machine's cassette port. The boards will even attach to a Coleco through their Atari interface device.

The 2000 Piggyback comes with 3K of Ram that is expandable to 19K. Its price, at this writing remains $125.

Will James Morgan Cure Atari Woes?

With the glut of new products in the micro-marketplace, there follows a glut of guts. Spilled, that is. And Atari is no exception.

With losses totalling hundreds of millions of dollars on quarterly earnings, Atari may start changing management like you and I change clothing. James J. Morgan, 41, a fellow who's done a great job peddling cigarettes for the domestic division of Philip Morris, Inc., has replaced Raymond E. Kassar as chairman and chief executive officer.

While we're willing to give Morgan every chance, the question is: Will he be able to market a product that hasn't been outlawed by the Surgeon General?

The mass market for home computers exploded last August when Texas Instruments, Inc. dropped the price of its basic 16K console to $150. Since then, hardware manufacturers have ridden some torturous paths, not to mention SEC plunges.

But there is a silver lining. With Atari writing off losses, like Pac-Man gobbles colored static, Morgan may be set up to right a lot of company wrongs. Many of Atari's write-offs — $310 million in the last quarter — consisted of inventory.

If that's true, look for even more bold price cutting and every dollar generated as a "profit" dollar next quarter.

Morgan, who is unfamiliar with personal computers says he'll bolster Atari's weak share of the education market.

Other antidotes to tailspinning profits include further consolidating of the home computer and video game business, revamping the line of home computers and eliminating mandates that the Atari line be handled exclusively by any given distributor.

West Coast Fever/Fervor

About every six months micro technology changes and that's about the time it took to get a Coke at the Eighth Annual West Coast Computer Faire. Nearly 47,000 persons jammed the escalators and packed the corridors at this once-a-year exhibition in that Mecca of microcomputing, San Francisco.

The annual fete brought together over 450 companies in the microcomputer field, who displayed their goods and services in 780 exhibitor booths. According to Jim Warren, the show's owner/impressario—a man who spends the whole three days of the convention on roller skates—the exhibitor space was sold out well in advance of the March 18 opening date. Fifty companies signed up on a waiting list for last minute space.

This year's exhibition blew the doors off of the Civic Auditorium. Booths stretched out to the loading ramp of Brooks Hall; they lined the corridors leading to the bathrooms and competed with lines around the refreshment stands.

Cash Programming Awards

A word to all those mothers in the audience: Dust off your seventeen-year-olds, they may be worth something yet.

David Beuhler of St. Paul, Minnesota proved it last January. The seventeen-year-old walked away with Atari's $25,000 grand prize for the best amateur freelance submission to the Atari Programmer's Exchange (APX).

David wrote something called *Typo Attack*, a program every budding young writer should own. The educational game improves your touch typing skills, while the player/typist takes satisfaction in repelling "animated typo invaders."

Since winning, David has had another program accepted by APX—a game called *Impact*.

SIG Sound-off

Some members of the popular Compuserve Atari Special Interest Group (SIG) sounded off to Atari President John Cavalier in an open letter.

In the letter, printed in the February issue of the Alamo Area Atari Users Association from San Antonio, TX, seventeen members of the SIG chastised Cavalier for Atari's slow follow-up of new products, the lack of simplicity in Atari's manuals, and Atari's perception of who they — the SIG members — are ("troublesome hackers").

They even score the company for their audibles at the line whereby the corporation changes direction. I'll quote: "Orginally the direction was promotion of the Atari 800 as a business machine. Then as an educational machine. Now as a home computer."

No one at *Hi-Res* can remember a strong promotion of the 800 as a business machine, but we'll take their word for it.

The group's product wish list includes a double-density drive, a direct connect modem, firmware for a faster floating point routine, a better disk file management method and an improved tape drive.

The SIG members do give Atari the benefit of the doubt: "The market for personal computers has defined and redefined itself every six months." That can raise havoc with any corporation's strategy.

Louisville Sluggers and the Mental Health of Longbeach

Antagonists and protagonists came together in Louisville, Kentucky in a political slugfest to argue the merits of video games and arcade amusements. The talks were held at a four-day National Recreation and Park Association Congress.

When the dust had settled the authorities decided that the games themselves are not hazardous to your health, but that the arcade parlor magnates and their teenage clientele need watching.

That was the opinion of both Defenders and Dragons. Ronnie Lamm, a national spokesperson against the proliferation of video games, did not take issue with the games themselves, but with their locations.

"We're not talking about arcades . . . ," she said, "we're talking about the back rooms. . . We want them (the games) controlled in the community."

Ronnie has been working to establish video game controls in her home of Centereach, New York. Our best advice is to steer clear of Centereach backrooms—whatever their activity.

You may have to give a wide berth to Longbeach as well. That's where psychologist B. David Brooks is studying the social effects of video games on young people. Principal among his findings were some "kids who were spending their lunch money to and from school on games."

This sharp observation lost some of its sting, however, when he qualified it by saying that he also "found kids spending their lunch money to and from school in cigarette machines, candy store and other places, too."

Holy gym shorts!

This being the state of social and psychological research on the West Coast, *Hi-Res* can only hope none of its readers develops a serious mental problem in Longbeach.

Elastic Scholastic

Microzine sounds like a skin cream for minor burns, but it's actually an interactive computer magazine for kids.

Scholastic, Inc.—a household word in educational publications—is broadening its activity in the micro software and magazine market. At last January's Consumer Electronics Show, the company introduced its Wizware line of educational software—soon to be ready for the Atari—as well as their *Microzine* project.

If that isn't enough, Scholastic, founded in 1920, will launch its first *consumer magazine*. In what field? You bet! *Family Computing* is coming off the press in September to the tune of 400,000 copies, according to Scholastic's initial publicity piece.

The company first mixed into the software business by publishing a catalog of software available to educators. Avery Hunt the VP in charge of software development said that the catalog was a sort of "Seal of Approval" from Scholastic. They examined the package, and if they thought the program a good learning tool, they said so.

Their own line of Wizware educational software was a natural spin-off.

They expanded the idea of interactive programming to include their new *Microzine*.

As a former child and regular subscriber to *The Weekly*

Reader, I called Steve Gass, formerly with *Electronic Learning*, another Scholastic publication for teachers, and now the project manager for Wizware and *Microzine*.

The bi-monthly *Microzine* will contain four different programs and a variety of interactive features.

"Ask Me," for example is a celebrity interview that the student conducts. He or she starts by selecting a "who is," "what are," or "did you" phrase. That sets up a menu listing ways to finish the question. A database gives the child a portion of the answer and the child has the option to ask for more information with another prompt. The celebrity can even ask the child a question.

Who's Scholastic's first celebrity interview? Robert McNaughton who played E.T.

The *Microzine*, available for the Atari and the Apple II+ is going to be peddled through retail stores for about 40 bucks a shot, an unusual move for a company who traditionally markets directly to school systems. But then, the micro industry is changing a lot of corporate habits.

Power-Plus Cartridges from CBS

CBS and their entry into the Atari software market is stale news, but their developments in the firmware industry bear watching. In-house VCS game developers soon encountered the walls and ceilings of the standard 2600 video game cartridge. Instead of trimming away the competitive beauty of the arcade bombshells that they've acquired — *Stomp-it*, *Blueprint*, *Solar Fox* — CBS developed its own chip to add some memory to the VCS cassettes — the RAM and chip.

According to Marilyn Wolpin, the chip adds both RAM and ROM to the cartridge. Their first release on the new RAM+ chip will be a flight simulator called *Wings*. CBS guarantees that their Atari graphics presentation will leave George Plimpton catatonic.

Their flight simulator was so demanding that the brain trust at CBS thought that the Atari joystick needed some rethinking. The result is the new Power Play Booster Grip, a finger-form grip that fits over Atari's present offering and plugs into a second port. The stick offers not only a better "feel" but two extra switches to the player.

Next up for CBS Video Games is *Charles Goren On Bridge*. The heavy-hitter from the entertainment pages of hundreds of newspapers will lend his name to a line of programs that help you learn the game. Should have been done long ago: Congratulations to CBS.

Data Age Turns About-face On Licensing

Video games and their developers have come of age. Industry tradition has coin-op arcade game manufacturers developing hot new games and reaping residuals from the sales of pared down versions to the personal computer market and the VCS cartridge makers.

Data Age is sneaking into arcade palaces through the back door. Their *Journey Escape* game for the 2600 has been picked up by Bally/Midway for arcade consumption.

The cartridge game — a so-so product by most reports —capitalizes on the rock group Journey's popularity among the teen set. Its success proves what Data Age has contended from its inception: that the smart money is on readily recognizable names and characters, redefined for the video game audience. With Journey the rock group, Data Age found instant market recognition.

Data Age is trying the same thing with its *Bermuda Triangle* program, *Frankenstein* and *Smokey the Bear* — all in the public domain. Add to this product line, Mr. Bill of Saturday Night Live fame, and Data Age comes in third after Mother and Apple Pie in terms of consumer identification.

CBS Poses Threat to Smaller Competitors

Watch for some price paring on CBS products through different distribution lines. CBS is emerging as a major contender for a market wedge in the lucrative software publishing industry. By swallowing up K-Byte Software last year, CBS's entry into the 400/800/1200 market was firmly established.

When Roklan developed the popular arcade game *Gorf* for 400/800 and then managed to store the essentials to a VCS cartridge for CBS, that company found a solid berth in the Atari 2600 market.

The latest from Art Barnett at CBS is that the company is changing its price structure to dealers and distributors. The net effect will be lower prices to consumers, "while maintaining or improving margins at all levels of distribution. We talked to Art Barnett, but he wouldn't say how much these prices were coming down. We don't know if CBS is talking about a $29.95 ROM program for the 800 or a $19.95 disk. So far, CBS has offered its programs only on ROM cartridges.

The announcement of the price cut said nothing about the VCS market. In any event, this is going to trigger some price-cutting among competitors.

Give Those "Compugirls" A Break

Women are slipping behind men in the race for computer literacy. That assertion lead to some more creative thinking by Sara Kiesler, a social scientist at Carnegie-Mellon University. She says that "the girls of today may find themselves second-class citizens in the computer-intensive world of tomorrow. (If this all sounds familiar, I recall outraged women speaking of themselves as traveling coach-fare through life when I was in college).

Even *Hi-Res* will agree that computing is male dominated; programs are male-designed and male marketed. There seems no more reason for this than the profit quest toward which males traditionally race.

That makes more sense to me than an article in *Psychology Today* that ran in March. Quoted in a recent issue of the *"Orlando Sentinel* by columnist Jeffrey Zaslow, he called Kiesler for some elaboration. The major stumbling block to women in computing seems to be social. According to Kiesler, "Men like their women to watch them play. And women try to fit the cultural roles expected of them."

This strikes *Hi-Res* as being archaic thinking and somewhat unreasonable.

On the hopeful side, no report that we have seen indicates any distinctions of ability based on sex while using or programming the computer. Females even seem to score just as well as males after practice on non-violent computer games.

The final and condescending conclusion of the scientists, which appeared in last March's *Psychology Today*, seems to eliminate the magazine as a barometer of contemporary intelligence. "Girls should not be discouraged by computing," the female and male scientists concluded, "Programming is more like following a recipe than fixing a bike."

Our conclusion: People who draw conclusions like the above, probably never dated much in college.

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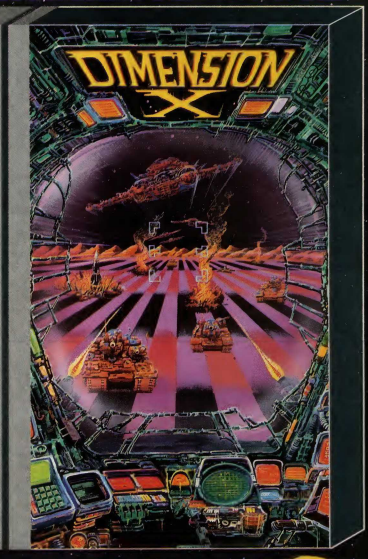

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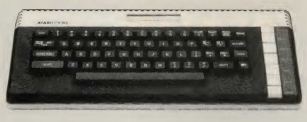
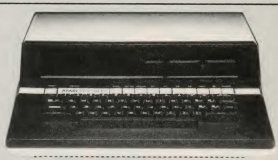


Atari's new 600XL is shipped with 16K and a full keyboard. It replaces the Atari 400.

The new 800XL replaces Atari's most popular computer, the 800. It appears the 800 had to be retired because of high production costs.

The 1400XL comes with 64K and a built-in modem and speech synthesizer. Will it replace the 1200?



The 1450XLD is Atari's second digression into the business market. The new computer carries an on-board dual-density, double-sided disk.

New Products Assault from Atari at June's Summer Consumer Electronics Show

Atari, Inc. drew blood from competitors in the volatile battle for micro market supremacy, a war for micro dollars which is anything but tiny.

At an otherwise sluggish Summer Consumer Electronics Show held this June in Chicago, Atari, Inc. introduced a rash of new hardware products, a variety of software packages, a corporate name change, and tantalized onlookers with veiled talk of Ataritel, their new phone subsidiary. At the same time, Alan Alda turned up as Atari, Inc.'s new spokesperson.

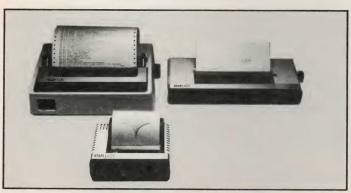
The Atari Products Company, a new title for an amalgamation of old departments, under President John Cavalier, is responsible for the bulk of the Atari's new slimly designed, color-coordinated hardware add-ons. The company's four new computers, the 600XL, 800XL, 1400XL, and 1450XLD will supersede the 400 and current 800, while the fate of the 1200 has not been ascertained. The new computers borrowed their cabinet styling from the 1200, but, hopefully, will inherit none of the bad press that surrounds that machine. (Latest rumor is that the 1200 will disappear from the market to be re-tooled and re-appear as the 1400XL.)

All the new computers from Atari have standard keyboards and most are shipped with 64K standard and Atari Basic on cartridge. The exception is the 600XL, which is shipped with 16K, but is expandable to 64K.

The 1400 and 1450XLD feature built-in modems and speech synthesizers. In addition, the 1450 will be shipped with a dual-density, double-sided drive and the appropriate cabinet slot for adding a second unit.

The new drive will be supported this fall by DOS III, providing 127K per side of storage, in contrast to the 88K currently available from DOS II.

All of Atari's low-end models can be connected to an inexpensive direct connect modem. The 300 baud 1030 modem is not yet available. According to a *Washington Post* article, 100,000 modems are being made by Penril Corporation in Rockville, MD. The four million dollar order, the *Post* speculated, should mean that the consumer can own a 300 baud modem for less than $100.



Atari introduced their latest printer the letter quality 1027, as well as a forty-column thermal printer.

Atari introduced its latest pistol-grip joystick for the 2600 game machine at June's Summer Consumer Electronics Show.

More Peripheral Support

A barrage of peripherals for the Atari Home Computers will be released from now until the first quarter of next year. Most

Alan Alda tried his hand at the new graphics tablet from Atari.

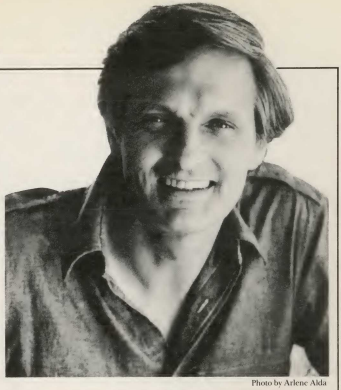


Photo by Arlene Alda

Alan Alda, not content to rest on his UHF residuals from MASH, made his debut at the Summer Consumer Electronics Show plugging Atari equipment for a fee. As the most trusted cynic in America, Alda's behavior probably would have given Hawkeye Pierce an inoperable four-pound gall stone, but then Hawkeye was canceled. Take that, America!

impressive will be Atari's 1027 printer, which will retail for $349.95 and features fully formed characters generated at 20 per second. The best news is that the printer will connect to any Atari Home Computer without the expansion interface.

The built-in voice synthesizers received a lukewarm reception at the Chicago show. The voice module on the 1400 and 1450 translates typed commands into a rough assimilation of phonetics known as English. Atari announced that "future programs" will be able to talk "to" the user.

In fact, quite a number of "future" products were announced that have to undergo some technical refinement before Atari can have them ready for the market. Atari's new trackball controller, a light pen, a graphics tablet, a Z-80 CP/M add-on for business software, and the 300 baud modem were all announced, but are not yet prepared for the market.

Technical Reception

Though the technical reviews are not in yet, it appears that Atari is in for the usual Hair Shirt Award from software developers and technologists alike. None of Atari's computers represented significant advances in state of the art microcomputing. Word is proliferating the technical "Old Boy" network that none of the machines are the technical equal of the former 800. The market truth is that the 800 cost too much to produce and in this microcomputing frontier, where, increasingly, manufacturers appear to be giving away hardware in order to ensure a market share in the future, Atari may have had no choice but to cut its most successful computer model.

The technically-minded in the audience will also bridle at the introduction of the long-awaited dual-density, double-sided disk that still only holds 254K of information. Furthermore, while the price of the new 1450 remained a mystery, the business computer does not appear to be the equal of the Tandy/Radio Shack Model IV with its two disk drives on board.

And, finally, a modem that transmits at 300 baud is not going to set the programming community on its collective rear.

Still, while technologists may find fault, the average consumer may welcome the comfortable line of matching products.

And there are bright spots. Atari's Expansion Box is certain to generate interest among consumers and technologists alike. The box allows all kinds of control cards, peripherals, and extra memory to be linked directly to the computer. The

The new Atari peripherals include a cassette, a dual density disk drive, as well as a Trakball controller and Touch Tablet for graphics.

box contains eight expansion slots, two RS-232 ports, and a bi-directional parallel bus, which means parallel printers and drives may be added. Reliable report has it that one of the controller cards under development will be IBM-compatible.

Educators may be interested in Atari's new learning lab series, which will fit specially designed measuring devices and custom software to an Atari that will calibrate temperature, time, heartbeat, and even detect lies — a package that may be more a source of anguish than amusement in the home or classroom. The first of the modules will be available in September for $89.95.

Software Additions

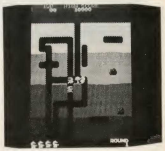
Twenty-eight new games were announced for the 2600 and the 5200, in both the entertainment and educational catagories. The long awaited 16K *Logo* language cartridge and the *Atariwriter* cartridge led the list of introductions for the Atari Home Computers.

The *Logo* cartridge will be available in the fall and together with accompanying manuals will cost $99.95.

Atariwriter features automatic page numbering, global search and replace, a form letter option and control over placing headlines on the page. It also costs $100.

Jungle Hunt, Ms. Pac-Man, Dig Dug, Moon Patrol, and *Battlezone* coin-op hits are all coming up on the 5200 and the 2600. A license between Atari and Walt Disney will bring Donald Duck, Dumbo, and the Sorcerer's Apprentice to the 2600, while a license from Charles Schultz and the United Features Syndicate will bring Snoopy and the Red Baron to the video game arena. Atari has further licensed Miss Piggy from Henson Associates and Road Runner from Warner Brothers. The company will also develop a game based on the 1983 summer release from Columbia Pictures called *Krull*.

Overall, the market is in for some flattening this fall, if early reports from the floor of the Chicago show were correct. Software sales were down from what had been expected and, other than Atari, Inc., new product introductions were minimal. The exception was the Coleco Adam System of peripherals for its video game system. That system will battle for position with the "Graduate" and its peripherals for the Atari 2600 unit.



Three of the many new Atari releases include Tempest *and* Xevious *for the 5200 and* Dig Dig *which will be available for the 5200 and the 2600.*

HELP *HI-RES* ESTABLISH A READER PROFILE.

You know just who you are, but we don't. Help us to serve you better by telling us something about yourself and your system.

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   - ☐ 2600
   - ☐ 5200
   - ☐ 400
   - ☐ 800
   - ☐ 1200XL
2. HOW MANY CARTRIDGES DO YOU OWN FOR THE 2600/5200? _____
3. HOW MANY OF THOSE ARE PUBLISHED BY ATARI? _____
4. DO YOU OWN A DISK DRIVE? _____
5. DO YOU OWN A CASSETTE? _____
6. DO YOU HAVE A FAVORITE GAME FOR THE 2600? _____
7. DO YOU HAVE A FAVORITE GAME FOR THE 400/800? _____
8. MY ATARI IS USED PRIMARILY FOR:
   - ☐ Game Playing
   - ☐ Home Finance
   - ☐ Research
   - ☐ Business Management
9. DO YOU USE YOUR ATARI FOR PROGRAMMING? _____
10. WERE YOU INTRODUCED TO PROGRAMMING IN SCHOOL? _____ AT WHAT LEVEL? _____
11. WHAT IS YOUR AGE?
    - ☐ Under sixteen
    - ☐ 16 to 21
    - ☐ 22 to 28
    - ☐ 29 to 35
    - ☐ 36 to 45
    - ☐ 46 and over
12. WHAT IS YOUR OCCUPATION? _____
13. HOW MUCH DO YOU SPEND ON SOFTWARE IN A YEAR? _____
14. DID YOU PURCHASE YOUR ATARI NEW OR RECEIVE IT AS A GIFT? _____
15. IF YOU'RE A STUDENT, DO YOU HAVE ACCESS TO AN ATARI IN SCHOOL? ____
16. WHAT IS YOUR APPROXIMATE ANNUAL FAMILY INCOME?
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by Daniel V. Horn II

They say when life deals you lemons... make lemonade. Well, just how often can one game player be made into lemonade before he wants to fight back!!!

I've been chewed on by the best: giant mice, alligators, evil slime, and yes, even attacked by a tumbleweed! Well it's time for *Underlemon* to do some of the squeezing, and I have just the plan.

In this column I'll be delving into the hidden world that is never seen by the ordinary game player. We will be discovering tips, hints, bugs, and program "switches" that permeate most, if not all, computer games. We'll call on a number of agents—denizens of deep adventure—in our continuing struggle against low point games or to help us elude some alligator's pallet.

Let me introduce this month's investigator: Colonel Hogan Klink III. He's here to illuminate one of the more difficult programs on the market, Castle Wolfenstein from Muse Software.

The plane bucked and kicked through the low-hanging, moisture laden clouds over Germany. Altogether a bleak night for flying. I was to bail out into the darkness, dropping into the wooded perimeter around the Castle Wolfenstein, a Nazi stronghold and the center of operations for "Rheingold." My assignment was to penetrate the enemy fortress and escape with those plans and my life. In that order.

The drafts played havoc with my chute; I drifted uncontrollably and I had barely touched down and unharnessed when a German patrol surrounded me and marched me into the cavernous interior of the Castle Wolfenstein. So far, the enemy were playing right into my hands. They threw me into a holding tank where I met the weakened, tortured remains of their last victim.

Dan Horn is an Adventure enthusiast. He works at Scott Adams, Inc., where he manages the Technical Division.

Take a look in the chests at the beginning of the adventure and get yourself a German uniform as soon as you can.

He gave me the only help that I'd receive in getting back out alive, a Mauser pistol with a ten-bullet clip.

At the first opportunity I eluded my keepers and set off through the castle. Guards patrolled the corridors regularly, posted in every room. I had only been free moments, when my presence was discovered. I raced down a corridor and waited for an opening. I got off a shot and put it into the nearest guard. That alerted the others. The guard in the other room started into mine. I positioned myself just around a corner and as he came in . . . bang; one less guard to worry about.

After searching the bodies I found grenades and keys. These, and a lot of luck, helped me onto the next floor of the castle but in getting there I discovered a few hints that may help some of you in your escape.

Grenades will blow holes in walls, and you can shoot through these holes. I found this out as I missed a throw at a lone S.S. Officer and hit the wall instead. In most cases the Stormtroopers will need to be blown up with grenades. Keep this in mind when you are getting low.

Shooting a guard in a doorway is a great way of keeping other Nazi guards away. The others won't be able to cross over the body.

One of the most important elements of the game is surprise. Disguise yourself from the guards. Take a look in the chests at the beginning of the adventure and get yourself a German uniform as soon as you can. Beware, the S.S. are not fooled by your uniform.

If you are in uniform, but out of bullets, there is a way of getting a full clip . . . try holding up a guard. Stand in his way, draw your gun when he moves toward you and then search him. Incidentally, you will still have to shoot him, but all's fair in love and war.

Castle Wolfenstein rewards you with promotion if you escape alive. But if you're smart you will go for the plans Operation Rheingold (found in one of the hundred or so chests in the castle) right from the beginning. Every time you exit the castle with the plans, you get a complete promotion to the next rank. But if you don't carry those important plans out, you rise in rank at half speed. Speaking from experience, this castle is too hard to escape. Don't waste your time getting out without those plans!

The one trick that saved me the most time and effort in Castle Wolfenstein is one that should be used, depending on the nature of the player, only in the most desperate circumstance. I speak of a trick that I learned while playing the Apple version of the program. It works the same way on the Atari.

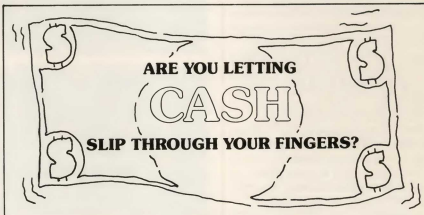
The instant I was caught or shot, I "popped" the disk drive door. The "dead" or "caught" record is not written until after the screen display is shown, and during that instant you can open a disk door. This will leave all pointers set up in the program to the room you just left. When you reboot the game, you'll find yourself in that same room, but you're neither "caught," nor "dead." Cheating? Maybe. But popping the drive saves you all the time required for the program to generate a new castle and for you to wander through it's introduction. There's nothing like a second chance.

One thing I would like to point out is that this process may damage you program disk. Nobody likes the hassle of sending a disk back to the company. Besides the game is designed with a goal that requires a long time to fulfill and you only cheat yourself by defeating the machine.

I'll leave it to you to discover hundreds of other clues to Castle Wolfenstein. The hints here will make the game a little more interesting and give you a firmer idea of how to play the game. Remember, give the S.S. a wide berth . . . they are deadly and are armed with machine guns, not just pistols!

Next month we'll uncover some of the secret "switches" that are becoming more and more common in computer games. Some of the programs we'll look at are "Preppie!," "Caverns of Mars," "Mouskattack," "Super Breakout" and "Sea Dragon." So if you don't know how to activate the switches in these games, I'll see you next month.

P.S. If you find failures and/or features in your programs please feel free to send them in to Hi-Res, and after testing them maybe you can turn the failures into features. If you're caught in some web of programmer deceit—a room without windows or doors, maybe I can help you find the key. Let me know.



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Reviews

Miner 2049er
by Bill Hogue
Big Five Software
Van Nuys, CA
16K Cartridge
400/800/1200
$49.95

by Pat Henderson

Beware all of you arcaders out there in Videoburg! We have a new foe to conquer, and it must be treated with the utmost of caution. This new arcade wonder surpasses the powers of *Pac-Man*, and ascends to greater heights than *Donkey Kong*.

Miner 2049er is the brash new adversary, the latest offering from the indisputable computer arcade champion, Big Five. Bill Hogue, the master mind behind many machine language games for the TRS-80 (*Galaxy Invasion Plus*, *Cosmic Fighter*), remains at the top of his form in his first venture into the Atari market.

Hogue may have borrowed the monster-munching spirit of *Pac-Man*, the girder-climbing aspect of *Donkey Kong*, and the claustrophobic underground of *Dig Dug*, but he's hashed them up, added many new dimensions and created the perfect arcade game.

Imagine, you're "Bounty Bob" trapped deep underground in a futuristic mining shaft. You have to scramble to the surface while dancing over floors of striated girders, turning them into solid structures. The Mutants that guard the shaft are right behind you, so close you can feel their radiation singeing your Levi's. When all seems hopeless, a shovel appears. You grab it, and chase the Mutants to their doom. When you finally crawl your last few steps to the top, completing all the girders, you find yourself transported to another level of the mine shaft. Everywhere you go in *Miner 2049er* you're surrounded by strangers in even stranger surroundings.

Bounty Bob tries to make his way from the bottom level of the mine shaft to the uppermost level, accumulating the highest score possible, with only four short-lived lives. Each level of the mine is divided up into many floors of girders which you must try ever so desperately to transform from stripes into a solid platform. You can get to most of these platforms by running up and down a ladder or taking a slide. Still others seem to free-float and you must leap toward them and hope that you make it.

The only hint I can give is miners don't like martinis. This level is a killer.

As you navigate the girders, you must evade one or more patrolling Mutants that guard each floor. These Mutants are radioactive and, when touched, turn Bounty into a sizzling puddle of *miner de jour*. You can hurdle the Mutants, or if you grab one of the various weapons available in each level, you can destroy them.

The weapons vary in each level of the mine, but they're the usual array of mining paraphernalia: hammers, picks, canteens, goggles, martinis, flowers, and Atari joysticks (martinis, flowers, and Atari joysticks??????). When you grab a weapon, the Mutants turn green with fright, and you can run over them. Caution! After five to ten seconds they soon regain their bravery and turn back to their original state of nastiness. This reminds me of the Power Pills in *Pac-Man*.

After you have transformed all girders from stripes to solids, you progress to the next level of the mine. Beware! As you advance, the nastiness of the Mutants increases and their cowardice decreases. As levels of play increase, the game delivers some new elements. For instance, Level 2 has many slides that can catch you as you run over them and send you plummeting, frightfully but safely, to the bottom of the screen. If you're agile enough, you can jump these slides to ensure your safe passage.

To make the game even more frustrating, you have only a certain amount of time to complete each level. The time varies for each screen. The timer starts at a number like 3500 or 4500 and counts down by increments of 100. When you finish a level, the time remaining is added to your score as a bonus.

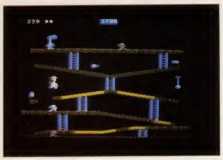
If you're like me, in your first experience with "Bounty Bob" you'll probably play for points. You can rack up a fairly high score, even if you haven't been playing the game for long. The scoring is simple. Each transformation of a girder section is worth five points; the Mutants are worth either 80 or 90 points. The maximum points are obtained by grabbing a weapon for Mutant destruction. Weapons are worth from 100 to 500 by factors of one hundred. If you are going to play for points, go for the weapons and Mutants first.

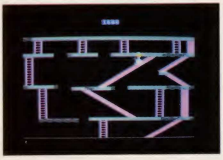
After a while, you'll want to see what each level of the mine shaft looks like. If you play the game cautiously enough and avoid going for foolish unnecessary points, you can advance to the next game level. I have played a game or two where I exhausted all my men on the third level, but I earned over 20,000 points. However, a time or two I have glimpsed Levels 5 and 6 and only accumulated a score of 15,000 to 18,000. So Bounty can be either an adventurer or a greedy point grabber.

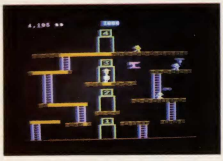
text continues

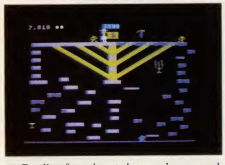
Pat Henderson is a regular contributor to the Hi-Res *review pages.*

For those of you who are disbelievers, Hi-Res *exercised some influence with master craftsman, Bill Hogue, to reveal each of those ten levels of play in* Miner 2049er.









Reading from the top down, column one shows screen levels 1-5, while column two shows screens 6-10.

Photos by Paul Grupp

Photo by Rich Richmond

Bill Hogue, a programmer turned businessman who began his career on the TRS-80 and has successfully made the transition to the booming Atari market.

Bill Hogue started programming on a TRS-80 in 1979, while he still worked for Radio Shack. He still has a beef with them about the computer he bought. "I wasn't allowed to write-up my own sale."

All employees received a ten percent discount on their purchases, but Hogue explained that another salesman had to write your ticket for you. That meant that the other guy took home the commission on the sale.

If Bill couldn't get the commission on the sale, then he didn't want anyone to get it. When he tried writing up his own purchase order, the ticket was nixed by management.

He bought the system anyway and the young programmer/founder of Big Five has never regretted it.

Though he hasn't foresaken his 80, Bill created his latest arcade attraction, *Miner 2049er*, for the Atari. And more programs are to follow. Already in development is something called *Scraper Caper*, the further adventures of "Bounty Bob."

Bounty Bob, the *49er* of arcade fame will break new ground when *Miner 2049er* is introduced on a cartridge for the Atari 5200. To Hogue's knowledge, *Miner* will be the first such 400/800 ROM cartridge translated to the 5200.

"The cartridges (for the 5200 and the 800) are programmed differently," said Hogue, "but we were aware of these differences when we programmed *Miner*."

Bill has come a long way since he dropped his first half-page ad in *80 Micro* for *Super Nova*. Watch for more from Big Five.

As you learn to skate from girder to girder gracefully, and master Mutant annihilation, you'll need a strategy for each level of play. Each level is different from the preceding, and each has its own distinct personality. If you're going to venture into these suicidal caverns, here are some basic playing tips for Levels 1-5.

Level 1: Do anything your instincts tell you to. This is an introductory level.

Level 2: Complete the floors from left to right, and bottom to top. BEWARE of slides! To jump a slide hurl yourself over the "mouth" of the slide. Also, you must slip down the upper most slide to complete this screen.

Level 3: Complete the left side of the screen first, the top second, then the right side, saving the transporter floors for last. Enter Transporter 1 first, go to Transporter 3, then down to Transporter 2. This is the easiest level so far.

Level 4: Climb the tall ladder first and complete this floor clockwise. Don't waste time! Objects hang around this screen in the most strategic places. This is definitely the hardest level up to this point.

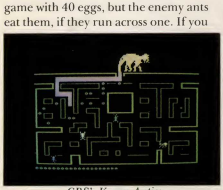
Level 5: The only hint I can give is, miners don't like martinis. This level is a killer!

Miner 2049er is a must for any arcader's collection. It has the makings of a classic. If all goes well for Big Five we might even see Bounty Bob lunch boxes, Bounty Bob pillows, and even Bounty Bob cartoons on Saturday morning. Good-bye *Pac-Man*, step aside *Donkey Kong*, here comes *Miner 2049er*!

K-razy Antiks
K-razy Kritters
By K-Byte Software
CBS Software
Cartridge
Atari 400/800/1200
Price: N/A (Coming down according to CBS)

Run for the hills, everyone! The Antiks are coming! Or so you'd think, when you play *K-razy Antiks* from CBS Software. *K-razy Antiks*, a cartridge-based program, transforms you into a white ant among six anthills.

The object of the game is for you to maneuver your white ant around the twisting tunnels of the hill, while avoiding four enemy ants and the tongue of the killer anteater! As you dodge these dangers, you must avoid a soaking from the torrential rain storms that flood the anthill. To remain alive in the game, you drop white eggs around the hill. These enable you to hatch out a new self when you die. You start the game with 40 eggs, but the enemy ants eat them, if they run across one. If you die with no eggs in the hill, you disappear into ant heaven.



CBS's K-razy Antics

The enemy ants also lay eggs. By snatching one of these and dropping it in front of him, you can destroy him. These are ant traps. Another way of forcing an enemy into the trap is to lure him into the flooding rain or into the tongue of the killer anteater. After you've secured all four ants in the ant trap, you graduate to the next level of play.

The anteater is one of the software's most oral enemies. He sticks his tongue into the top of the anthill and probes the tunnel, until he has satisfied his appetite or he becomes discouraged enough to go home. The flood waters from the rain storm rise from the bottom of the hill and stop at some random point. Guaranteed safety rests in the top tunnel of the hill. Any contact with either the anteater's tongue or the flood waters spells curtains for you and the enemy ants.

K-razy Antiks, is designed to challenge you to increasingly difficult levels of play. Although the game doesn't emphasize point gathering you die-hard arcaders can still stack up a hefty score while enjoying the strategy aspects of this zany fun-fest. *K-razy Antiks* is an original, and a solid addition to any gamer's collection.

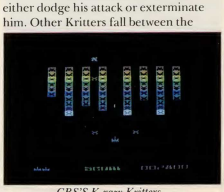
"Star Base One to Star Base Defense... Kritters are now being teleported to attack position. At last count 8 stacks of 10 Kritters were poised for attack. Take care boys and watch out for the free-falling Kritters that sneak attack between each row."

That was the last transmission from Star Base One before I struck out to defend our home base against the Alien Kritters who attack in the Stack Attack formation that is so prevalent in other popular games like Space Invaders, Galaxian, and Galaga.

K-razy Kritters, like Antiks, was written by the people at K-byte Software and are receiving a well-deserved re-exposure from CBS Software who licensed the company's wares last year.

Though similar to so many other games, Kritters still manages a few surprises. For example, no other game has a clean-up crew clear your mess off the screen after you fail to eliminate all of the Alien Kritters. No other game has free-falling Kritters that sneak attack between each stack of regulars. And lastly, no other stack attack game has Supermissiles can which destroy an entire stack of kritters at one blow.

K-razy Kritters also challenges you with an alien kamikaze. When your ship shoots the bottom-most alien Kritter off the stack, he attacks you. You must either dodge his attack or exterminate him. Other Kritters fall between the



CBS'S K-razy Kritters

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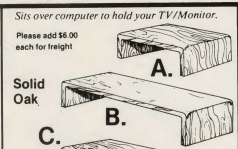

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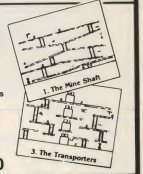

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The high-and-mighty Alien Patrol Kritters appear sporadically to check up on their troops.

stacks and attack you at random intervals. Destroy these or dodge their attack path. The high-and-mighty Alien Patrol Kritters appear sporadically to check up on their troops. They travel from either left to right or vice versa. For each patrol you destroy, Star Base One awards you another ship.

If your ship gets shot out from under you, Star Base One sends out the Sanitation Crew to clean up your mess, outfits you with another vessel and sends you back into battle. Lose all of your ships and you are cast out among the other losers of the Universe.

If all else fails, launch the all powerful "Supermissile" which destroys everything it hits. Star Base One only gives you one per attack wave of Kritters. If you're good enough, and don't have to resort to your Supermissiles, you can accumulate them to use on future levels.

K-razy Kritters is for the arcader who has to get a score in the tens or hundreds of thousands to feel satisfied with a game. After clearing away a wave of Kritters, you do progress to a new level of faster action, but each level is the same as the previous one except for the attack speed. If you liked *Space Invaders*, you'll love K-razy Kritters.

-Pat Henderson

That's nothing. You should see the Atari version!

Jumbo Jet Pilot
Submarine Commander
ROM Cartridge
400/800
Thorn EMI
New York, NY
$49.95 each

by Jim Wooding

Open the truly well-made package (looks about the same size as a Beta VCS tape box, but built strong enough to hold Tonka's elephant!), remove the instructions, turn the cover and read: "This exciting and sophisticated flight simulator offers a real insight into the arts and problems of flying." Read on, my high-flying friends.

After thoroughly reading the instructions (those six-figure salaries of wide-body jet pilots have always appealed to me), I quickly removed the 16K cartridge from its container, plugged it into my 800, fastened my seatbelt and radioed the tower for clearance instructions. (Actually, it was more like instructions to the family for quiet while I took on this new "challenge"!)

Using the keyboard for viewing the landing lights and raising and lowering the undercarriage/landing gear (DON'T push "U" while you're still on the ground!!!), and the joystick for elevator and rudder controls, I began my long-awaited flight.

The screen display reveals an array of instruments and the windshield, through which I can see the runway up ahead. Believe it or not, it took over 12 minutes to reach the runway! There are two left turns to make before reaching the main runway for lift-off. Another 12 minutes of taxiing before the required speed for lift-off! All totaled, 24 minutes had elapsed just sitting during the taxiing. (If you like chess, you'll like this program!)

Well, the jumbo jet is in the air. I can see the horizon in the windshield (nice graphics during banking turns), and the stewardess comes in to tell me coffee is ready! (I'm still trying to figure out how

Jim Wooding will be reviewing software regularly for Hi-Res. *He lives in Santa Maria, California, where he is president of the Lompoc/Santa Maria Atari Users Group.*

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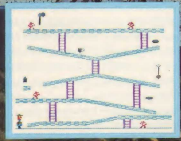
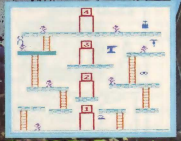
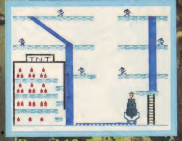
Here are just three of ten rounds in the game:



Round 1: The Mine Shaft. Sharpen your timing a little.



Round 3: The Transporters. Now you're getting it!



Round 10: The Crusher. Shoot yourself to the top!

BIG FIVE SOFTWARE

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To order, see your local dealer. Then ask for "Miner 2049er" then send a check or money order to us for $49.95 plus $2.00 for shipping and handling for immediate shipment. (California residents add 6½% sales tax.)

"Atari," "Apple," and "TRS-80" are trademarks of Atari Inc., Apple Computer, and Tandy Corp., respectively.

I once flew from Los Angeles to Denver in less time than this flight was going to take me!

my wife showed up with my cup at 1500 feet!)

Now for you really avid chess fans, get this. There is very little to do but wait once you get your aircraft trimmed and leveled off. Looking at the map every few minutes I soon realized that this is a "true" simulation program. (I once flew from Los Angeles to Denver in less time than this flight was going to take me!)

After 30 minutes I was barely half way to the other airport. One hour, 28 minutes and 56 seconds later (a clock is nicely displayed above the windshield) with 9/10 of my journey complete and while descending to make my landing approach...CRASH! My descent had been too steep and once again Sir Issac Newton's theory proved true—that whatever goes up must come down.

The only major problems with this program were: 1. Lengthy taxiing (20 minutes plus); 2. To descend, you are instructed to "reduce the throttle setting slightly, then raise the elevators a little ..." I found that even decreasing the engine speed to minimum the plane could still increase altitude by pulling the stick back.

Like Jumbo Jet Pilot, the cartridge container is made like a vault! Opening the box, and taking out the small book of instructions made me actually feel like a World War II submarine commander out at sea opening his secret mission instructions.

And, thus, the mission unfolds: "You are in command of a submarine in the Mediterranean. Your mission: to attack and destroy the enemy convoys scattered over the sea. To help you: a map, sonar, periscope and torpedoes. There's more to it than that, of course. The enemy, for one thing, can hit you with shells and depth charges, so you can also have a full instrument panel to help you creep up undetected."

How true it is! Of the enemy ships which are your goal there are destroyers, tankers, patrol boats, and cargo ships. Some don't attack unless attacked. Others (like destroyers) get enjoyment out of sitting directly over you dropping depth charges while you dive deeper and deeper, trying to escape the cans, only to discover that there is no escape.

This simulation game is truly habit-forming! The challenge is there...stay periscope depth...aim...: "FIRE ONE, FIRE TWO"! From across the room comes confirmation, "Aye, aye, Captain. Torpedoes one and two away!"

Then you wait. If your aim was good, you'll see the hit and watch the enemy ship sink. In the higher levels of play (there are nine in all), it may take more than one direct hit to sink a ship. A crash dive may be in order, as often, once your torpedo has been detected, the shelling begins. Through the periscope you can see the gunblasts, and, moments later, the whine of the cans as they fly through the air and explode in the water. Take enough hits and your sub can sink. There is always plenty to do in Submarine Commander. The instrument panel consists of a compass, depth gauge, damage indicators (indicating hits taken), clock, tonnage sunk recorder, air supply, torpedo supply, fuel supply, battery charge reading, speed reading, (in knots), attitude indicators (horizontal and vertical), a clock (mission time since beginning of game).

In the center (is there room enough? YES! Graphics are excellent!) is a tri-purpose area. You have your choice through keyboard inputs to select a map of your mission area (the Mediterranean Sea), showing your position and the enemy convoys, sonar. The sonar is equipped with a hydrophone chart that reacts to the enemy ships' engines long before the sonar begins to pick them up. Your periscope has a one mile range.

Unlike some other simulation programs this one is very realistic and gives you the sensation that you are really diving; really firing torpedoes; really being fired upon with depth charges. The screen display shakes with each hit and a realistic explosive sound

convinces you that your sub is under attack! Submarine Commander is fast-paced enough to keep you on your toes during each engagement.

The only complaint I've heard is the time it takes to move across the Mediterranean to catch up with a convoy (surface speed is much faster and allows for repairs, oxygen replenishment, and battery charge). My reply is, "show me another way you can cross the Mediterranean Sea in only 5 minutes!"

If there is a weakness to this fantastic game, it is only this length of time required to maneuver your submarine to one of the enemy convoys!

If under attack, you have the opportunity to crash-dive (push "C" on the keyboard) in hopes of escaping. (Watching the display in the center-right of the screen allows you to keep from crashing.) Once safe, a quick return to periscope depth can be accomplished by blowing your ballast (push "B" on the keyboard).

Speed is selectable, from standing still to nine knots (20 knots when surfaced), and if dinner is ready and you have to leave the bridge, you can either "pause" the game or "abort" the mission altogether. A rating is given if aborted as well as if completed.

There is no question about Submarine Commander. It is the underwater Star Raiders!

Spell Wizard
32K Disk
Dictionary Disk
Datasoft, Inc.
Chatsworth, CA
$79.95

Writers are supposed to be notorious misspellers. In my case, I can spell well, but my fingers don't always find the keys I want. Now, the good folks at Datasoft have come to the rescue with *Spell Wizard*. This is a spelling checker program with a dictionary of over 33,000 words. And, if that isn't enough, you have the option of preparing your own dictionary of terms.

Spell Wizard can run on a one- or two-disk drive system. The software is easy to use in either configuration. Datasoft provides a program disk and the dictionary disk. The user dictionary is stored on a third diskette that you provide.

Place the program disk into drive 1, turn the computer on and a menu appears on the screen. Using the Option key, you can choose whether to Proof a Document, Print Dictionary, Search Dictionary, or to Exit *Spell Wizard*. Pressing Start begins execution.

Print Dictionary will print all or part of the *Spell Wizard* dictionary on your printer. Search Dictionary allows the user to look for a particular word or a range of words within the dictionary. A useful function, if you're not sure how a word should be spelled.

When executing Proof, the program will ask you to name the file to be checked and load it into memory. As it is being read into memory, *Spell Wizard* checks the number of words in the file and the number of unique words the file contains. Words like "it" and "the" are only counted once as unique words. The unique words are checked against the dictionary. On-screen counters tell you how many words are in the file and how many unique words there are. A third counter tells how many words are checked in the dictionary.

After *Spell Wizard* checks its dictionary, you are given the opportunity to check a dictionary of your own. The Wizard tells you if there are errors.

If there are flagged errors, you have the opportunity to correct the spelling or to accept the word as it's spelled. You can check the dictionary spelling of any words in question and correct them if necessary. All corrected words can be changed simultaneously. After that you can add words to a dictionary of your own.

Here's a slick feature of *Spell Wizard*: After proofing a document, you can use the Exit Spell Wizard option. *Spell Wizard* will then ask that the word processor disk be placed in drive 1. Pressing the return key loads the word processor. Neat.

Thirty-three thousand words is a lot. I don't quite understand, though, why the dictionary contains "disk" and "diskette," but does not contain "cassette." The dictionary also has "applique" and "application," but not "apply." I suggest, too, that Datasoft create a special dictionary of state names and abbreviations, and major cities for secretaries and other folks who write letters.

The *Spell Wizard* manual can be improved, too. Perhaps Datasoft should create a sample text file that steps you through *Spell Wizard's* features.

Nitpicking aside, *Spell Wizard* is a much-needed software package and works quite well. *Spell Wizard* will not only check text created by *Text Wizard*, another fine Datasoft product, it will check any text file created under Atari DOS 2.0. That means that you can use it with the Atari Word Processor, *MEDIT* (from the Atari Program Exchange), or any other text processor, except *Letter Perfect*. *Spell Wizard* is well worth the $79.95 price tag for anyone doing a lot of writing on their Atari Home Computer.

Steve Harding

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Strolling Forth

Hi-Res has asked Steve Maguire and Evan Rosen, creators of Valforth, to talk to you about a language they believe heralds the future of programming.

We'll caution you. The column may be too advanced for some, but in the interests of expanding the readerships' knowledge of programming, Hi-Res presents the following. Your comments will be welcomed by the editors and by Rosen and Maguire.

Critics of Forth, ourselves included, are quick to point out that for all its talent, the language is not yet fully housebroken. For instance, Reverse Polish Notation (RPN) used by Forth can produce disturbing phrases like: X Y Z / +, which is not unlike saying, "The rat the cat I bought caught escaped."

Both phrases will "work," but they are easier on machines than humans.

In Basic the first expression would be: X+Y/Z. (The second expression is already correct English.)

And the "troubles" with Forth don't end there. Because of the way Forth currently uses its stack to pass parameters, programmers have to train themselves to picture a sequence before operations may occur. This can be serious nuisance.

Well, why Forth at all, then? We'll give you two convincing reasons right here, though there are many more.

In Atari Basic, the program

```
100 FOR X = 1 TO 30000 : NEXT X
```

runs in just about 64 seconds. In Valforth the equivalent program

```
: TEST 30000 0 DO LOOP ;
```

runs in 3.2 seconds.

Another reason why you might like Forth is that it is extensible. This means that you can invent new kinds of data structures or other, stranger animals as your program. For example, if you wanted a lookup table structure in your program, you could put one in as simply as this:

```
: LOOKUP <BUILDS DOES> SWAP 1 - 2* + ;
```

No fooling. Now, the command LOOKUP is not the table itself. LOOKUP *creates* lookup tables roughly the same way that DIM in Basic defines arrays. To use LOOKUP to define a table of, say, days in each month, we would do:

```
LOOKUP MONTH-TO-DAYS
31 , 28 , 31 , 30 , 31 , 30 ,
31 , 31 , 30 , 31 , 30 , 31 ,
```

Then, by saying, for example, 6 MONTH-TO-DAYS, the number 30, for 30 days in June, would be left on the stack. Any number of other lookup tables could also be generated by LOOKUP. This kind of flexibility is hard to beat. As a matter of fact, we have used this same extensibility in-house to produce a very nice solution to the stack manipulation problem, without sacrificing speed. We hope to release it in a few months.

Varieties of Forth

Which Forth? Virtually all Forths available for the Atari are based on the FIG (Forth Interest Group) model for 6502 by William Ragsdale, so there is relatively good code compatibility. There are currently about a half-dozen Forths for the 400/800's. In approximate chronological order of appearance, they are: Coin-op Forth, a sort of in-house version at Atari; Sunnyvale Forth, a public-domain version from a users group there (?); QS Forth, from Quality Software; PNS Forth from Pink Noise Studios; APX Forth, from Atari; Ataforth, (sorry, not sure whose); and Valforth, from Valpar International. We wrote and use Valforth, though the programs appearing in this column will generally run without much prodding on any of these systems.

For the newcomer, the best introductory Forth book is *Starting Forth*, by Brodie, though for some reason the book is not based on the most common dialect of Forth, FIG-Forth. If you already have the book and would like the translation key to FIG-Forth, you can send a stamped, self-addressed envelope to: Starting Forth notes, Valpar International, 3801 E. 34th Street, Tucson, AZ 85716. We'll send you a free copy of the key. (We'll sell you the book, too, if you like.)

In the coming months we'll give you what you seem to want most: novelty, simplicity, and utility. We also hope to hear from you by mail with your questions and comments.

Dr. Quatro will be fielding technical questions as space allows. Here's the Doctor now...

Hello Users, my name is Quatro. Since you haven't written me with any of your questions yet I'll make some up. But next month I want real mail, do you hear?

Good, Now, here is our first letter.

Continue to 68

Evan Rosen and Steve Maguire are the creators of Valforth by Valpar Int. They live and work in Tucson, Arizona and will be contributing a monthly column to Hi-Res *on Forth.*

Advanced User Forum

by Russ Wetmore

Let me tell you a little about this series of columns. As you can tell by the title, I would like to cater to the more advanced Atari 400/800/1200 owner—someone who is very good with Basic and perhaps has dabbled a little in Assembly language. I will describe programming techniques and offer routines that you can use either as part of your own programs, or as tools to help you in their creation. Within a few months, I hope to begin a major project—writing a complete arcade game, with emphasis not so much on the game itself but rather on how it's created.

Programming is a highly individual process. I've been writing for microcomputers since the days of the classic TRS-80 Model I (4K Palo Alto Tiny Basic, NO SOFTWARE) and over the years have developed my own personal style and approach to solving programming problems. I will try to share some of what I have learned, but by no means do I believe that my way is the only way to do things. Give 100 programmers a problem to solve, and you'll get 100 solutions. Some solutions will be more elegant, some faster and shorter than others, but all solutions nonetheless. Take what I say with a grain of salt and as an open challenge to improve on it if you can.

Secondly, for both the advanced and not-so-advanced users, I'd like to solicit technical questions on programming and on Atari home computers in general. I'll try to answer as many as I can each issue, perhaps *Hi-Res* will need a separate column for these. In many cases, the same problem you're mulling over is being "mulled" by hundreds of other programmers the same time. Your questions will also help me determine the direction of this column. Please send all correspondence to my attention at the address listed in the front of the magazine.

Give 100 programmers a problem to solve, and you'll get 100 solutions.

Lastly, I'll be reviewing products, old and new, specifically written with software development in mind. (Or even some products that you can use in your programming that aren't meant to be used that way, such as *Micropainter*.)

This is a good place to start. Since an Assembly language programmer's most important tool is his assembler, I'll devote the rest of this first column to a review of the major assemblers currently on the market, along with my personal rating of each.

Assemblers Reviewed

ATARI Macro Assembler (AMAC)	Atari
ATARI Assembler/ Editor Cartridge	Atari
SYNASSEM	Synapse
MAC/65	OSS
MAE	Eastern House
ATMASD	Elcomp (Hofacker)

Speed

SYNASSEM, without a doubt, is the fastest of the lot, with *MAC/65* coming in a close second. There are two reasons for their speed: their use of "tokens" and their assembly from memory. What are tokens? Well, let's say you write a program that has 500 LDA instructions in it. Using an assembler without tokens, means that your program must count off the three letters of the instruction 500 times, determine they mean "LDA" 500 times, and then make a decision about how to interpret the instruction—500 times. It makes sense to have the editor substitute a code for the LDA, a "token," which, upon assembly, the program uses directly to determine how to handle the LDA.

Also, both *SYNASSEM* and *MAC/65* can assemble from source programs already stored in memory, as opposed to a disk-based file system, like Atari's *Macro Assembler* (AMAC).

The brunt of many jokes regarding its speed, the Atari *Assembler/Editor* cartridge can boast being absolutely the slowest assembler on the face of the planet. You can attribute its lack of speed to its use of floating point numbers. (Try typing in 1E2 for a line number — it works!)

Human Engineering

I can't tolerate any program that doesn't take the end user's level of competence into account. Almost as much time should be spent on how a program will interface with its user as on the actual program itself. To this end, I think *AMAC* is the easiest to use, even taking its extreme power and flexibility into account. There are no line numbers to worry about and the editor portion has true full-screen scrolling with easy to remember command abbreviations for text manipulation. The documentation is excellent and, in most cases, easy to follow.

Most of the other assemblers follow fairly standard editor and assembler conventions with a few exceptions. MAE uses very strange mnemonics for their pseudo-opcodes. For easy decoding,

(See chart p. 30) Continue to 37

Russ Wetmore, author of Preppie! I, Preppie! II *and* Atari Sea Dragon, *lives and works in Casselberry, Florida. He has received a number of programming accolades.* Video Review *magazine recently named* Preppie! I *the best computer game of 1982. Currently, Russ heads his own software firm, Star Systems Software, Inc.*

	Documentation	Editor ease of use	Assembly speed	Macros	Human Engineering	Listing facility	Diagnostics (Error handling)	Cross-reference	Debugger	Type of Editor Line, Screen	Media format Disk, tape, Cartridge	Assembles from Disk, Memory	Price	Published by:
Atari Macro Assembler (AMAC)	10	10	6	8	10	10	6	8	N/A	S	D	D	$89.95	Atari, Inc. Sunnyvale, CA 94086
Atari Assembler/Editor Cartridge	10	6	1	N/A	6	5	8	4	6	L	C	D, M	$59.95	Atari, Inc. Sunnyvale, CA 94086
SYNASSEM	5	6	10	N/A	6	2	8	5	6	L	D, C	D, M	$49.95	Synapse Software 5221 Central Ave. Richmond, CA 94804
MAE	4	4	6	4	5	5	5	6	5	L	D (T)	D, M	$99.95	Eastern House Software 3239 Linda Dr. Winston-Salem, NC 27106
MAC/65	8	6	10	5	6	6	8	4	10	L	D	D, M	$80.00	Optimized Systems Software, Inc. 10379 Lansdale Ave. Cupertino, CA 95014
ATMASD	1	1	6	7	1	4	5	4	2	S	D, C (T)	M	$89.00	Elcomp Publishing, Inc. 53 Redrock Lane Pomona, CA 91766

The above are my personal ratings for assembler features. One is a low rating, 10 a high.

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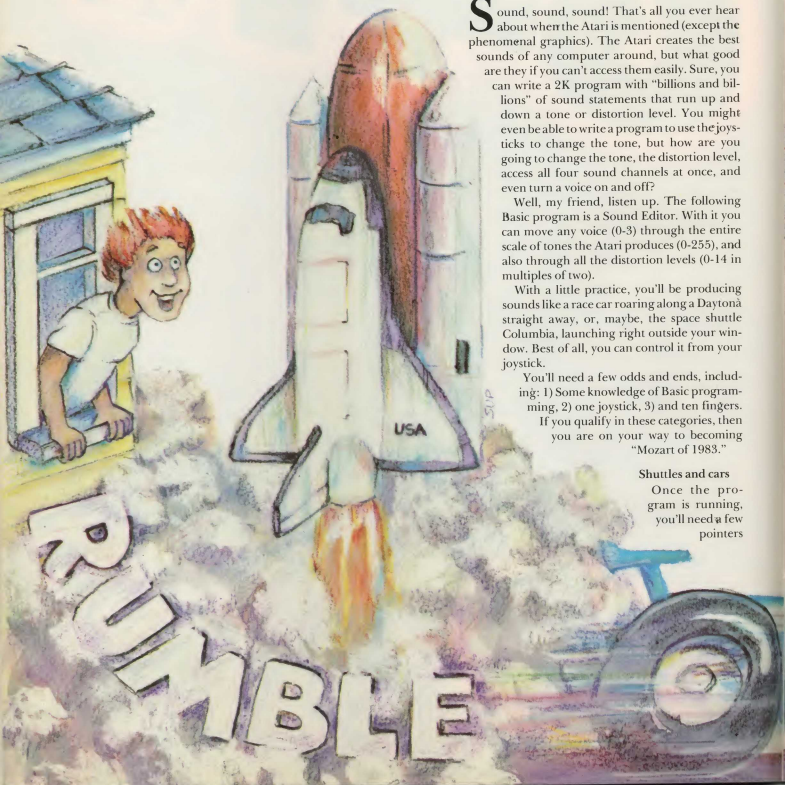
ZOUNDS!

by Pat Henderson



Sound, sound, sound! That's all you ever hear about when the Atari is mentioned (except the phenomenal graphics). The Atari creates the best sounds of any computer around, but what good are they if you can't access them easily. Sure, you can write a 2K program with "billions and billions" of sound statements that run up and down a tone or distortion level. You might even be able to write a program to use the joysticks to change the tone, but how are you going to change the tone, the distortion level, access all four sound channels at once, and even turn a voice on and off?

Well, my friend, listen up. The following Basic program is a Sound Editor. With it you can move any voice (0-3) through the entire scale of tones the Atari produces (0-255), and also through all the distortion levels (0-14 in multiples of two).

With a little practice, you'll be producing sounds like a race car roaring along a Daytona straight away, or, maybe, the space shuttle Columbia, launching right outside your window. Best of all, you can control it from your joystick.

You'll need a few odds and ends, including: 1) Some knowledge of Basic programming, 2) one joystick, 3) and ten fingers. If you qualify in these categories, then you are on your way to becoming "Mozart of 1983."

Shuttles and cars

Once the program is running, you'll need a few pointers

SOUNDS!

before you can use it effectively. The colorful numerals that float around the screen are roving reminders of the tone and distortion effects on each voice number (0-3). (I'll call these voice/numbers hereafter.) The tones are represented horizontally, the distortion vertically.

The active voice/number on screen will appear to roll in color. To change from this voice to another, press the trigger on your joystick. To shut that voice off, press the spacebar. Press it again to turn the voice back on. If you want to change the tone, move the joystick left or right. Moving it right will cause the tones to fall lower and lower; moving it to the left will cause the tones to increase in pitch. Moving the joystick up and down changes the distortion level. By moving it up, the distortion decreases; move it down, and the distortion increases. Any distortion level greater than 14 is the same as the distortion level minus 14 or a multiple of 14. In other words let's say the program indicates you have a distortion level of 22; you actually have a distortion of 8 because 22-14 = 8. The bottom of the screen shows a table that tells you what voice is outputting what tone and distortion.

As you are typing the program consult Table 1 for a full line description. This will help you to write your own program.

Line Description

1	Dimensions 6 arrays to hold values for each voice.
2	Puts you in Graphics Mode 0 and turns the screen black. It also turns the cursor off and clears the keyboard scan.
3	This line tells the computer where to find the graphics for the voice/numbers. This is done using player/missile graphics.
4	This line zeros the memory to be used for player/missile graphics.
5	This line stores the values for the colors of all the voice numbers. Fourteen = White, 132 = Blue, 196 = Green and 64 = Red.
6	These are the values where the voices start.
7	This puts the word Voice on the bottom of the screen and puts the colors into memory and puts the voice/numbers on the screen.
9	This draws the voice/numbers on the screen.
10-13	Data for the voice/number graphics.
15	Starts with voice/number 0.
16	Scans keyboard for space bar.
18	If space bar was hit and sound was on, turns sound off.
19	If space bar was hit and sound was off, turns sound on.
20	Updates the sound to current values, if sound is supposed to be on.
21	Moves the voice/number and scan joystick for position. If the joystick was not moved it jumps to "Rolling Colors Routine" (lines 52-56).
22	Jumps to "Variable Update Routine" (lines 49-51).
24	Changes color back to correct one; checks for pressed button. If pressed, goes to next voice/number.
25	Checks joystick again.
26	If joystick is to the left, changes horizontal and tone variables.
27	If joystick is to the right, changes horizontal and tone variables.
28	If joystick is up, jumps to "Up Routine" (lines 35-41).
29	If joystick is down, jumps to "Down Routine" (lines 42-48).
30-33	Checks for upper and lower limits on variables.
34	Loops back to line 15 and starts over.
35-41	Moves voice/number up 3 lines and decrements distortion.
42-48	Moves voice/number down 3 lines and increments distortion.
49-51	Changes variables on the bottom of the screen.
52-56	Rolls colors through the current voice/number.

Table 1: A line description of the Sound Editor program.

The race car effect

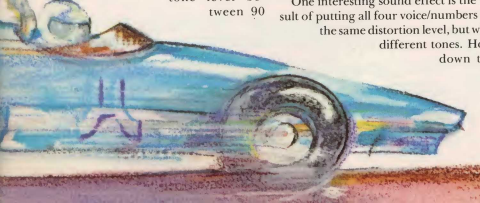
To start using this program, try these few examples and experiments. You can create a race car sound effect by moving one voice/number to distortion level 6 and putting the tone level between 90 and 130. Try putting more than one voice in this area to get a muffled car sound, or even multiple race cars. By putting one voice/number on tone 0 and distortion 10, you can create a shuttle blast-off. Move the voice/number up the tones, and it sounds like the shuttle is actually launching outside your room.

One interesting sound effect is the result of putting all four voice/numbers on the same distortion level, but with different tones. Hold down the button and the space bar while pressing the joystick to the right or left. A strange mixture of sounds emerges.

Also, if you put certain voice/numbers in different places on the screen, but have them turned off, you create different sounds in other voices. This is a strange but useful feature that can add new dimension to your own programs.

If you want to crank the volume up, change the SOUND I,S(I),D(I),15. This last number can't exceed 15 or the result is an error on that line. Keep experimenting and soon you'll be creating your own original sound effects.

See listing page 35



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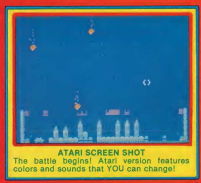

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```
0 REM (c)1983 Hi-Res Magazine
1 DIM FLAG(4),C(4),Y(4),S(4),D(4),X(4)
2 GRAPHICS 0:POKE 710,0:POKE 764,255:P
OKE 755,0
3 A=PEEK(106)-8:POKE 54279,A:BASE=256*
A:POKE 559,46:POKE 53277,3
4 FOR I=BASE+512 TO BASE+1023:POKE I,0
:NEXT I
5 C(0)=14:C(1)=132:C(2)=196:C(3)=64
6 FOR J=0 TO 3:X(J)=61:D(J)=0:S(J)=0:Y
(J)=16:FLAG(J)=0:I=J:GOSUB 49:NEXT J
7 FOR J=0 TO 3:POSITION 2,19+J:PRINT "
Voice=";J;:POKE 704+J,C(J):POKE 53248+
J,X(J):NEXT J
9 FOR J=0 TO 3:FOR I=BASE+512+(J*128)+
Y(J) TO BASE+519+(J*128)+Y(J):READ A:P
OKE I,A:NEXT I:NEXT J
10 DATA 126,195,199,219,227,195,255,12
6
11 DATA 60,124,252,60,60,255,255,255
12 DATA 126,199,15,60,224,255,255,255
13 DATA 255,7,28,7,7,255,255,255
14 I=0
15 C=PEEK(764):IF C  33 THEN POKE 764,
255:GOTO 20
17 POKE 764,255:IF FLAG(I)=0 THEN POSI
TION 29,19+I:PRINT "Sound=OFF";:FLAG(I
)=1:SOUND I,S(I),D(I),0:GOTO 21
18 POKE 764,255:IF FLAG(I)=1 THEN POSI
TION 29,19+I:PRINT "Sound=ON";:FLAG(I)
=0
20 IF FLAG(I)  1 THEN SOUND I,S(I),D(I
),10
21 POKE 53248+I,X(I):A=PEEK(632):IF A=
15 THEN COL=C(I):GOSUB 52
22 GOSUB 49
24 POKE 710+I,C(I):IF PEEK(644)=0 THEN
25 A=PEEK(632)
26 IF A=11 THEN X(I)=X(I)-1:S(I)=S(I)-
2:GOTO 30
27 IF A=7 THEN X(I)=X(I)+1:S(I)=S(I)+2
:GOTO 30
28 IF A=14 THEN GOSUB 35
29 IF A=13 THEN GOSUB 42
30 IF X(I) 61 THEN X(I)=61
31 IF S(I) 0 THEN S(I)=0
32 IF X(I) 189 THEN X(I)=189
33 IF S(I) 253 THEN S(I)=253
34 GOTO 15
35 IF Y(I)-3 =16 THEN 37
36 GOTO 30
37 FOR J=1 TO 12
38 POKE BASE+509+(I*128)+Y(I),PEEK(512
+BASE+(I*128)+Y(I)+J)
39 NEXT J:Y(I)=Y(I)-3
40 D(I)=D(I)-2
41 GOSUB 49:GOTO 30
42 IF Y(I)+3 =82 THEN 44
43 GOTO 30
44 FOR J=12 TO 0 STEP -1
45 POKE BASE+512+(I*128)+Y(I)+J,PEEK(5
09+BASE+(I*128)+Y(I)+J)
46 NEXT J:Y(I)=Y(I)+3
47 D(I)=D(I)+2
48 GOSUB 49:GOTO 30
49 POSITION 11,19+I:PRINT "Tone=";S(I)
;" ";
50 POSITION 20,19+I:PRINT "Dist=";D(I)
;" ";
51 RETURN
52 IF (PEEK(632)  15 OR PEEK(644)  1)
THEN RETURN
53 COL=COL+1:IF COL 255 THEN COL=0
54 POKE 704+I,COL
55 C=PEEK(764):IF C  255 THEN 15
56 GOTO 52
```

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.R S E  PASCAL.
.O K R B T  I.
.M E W A I B  S.
.  T ASSEMBLER T.
.BIT R I E I  .
.  E E C R POKE .
. . . . . .
```

MOSAIC 64K RAM SELECT™*

The Mosaic 64K RAM Select is a RAM board with flexible memory configuration abilities built in. Alone in the Atari 400 or 800, the 64K Select will have 48K hard wired with 4 banks of 4K RAM accessed above the normal RAM limit. This means machine language programs such as Visicalc or Word Processors will have 52K of continuous RAM. 30% more room for work. Quite a boost.

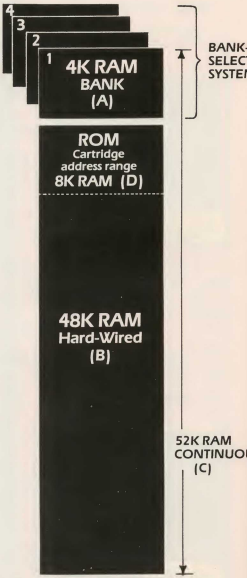
With the basic cartridge installed, 40K RAM is available plus 4 banks of 4K RAM that remains invisible to the cartridge. Now functions difficult or impossible before are available. Advanced programmers can use these banks for player/missile data, character set data, utilities of all kinds, and/or wedges and more. For example, Micros DOS program normally taking up all of page 6 and part of page 1 will fit into one bank and still have 62+ pages to spare. It means a large range of programming helps can be stored and instantly available and completely safe from cassette, disk or basic demands on RAM. Now load utilities once. No need to erase a program to format a disk ever again. Disk copies are much quicker, too.

Now store data in the Select's memory banks and pass it to related programs instantly. A true advantage for chained programs (no more time-consuming cross-indexing line numbers), Adventures (a lot of data required) and application programs (which requires the same data for different processes), page flipping (now so easy) and other tricks. Plus the new double density disk drives, which require much more memory for their DOS, can be used more effectively.

Atari 400/800 owners, the Mosaic 64K RAM Select gives you more than you ever thought possible from a memory board, more than you thought possible from your Atari computer. But for the 800 owners, it doesn't stop there. 800 owners can emulate the Atari 1200 memory to run 1200 software, with the possible exception of special key functions. The Select is also compatible with the Atari 16K boards and Mosaic 32K boards. This means, for example, if you have three 16K Atari boards and use the Mosaic Adapter with the Mosaic 64K Select, you'll have not only 64K RAM…but 112K RAM. INCREDIBLE! Use three Mosaic 64K RAM Select's together and you'll have 192K RAM! Unbeatable.

The Mosaic 64K RAM Select is the most advanced memory system available for the Atari 400/800 computers. Highest quality components, crystal clear display, superior benchmark design. Mosaic Electronics doesn't settle for less, because serious Atari owners won't either.

Increasing your computer's memory capacity is like adding space to a gymnasium. With more space comes more activities and better use. But the 64K Select does more than simply increase the RAM space of your computer.



MOSAIC PERFORMANCE POINTS:

1. Unlimited software applications.
2. No solder installation.
3. Powerful, most memory available.
4. No chip sockets for better reliability.
5. Versatile — multiple memory configurations.
6. Compatible with 8K and 16K ROM cartridges.
7. Low power design. Less power and heat than Atari 16K RAM.
8. Can emulate Atari 1200 Memory. 1200 software.
9. Test cycled 24 hours to insure reliability.
10. Larger work space for disc software (i.e., Visicalc, Word Processor, etc.)
11. Four year warranty.
12. Allows 400 owners to run disc drives more effectively.
13. Very low cost per byte.
14. Allows more powerful graphic manipulations.
15. Complete users guide.
16. Membership in the "Select" club.
17. Powerful program library.
18. Disc emulation software available for super fast loads and saves.
19. Tool kit software available — never type DOS again (format, directory and much more).
20. All Mosaic 64K software maintains 48K RAM for program space.
21. Allows for up to 192K RAM in Atari 800.
22. Can be used with Atari 16K's and Mosaic 32K's.
23. Gold edge connectors.

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I can' tolerate any program that doesn't take the end user's level of competence into account.

Continued from 29

Eastern House limited all mnemonics to three letters, pseudo-opcodes starting with a period. This means that you have to express what a pseudo-op is in two letters, which many times doesn't accurately describe its function. (.DI means "designate internal" label, which is just an equal sign on most other assemblers.)

The booby prize for human engineering goes, hands down, to *ATMASD* from Elcomp. The editor uses weird key combinations that don't make any sense. The backspace key doesn't work! You have to type Control-H to wipe out a character. You can't use the arrow keys to manipulate the cursor, and the tab is a Control-I instead of the tab key. The documentation comes in a book that includes instructions for Elcomp's entire program line. Part of the docs are poorly typeset, part are printed on a daisy-wheel, and you need a magnifying glass to see any of it. The actual assembler is not that bad, but you can't see the forest for the trees.

Debugging Capabilities

All of the mentioned assemblers come with debugging monitors, except for *AMAC*. (A separate debug package, *Dunion's Debugging Tool*, specifically designed for use with *AMAC*, is available from APX.)

A good monitor is essential in an assembly language program's development, to help track down the hundreds of bugs that creep into one's code. The Atari cartridge is handy for quick debugging, even if you don't use the assembler. My personal favorite is *BUG/65* which comes with the *MAC/65* package.

Again, Elcomp's *ATMASD* loses in this category, their poorly designed monitor has limited uses. (No tracing or single-stepping, limited I/O and no assembler for "touching-up" code.)

Macros

All the above assemblers have macros, except the Atari cartridge and *SYNASSEM*. Macros offer you a convenient way of representing frequently used instruction sequences, and, taken to extremes, can even be used to define instructions approaching higher level languages. *AMAC* and *ATMASD* are about are about equal in power, with *MAE* being the hardest to use.

Editor

Almost as important as the assembler is the editor, which is, after all, where you spend most of your time. Again, *AMAC* is best. If you have worked with the Atari Assembler Cartridge, you should feel comfortable with *MAC/65* and *SYNASSEM*. Their line-oriented editors are based on the cartridge format.

ATMASD is abysmal; and *TED*, the editor that comes with *MAE*, has about three times as many commands as I can personally remember. *TED* is line-oriented also.

Esoterics

Some miscellaneous points. *SYNASSEM* has no true listing capability. There is no paging or titling,

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by Tim McGuinness

Welcome! Welcome to Hi-Res, and to my first column. We'll meet here in each issue to open a new world in computer graphics. Generally, I'll cover various aspects of creating graphics in your Basic programs. I'll take some space to review utilities and tools that can simplify many of the difficult jobs when you create screen images. In addition the column will deal with exceptional games which break new ground in graphic displays.

Some Basic Commands

Atari Basic, unlike other Basics, offers a wide range of commands to make its graphics relatively easy to use. The first of these commands is the Setcolor. This command in a Basic statement allows you to select one of the 256 available colors. It's used in combination with a color register numeral. There are five of these registers available in Basic, and depending upon which Graphic Mode the system is in, it is possible to use from two to five registers to color objects on the screen.

Before we go on, let's look at a Color Register. A color register tells the Atari in which part of the screen or "playfield" the color you selected is to be put.

Tim McGuinness has a number of magazine articles to his credit. He'll be writing a graphics column each month for Hi-Res. *He lives in Milpitas, California and is the director of software development at Romox, Inc.*

Let's try something. When the system is first turned on with the Basic cartridge installed, the display is in the Atari Graphics Mode 0. In Mode 0, two color registers are available for use in the playfield, and one for the border. The background is blue, the letters are light-blue and the border black. In Atari Basic, type the following program.

```
10 FOR I = 0 to 255:SETCOLOR 2,
I/16,I-I/16:NEXT I
```

Type RUN. The program is changing the background color, while leaving the letters and borders unchanged. Note also, that you used the Setcolor command.

Now we will change the program to cycle or rotate the colors of the letters displayed on the screen. Change the Setcolor command to the following: SETCOLOR 1,I/16,I-I/16. Type RUN, and observe the new program. This time we changed the color of the letters. However, because of the way the Atari uses Mode 0, we only saw the letters change in brightness.

Try one more variation using the border. First, press the System Reset key to return the screen to normal. Now re-type the above program, changing the Setcolor command to the following: SETCOLOR 4,I/16,I-I/16. This will rotate the colors of the border. As you see, the color register number selects that area of the screen that the Setcolor command is to change. Here we used

Continue to 38

A color register tells the Atari in which part of the screen or "playfield" the color you selected is to be put.

registers 1,2, and 4; but in other Modes we could use all five (0 through 4).

In the above program we used two other features of the Setcolor command, color hue and color luminance. These were indicated by I/16 and I-I/16. As stated, the Atari has 256 colors available. However, when using the Setcolor command, we first have to divide these 256 into 16 hues and 15 luminances, that is, 0 through 15 hues, and 0 through 14 luminances. Type the following to change only the hue of the background:

```
10 FOR I=0 TO 15:SETCOLOR 2,I,8:
FOR J=1TO100:NEXT J:NEXT I
```

Here the "I" in the Setcolor command changes only the hue. The "I" is replaced by number from 0 to 15. To change only the luminance, change the command to the following: SETCOLOR 2,8,I. Note the FOR J/NEXT part of the program just adds a delay. To find what registers are available for any given Graphics Mode, refer to the chart below.

The Graphic Mode

I've been talking about Atari's Graphic Modes since the start of the column; it's time I explained them. The Graphics Mode defines what kind of screen we wish to use, that is, a character screen, a large character multi-colored screen, a point-plotting screen, etc. The mode number controls the screen display. In the above chart, we listed the Setcolor command for each mode; now let's look at each mode. The format for this command is as follows:

```
5 GRAPHICS 4
   or
5 GRAPHICS 4+16
```

Mode 0 (zero) is the standard default mode. That is, when the system is turned on, Mode 0 is set. This mode is a text mode, and can display 24 lines of 40 characters each on the screen. Its default colors are shown in the above chart.

Mode 1 is a split-screen text mode. If you enter the command GRAPHICS 1, the computer displays a small strip at the bottom which is actually a Mode 0 area. The Mode 1 area with a black background is above. This Mode 0 area is called a text window; it's used to type commands. You'll find this window in a number of Graphics Modes, since many modes require special commands or formats in order to enter data into the region above the window.

If you want to eliminate the window, add the value 16 to the number following the Graphics command. GRAPHICS 1+16 or GRAPHICS 17 displays only Mode 1 on the screen. In this mode, the system can display characters in any of four colors, with 20 lines, of 20 characters each.

Mode 2 is also a text mode that displays up to four colors of text. In this mode the size of the characters is larger, so fewer fit on the screen. In Mode 2 you can display only 10 lines of 20 characters. The text window appears in this mode as well.

Mode 3 is the first of the true graphics or plot modes. Like Modes 1 and 2, Mode 3 has the text window, but in the area above, instead of characters, you can plot points or draw lines using graphics pixels. Each pixel in this mode is large. There are 20 rows of 40 pixels, a total of 800. Mode 3 allows you to use up to four colors.

Mode 4 also has a text window. In this graphics mode the pixels are smaller than in Mode 3. There are 40 rows of 80 pixels each, a total of 3200 pixels. In this mode only two colors are available. One to plot and one for the background.

Mode 5 is the same as Mode 4, but has two more colors available (see chart).

Mode 6 contains even smaller pixels, which allow far more detailed drawing or graphics than in the previous modes. There are 80 rows, of 160 pixels each, for a total of 12,800 pixels. Like Mode 4, this is a two-color mode.

Mode 7 produces the same size pixels as Mode 6, but like Mode 5, this is a four-color mode.

Mode 8 is the highest resolution

graphics mode. In this mode, your Atari can display its greatest detail. There are 160 rows, of 320 pixels each, for a total of 51,200 pixels. This is only a two-color mode, but, as we will see in future columns, there are ways of giving more color to even a two-color mode.

In the next issue of *Hi-Res*, we will continue our discussion of the Atari graphics. However, for those beginners interested in some other useful literature, try *Understanding Atari Graphics* by Michael Boom, Alfred Publishing Co., *Your Atari Computer* by Ion Poole, Osborne/McGraw-Hill, or *Atari Games & Recreations* by Kohl, Kahn, Lindsay, and Cleland, Reston Publishing Co., Inc.

Advanced User Forum

Continued from page 37

only a line-by-line listing. *AMAC* has the most flexible listing facility. It's the only assembler with a true cross-reference listing. But be warned, there are bugs in this section of the program. Nothing major, but something to be aware of.

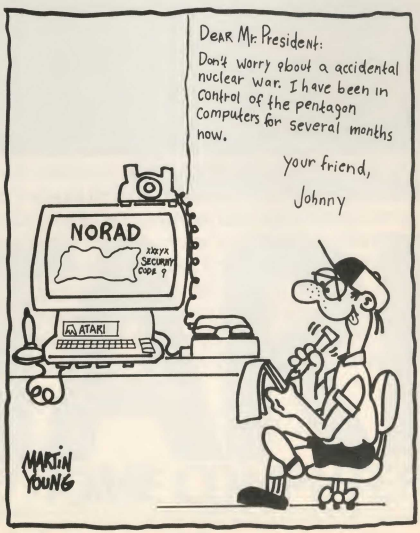
Only one assembler, *MAE*, boasts any kind of relocating capacity. If you don't know what this is, you probably don't need it. Let is suffice to say, that for long programs, *MAE* can save you a lot of assembly time near the end of the project. *MAE* doesn't use a true linking system. No external labels are resolved; you must track all external references in each module and change them manually. This is tantamount to the "load offset," which is provided in several of the debug portions of other Assemblers.

Most of the mentioned Assemblers come on disk, but two of them (*SYNASSEM* and *ATMASD*) can be specially ordered on cartridge for about $50 more. There are cassette versions of *MAE* and *ATMASD* (both without macros). *SYNASEM* and *MAC/65* both offer almost direct upward compatibility with the Atari cartridge. *MAC/65* can read source files without line numbers, meaning you can create files with your favorite word processor if you like.

I've rated my personal favorites in the chart that accompanies this column (1 = lowest, 10 = highest). Next month, we'll begin discussing programming techniques and how to use them.

Setcolor Command Chart

NORMAL COLOR	GRAPHICS MODE	COLOR REGISTER	PLAYFIELD RESPONSE
	MODE 0	0	NONE
LT. BLUE	MODE 0	1	CHARACTER LUMINANCE
BLUE	MODE 0	2	BACKGROUND COL/LUM
	MODE 0	3	NONE
BLACK	MODE 0	4	BORDER COL/LUM
ORANGE	MODE 1 & 2	0	CHARACTER COL/LUM
LT. GREEN	MODE 1 & 2	1	CHARACTER COL/LUM
BLUE	MODE 1 & 2	2	CHARACTER COL/LUM
RED	MODE 1 & 2	3	CHARACTER COL/LUM
BLACK	MODE 1 & 2	4	BORDER COL/LUM
ORANGE	MODE 3,5,7	0	POINT COL/LUM
LT. GREEN	MODE 3,5,7	1	POINT COL/LUM
BLUE	MODE 3,5,7	2	POINT COL/LUM
	MODE 3,5,7	3	NONE
BLACK	MODE 3,5,7	4	BORDER COL/LUM
ORANGE	MODE 4 & 6	0	POINT COL/LUM
	MODE 4 & 6	1	NONE
	MODE 4 & 6	2	NONE
	MODE 4 & 6	3	NONE
BLACK	MODE 4 & 6	4	POINT/BACKGROUND/ BORDER COL/LUM
	MODE 8	0	NONE
LT. BLUE	MODE 8	1	POINT LUMINANCE
BLUE	MODE 8	2	POINT BACKGROUND COLOR/LUMINANCE
	MODE 8	3	NONE
BLACK	MODE 8	4	BORDER COL/LUM



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ATARI SAFARI WITH... DR. SCHNORRER, the Atari Explorer

AS INTERVIEWED EXCLUSIVELY BY DAVID HELLER, WHO IS STILL LOST IN THE BUSHES.

Welcome to the Atari Safari! Join the famous Dr. Schnorrer, as he leads you on an exciting monthly safari through the wondrous world of Atari. The Doctor's guided tours show you new ways to take advantage of the greatest personal computer in the world ... your Atari Home Computer.

The first safari series

"The Communications Machine," Dr. Schnorrer's first Safari Series, explores the world of computer telecommunications. You'll discover exciting ways to use your Atari and add to your software library. You'll meet computer pals, buy and sell merchandise and services from the comfort of your home, and increase your understanding of the world around you.

In his second Safari Series, the great Explorer takes you on a guided tour to Atari users groups. He explains what users groups are, shows what they have to offer, and even tells you how you can start your own Official Atari Users Group.

Your ideas and suggestions are an essential part of each Safari. The Doctor will explore any area that interests you. Please write Dr. Schnorrer, the Atari Explorer, in care of this magazine with your suggestions for future Safaris and comments on the ones you've been on.

The communications machine

The modem, an inexpensive device that allows you to use your computer to communicate with other computers through regular telephone lines, has brought the age of telecommunications within reach of all Atari computers owners.

A diverse network of services and recreations is now as close to you and your Atari computer as your telephone. Hundreds of information services and electronic bulletin boards (BBS) are standing by at this moment waiting for you ... and many of them cost no more than the price of an ordinary phone call.

A wide variety of subscriber information services are now available that enable you to access gigantic databases with your home computer. By calling one of these services, for example, you'll be able to get information on anything from acupuncture to women's liberation. You can play computer games, reserve remote computer memory for your larger programs and check airline schedules. You can even get the latest news update and weather report. For the investor, other services offer complete and current data

On his travels through the world of Atari, Dr. Schnorrer discovered many FREE services...

files on all the corporations traded on the major stock exchanges. The investment information that you can now receive at home is as comprehensive as the information your broker receives in his office.

On his travels through the world of Atari, Dr. Schnorrer has discovered many FREE services that are now available to home computer owners. On his first trek into the bush, the Doctor happened upon a wide variety of bulletin board services.

Atari users groups, hobbyists, entrepreneurs and people like me throughout the world are operating bulletin boards and information terminals that are loaded with easy-to-access features that expand the usefulness of your home computer. The message center is the heart of each bulletin board. Do you have information to share with other Atari enthusiasts? Something to sell? Are you looking for a Blue Kangaroo? You'll probably find it listed in the "Computer Classified Ad Department," the electronic message center.

I was looking for a Blue Kangaroo to help guide an Australian Safari. I placed my "Blue Kangaroo Wanted" ad on a number of bulletin boards, and within days received a reply from a zoo keeper in San Francisco. My Australian safari was a hopping success, complete with Blue Kangaroo, thanks to the free bulletin board service.

A framed copy of my Kangaroo ad hangs on the wall behind my Atari computer as a reminder of the power of BBS.

Here's what it looked like:

```
MSG#    0326      DATE:02/02/81
TIME:18:26:49
FROM: Dr. Schnorrer the Atari Explorer
TO: All
SUBJ: Wanted-Blue Kangaroo
Desperately need a Blue Kangaroo. If you
know where I can find one, please leave a
message on this BBS.
TOP$$PAID
```

Free public domain software available

Public domain software is either uncopyrighted software, contributed by a fellow Atari enthusiast, or copyrighted software put on the BBS with the author's approval.

Once you have the proper "Terminal Software," (I'll be covering this in a future Safari) you can call a BBS, check its list of available software, and download public domain programs to your computer. It's then a simple matter to save your newly acquired programs to disk or cassette.

All types of programs are available: utility programs that ease your programming chores, adventure and arcade games, educational software, business software, terminal software. There are even public domain programs available that allow you to set up your own BBS!

The BBS network is a two-way street. If you've developed programs you'd like to share with other Atari communicators, all you have to do is upload them to your favorite BBS.

In my explorations of The Communications Machine, I've stumbled across some other extremely interesting services that you can access once you've been bitten by the communications bug.

Coming Next in *Hi-Res:*

In our next issue *Hi-Res* begins four new feature columns:

The Family Place is designed with parents as well as young computerists in mind. Dorothy Heller will be helping you, month after month, to cope with the coming of **computer literacy.**

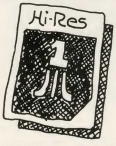
Kids and the Atari is a book from Reston Publishing by Ed Carlson and the gang at Datamost. The book addresses itself to young readers in the audience who are new to computing. *Hi-Res* will be serializing a number of its lessons in future issues.

Author and game producer Robert Schilling will kick-off our Black Box column, a series of hardware projects designed with the hardware hacker in mind.

Expanding our coverage of the impact of programming and video games, *Hi-Res* will begin a series of youth reviews, a survey of popular software written by young people themselves.

A teacher from Illinois has written a musical program that he'd like to share with you. In the first of a series of music and sound articles, Duane Tutaj will be introducing a sight-reading tutorial.

The basics of animation is the subject of a series of articles by Pam Sexton. She'll explore the reader's impulse to observe art and examine its creation on the Atari.



Hi-Res...Watch for Us!

The Living Tree

As its name implies, a Living Tree service is a vast and ever-expanding information bank structured like a tree with many branches. You enter the tree at its top, and by typing commands like down, up, left or right, you slide down its trunk or climb onto its various limbs and branches. (I should know; I fell off one, once.)

I explored a local Living Tree and discovered personal mail boxes in one branch of the tree, classified ads in another, and a "Living Story" in yet another. In the Living Story, I was able to contribute my own continuation to the existing narrative. If you're a budding young, old, or middle-aged writer this may be your chance to vent your literary talents.

Most Living Trees don't offer up or downloading services, but they do give you the opportunity to add to their ever-expanding structure. We'll explore a Living Tree in an upcoming Safari. It's a unique and exciting experience.

Dial Your Match

I felt that I couldn't end this introductory Safari without mentioning Dial Your Match. A good example of the many free services available to Atari communicators is a confidential find-a-mate-by-modem service available FREE in fifteen locations throughout the U.S. You enter a code name, answer a brief questionnaire and check back periodically to see if you've been matched with the romance of your life.

There's much more, folks!

The list of both commercial and free services available to Atari computer owners is growing daily. Entering this exciting world is as easy as buying a modem, hooking it up, and dialing your phone.

Join Dr. Schnorrer on next month's Atari Safari as he shows you how to trap the right modem and bring it back alive with the Complete Modem Buyer's Guide for Atari Owners.

David Heller is a co-author of Space Knights *from Reston Publishing and is currently working on a book for Addison-Wesley. His Atari Safari columns will appear in different form in a book from Enrich Publishing later this year.*

Illustrator John Johnson, co-author of E. McSquared's Calculus Primer, *published by William Kaufmann Publishing, is also the author of* Milo Whimper, *Enrich Publishing.*

Hi-Res Banner Magic

Program by: Dan Horn
Article by: Pat Henderson

A machine language assist can help you squeeze 200 colors onto your monitor, while this banner program lets you create your own specialty screens.

When you were looking at an Atari to purchase, a salesman probably showed you one of those fantastic demo programs that all Atari dealerships have. One of those demos has a particularly interesting title screen. The Atari logo is flashed on the screen with many colors scrolling through it. If you know the program, it probably caught your eye the same as it did mine. But how did they get all those colors on the screen at once? Well, the short Basic program below, unravels the mystery of *Scrolling Colors* with a little machine-language assist.

Scrolling Colors puts almost 200 colors on the screen at the same time. Yet in Basic, the Atari screen can show only up to five colors at one time (unless you are using player/missile graphics). To create more than five, you need to call on machine language.

Handling more than five colors on the screen at once and scrolling them, requires some fancy work with the monitor. We want to change colors on every scan line of the screen, and to do this we set up what is called an Interrupt. An Interrupt is almost exactly what it sounds like; it interrupts the microprocessor (the brain of the computer), and tells it where to go in memory for its next instruction. The Interrupt stores a value which is the location in memory that points to our machine-language routine. We place this Interrupt a few scan lines down from the top of the screen. When the computer is drawing on the screen, and it hits the Interrupt, the Interrupt gives control to our

Pat Henderson and Dan Horn are technical toilers at Adventure International in Longwood, Florida.

```
13005 PLOT 68,R+6:DRAWTO 72,R+6
13006 PLOT 74,R+4:DRAWTO 74,R+2
13007 GOTO 2200
18100 REM WRONG ANSWER SOUND
18101 POKE 53760,0:POKE 53762,0:FOR JJ
=1 TO 15:SOUND 0,60,4,10:NEXT JJ:SOUND
 0,0,0,0:RETURN
18200 REM CORRECT SOUND
18201 POKE 53760,0:POKE 53762,0
18202 FOR Q=1 TO 5:SOUND 0,20,10,10:NE
XT Q:FOR Q=1 TO 15:SOUND 0,35,10,10:NE
XT Q:SOUND 0,0,0,0:RETURN
20000 GRAPHICS 17:POKE 710,210
20005 POSITION 0,3:? #6;"music theory
drills "
20010 POSITION 6,8:? #6;"PART 1"
20020 POSITION 4,13:? #6;"note names"
20025 GOSUB 25000
20030 GRAPHICS 17:POSITION 9,3:? #6;"b
y"
20040 POSITION 4,10:? #6;"DUANE  TUTAJ
"
20050 POSITION 2,21:? #6;"COPYRIGHT  1
983"
20060 GOSUB 25000
20070 FOR Z=1 TO 100:NEXT Z
20100 GRAPHICS 0:POKE 710,112
20105 ? :? :? "                NOTE  NAM
ES
                "
20110 ? :? :? "1) NAME TREBLE CLEF NOT
ES ONLY."
20115 ? :? "2) NAME BASS CLEF NOTES ON
LY."
20120 ? :? "3) NAME BOTH TREBLE AND BA
SS NOTES."
20150 ? :? :? "TYPE NUMBER OF QUIZ THA
T MATCHES YOUR CHOICE."
20160 ? :? :POKE 764,255:? "?";:GET #1
,A
20165 IF A=49 THEN MENU=1:GOTO 20
20166 IF A=50 THEN MENU=2:GOTO 20
20168 IF A=51 THEN MENU=3:GOTO 20
20171 ? " YOU TYPED A WRONG NUMBER.":G
OTO 20172
20172 FOR I=1 TO 200:NEXT I
20175 GOTO 20100
22000 IF C<20 THEN RETURN
22050 REM PRINT TEST RESULTS
22060 GRAPHICS 17:POKE 710,122
22070 ? #6;"HERE'S YOUR RESULTS!"
22080 POSITION 0,4:? #6;"YOU HAD ";RR;
" CORRECT."
22082 KK=RR+WW:LET PP=INT((RR/KK)*100)
22083 POSITION 0,8:? #6;"AND ";WW;" WR
ONG.":POSITION 0,12:? #6;"FOR A SCORE
OF ";PP;"%."
22085 FOR I=1 TO 300:NEXT I
22100 POSITION 0,15:? #6;"would you li
ke":POSITION 0,17:? #6;"to play again?
";:POKE 764,255:GET #1,A
22101 IF A=89 THEN GOTO 22150
22102 CLOSE #1:END
22150 C=0:WW=0:RR=0:KK=0
22160 GOTO 20100
25000 REM PLAY ARCADE MUSIC
25010 RESTORE 26000
25300 FOR Z=0 TO 3:READ Y:IF Y=9999 TH
EN GOTO 25320
25305 YY(Z)=Y:NEXT Z
25310 SOUND 0,YY(0),10,10:SOUND 1,YY(1
),10,4:SOUND 2,YY(2),10,4:SOUND 3,YY(3
),10,10
25315 SETCOLOR 2,INT(16*RND(1)),6
25317 GOTO 25300
25320 FOR Z=0 TO 3:SOUND Z,0,0,0:NEXT
Z:RETURN
26000 DATA 53,0,0,162,40,108,128,162,4
0,0,0,217,47,108,128,217
26010 DATA 53,0,0,162,64,108,128,162,8
1,0,0,217,72,108,128,217
26020 DATA 64,0,0,162,53,108,128,162,6
4,0,0,217,72,108,128,217
26030 DATA 64,108,128,162,64,0,0,217,0
,0,0,193,0,0,0,173
26040 DATA 53,0,0,162,40,108,128,162,4
0,0,0,217,47,108,128,217
26050 DATA 53,0,0,162,64,108,128,162,8
1,0,0,217,72,108,128,217
26060 DATA 64,0,0,173,72,121,144,173,8
1,0,0,217,64,121,144,217
26070 DATA 72,121,144,173,72,0,0,217,0
,0,0,193,0,0,0,173
26080 DATA 53,0,0,162,40,108,128,162,4
0,0,0,217,47,108,128,217
26090 DATA 53,0,0,162,64,108,128,162,8
1,0,0,217,72,108,128,217
26100 DATA 64,0,0,162,53,108,128,162,6
4,0,0,217,72,108,128,217
26110 DATA 64,108,128,162,64,0,0,217,0
,0,0,193,0,0,0,173
26120 DATA 40,0,0,162,53,108,128,162,5
3,0,0,217,47,108,128,217
26130 DATA 53,0,0,162,64,108,128,162,8
1,0,0,217,72,108,128,217
26140 DATA 64,0,0,162,81,108,128,162,7
2,0,0,217,85,121,144,217
26150 DATA 81,108,128,162,81,108,128,1
62,81,108,128,162,0,0,0,0
26155 DATA 9999
```

Program Listing 1. Music Theory Drills.

Advertiser's Index

```
0 REM (c)1983 Hi-Res Magazine
1 GOSUB 504
20 PLOT 3,1:DRAWTO 3,4:PLOT 4,5:PLOT 5
,4:PLOT 6,5:PLOT 7,4:DRAWTO 7,1
22 PLOT 11,1:DRAWTO 9,1:DRAWTO 9,5:DRA
WTO 11,5:PLOT 10,3
24 PLOT 13,1:DRAWTO 13,5:DRAWTO 15,5
26 PLOT 19,1:DRAWTO 17,1:DRAWTO 17,5:D
RAWTO 19,5
28 PLOT 21,1:DRAWTO 21,5:DRAWTO 24,5:D
RAWTO 24,1:DRAWTO 22,1
30 PLOT 26,5:DRAWTO 26,1:DRAWTO 28,3:D
RAWTO 30,1:DRAWTO 30,5
32 PLOT 34,1:DRAWTO 32,1:DRAWTO 32,5:D
RAWTO 34,5:PLOT 33,3
34 PLOT 28,7:DRAWTO 30,7:PLOT 29,9:PLO
T 29,8
36 PLOT 32,7:DRAWTO 32,9:DRAWTO 34,9:D
RAWTO 34,7:DRAWTO 32,7
38 PLOT 5,12:DRAWTO 5,19:PLOT 4,17:DRA
WTO 4,21:PLOT 3,19:DRAWTO 3,21:PLOT 2,
20:PLOT 2,21:PLOT 6,16
39 PLOT 8,12:DRAWTO 8,19:PLOT 9,17:DRA
WTO 9,21:PLOT 10,19:DRAWTO 10,21:PLOT
11,20:PLOT 11,21
40 PLOT 7,16:PLOT 12,12:PLOT 12,13:PLO
T 12,15:DRAWTO 12,20:PLOT 14,17:PLOT 1
5,17
42 PLOT 17,20:DRAWTO 17,12:DRAWTO 21,1
2:DRAWTO 22,13:DRAWTO 22,15:DRAWTO 21,
16:DRAWTO 19,16:DRAWTO 19,17:DRAWTO 22
,20
44 PLOT 26,18:DRAWTO 28,18:DRAWTO 29,1
7:DRAWTO 28,16:DRAWTO 25,16:DRAWTO 24,
17:DRAWTO 24,19:DRAWTO 25,20
46 DRAWTO 35,20:DRAWTO 36,19:DRAWTO 35
,18:DRAWTO 32,18:DRAWTO 31,17:DRAWTO 3
2,16:DRAWTO 36,16
500 FOR I=50 TO 0 STEP -1:SOUND 0,I,10
,10:NEXT I:FOR J=1 TO 70:NEXT J
501 FOR I=10 TO 60:SOUND 0,I,10,10:NEX
T I:SOUND 0,0,0,0
502 POKE 712,0:POKE 54286,192:POKE DLI
ST+6,136:POKE 1551,24
503 GOTO 503
504 GRAPHICS 3+16:COLOR 3:POKE 712,149
505 DLIST=PEEK(560)+256*PEEK(561)
506 FOR J=0 TO 23:READ A:POKE (1536+J)
,A:NEXT J
507 DATA 72,138,72,162,255,238,255,6,1
73,255,6,141,10,212,141,18,208,202,208
,241,104,170,104,64
508 POKE 512,0:POKE 513,6
509 RETURN
```

Banner Magic Version 2

Line 506 reads in the data from Line 507. The numbers in Line 507 correspond to actual machine-language instructions.

509 Return to draw the letters.

As you can see in Listings 1 and 2, the program does not Print letters on the screen, it draws them using Plot and Drawto statements. Plot and Drawto are very easy to use when you know what you want to put on the screen.

The screen is divided into 40 columns (0-39) by 24 rows (0-23)(Fig. 1). Columns run vertically and rows horizontally. If you want to illuminate a single block on the screen, use the statement PLOT (column, row). To illuminate a block in the middle of the screen, for example, you would use PLOT (20,12). If you want to draw a line, use Plot and Drawto statements together. You must tell the computer where to start the line and where to stop the line. A Plot is used to tell it where to start, and a Drawto is used to tell it where to stop. If we wanted to draw a line across the top of the screen, we might use PLOT (0,0) and a DRAWTO (39,0). If you desired a line drawn from the upper left corner of the screen to the lower right use: PLOT (0,0) and DRAWTO (39,23)." The computer draws the closest thing to a line that it can. To continue the same line to the lower left corner use DRAWTO (0,23). Let's say we wanted to draw an "A" in the middle of the screen. We would use PLOT (13,16) and then DRAWTO (20,9), then a DRAWTO (27,16) to get the left side and right side. To put the crossbar in the middle, use a PLOT (16,14) to start it and a DRAWTO (25,14) to finish it.

Graphics Mode 19

Our *Hi-Res* banner program uses graphics mode 19 and color 3 (medium blue) to create the screen. (Don't change the drawing color or the program won't work.) Graphics Mode 19 is the same as Graphics Mode 3 except for the absence of the text window at the bottom of the screen. In Mode 19, as in Mode 3, the computer uses larger graphics blocks and has fewer places to access with Plot and Drawto statements; thus we need less time to set up our banner.

If you used Graphics Mode 24 (same as Graphics Mode 8 minus the text window), you would have to access many more places on the screen, but the resolution of your drawing would be that much higher.

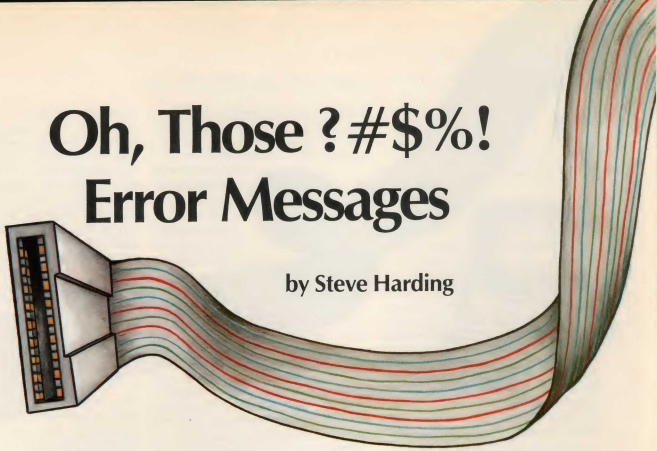
As you can see in Fig. 1, the grid shows how Graphics Mode 3 sets up the screen. Lines 20-50 of Listing 1 draw the letters. If you want to create your own banner screen, change these lines to draw letters you want. There is enough space to use lines 2-499 to put in Plot and Drawto statements of your own. Use the graph in Fig. 1 to design what you want on the screen.

If you will look at Listing 2, you will notice that lines 20-46 are different from the same lines in Listing 1. By altering these lines I recreated a close facsimile to the *Hi-Res* logo on the cover of this magazine. I drew out the logo on a grid and then plotted my lines from that.

By typing both listings, you will also notice that when the program in Listing 2 is executed, the letters do not appear before the scrolling colors are activated. This is because the background is the same color as the letters (Line 504), so they are "invisible." When the scrolling colors are "turned-on," the letters seem to "pop" onto the screen.

Once you get the feel for the Plot and Drawto statements, you should be able to create some great banner screens. If you have any problems with either of these statements, consult your *Atari Basic Manual*.

Oh, Those ?#$%! Error Messages



by Steve Harding

Scenario: It's two o'clock in the morning. You have just finished keying in a program listing from *Hi-Res* into your favorite computing machine, and it's time to see what you've created. You type RUN, and sit back, expecting to see a spectacular graphic display. What do you get?-ERROR 17 AT LINE 1220.

What in blue blazes!! What is ERROR 17?! Muttering mightily under your breath, you reach for your copy of the Atari Basic Reference Manual. Ah, here it is, listed on the inside of the front cover: ERROR CODE 17 ... Garbage Error. Garbage Error!! What does that mean?!

Ah... down here at the bottom it says, "For explanaion of Error Messages see Appendix B." OK... Appendix B. Here it is. Wait a minute, what does this mean? "Bad RAM Bits?! Type NEW or power down, and reenter the program?!" You've spent six hours entering this program! Who do they think they're kidding?!

All is not lost. It is the intent of this series to give you a better understanding of those cryptic numbers Atari calls error codes that are generated by Basic, the Atari Disk Drive, the Atari Program Recorder, and, to some extent, the Atari 850 Interface Module. We will explain what each error code means, how to avoid error, and how you can use them to your advantage. (Error codes that occur when using assembly language, we'll leave to our assembly language experts.)

There are two different types of errors: errors in the Basic program, and errors that are generated from a peripheral device. In some instances, the device will notify the computer that an error has occured. Otherwise it's the computer that generates the error. For our uses, it doesn't matter. We are just looking at the error code itself.

The Basic Trap Statement

Use error codes in programming? That's right. Most of the errors generated by your Atari Home Computer can be trapped and checked, and then used by your program.

Atari, in their wisdom, included in their Basic, a statement called Trap. This statement, added to any program line, will watch for any errors following the Trap statement. If an error occurs, the Trap will branch the program to another line (which you have designated in the Trap statement). There you can check the error and branch to any other program line that you want. (We'll discuss how to check the error in a minute).

Try this little experiment. Insert the Basic cartridge into your computer, turn the power off and then turn the power back on again. Key in the following program and then run it.

```
10 TRAP 60
20 OPEN #1,4,0,"D:JUNK"
30 GOTO 90
60 PRINT "ERROR"
90 PRINT "END OF PROGRAM"
```

NOTE: This program will work, even if you do not have a disk drive.

The Trap is set in line 10. Line 20 calls for the opening of a file on disk drive 1. If you have no disk drive in your system, or if the file does not exist, then the drive generates an error. Because of the Trap, the program branches to line 60 and prints the statement, ERROR. Once the error "springs" the Trap, it will have to be reset.

Then line 90 prints, END OF PROGRAM.

Suppose you have a disk drive and your disk contains a file called Junk. In that case, the Trap will never be sprung. File Junk will be opened (line 20), and the program will jump to line 90 (line 30). If the program contained more statements, then the Trap remains set until an error occurs.

Steve Harding is a freelance technical writer from San Jose. He is the West Coast editor of Hi-Res.

Oddly enough, if you wish to remove the Trap, you also use the Trap statement. Adding, TRAP 32768 will clear your original Trap statement. For more details on Trap see the Atari Basic Reference Manual.

Checking the Error

Remove line 10 from the program and run it. Without the Trap an error message will appear on your television screen. The exact Error Code number will depend on your computer configuaration, but in any event, the error will have occurred at line 20. Remember this number.

Type the following: 60 PRINT "ERROR"; PEEK(195) and run the program. It will ERROR XXX. XXX is the same number that was generated when you ran the program with line 10 deleted! How come? When an error happens, the computer stores the value of the Error Code into decimal location 195. You can PEEK at that location and read that value at any time.

Depending on what you want your program to do, you can now make decisions based on the Error Code generated. Let's make a few changes in our program:

```
60 X=PEEK(195)
70 PRINT "ERROR"; X
80 IF X=138 THEN PRINT
   "NO DISK DRIVE"
85 IF X=170 THEN PRINT
   "NO SUCH FILE"
```

Now run the program and see what happens. You have just used an Error Code in a program.

The Error Codes

Let's take a look at some of the Error Codes. As you read you may want a few references. The *Atari Disk Operating System II Reference Manual* and the *Atari Basic Reference Manual* are helpful. The *Atari 850 Interface Module Technical Manual* is also handy, particularly if you plan to program the interface module ports.

Another excellent source is *De Re Atari*. Anyone who is planning to do some serious programming on the Atari Home Computer should have a copy of this excellent reference in his library. Written by several of the Atari programming wizards, the book is available from the Atari Programming Exchange (APX), as well as other sources for a list price of $19.95. It's a good investment for the serious programmer.

Error Code 0

You can assume that Error Code 0 cannot be trapped. Try this: turn your computer off. With the Atari Basic cartridge in place, turn the machine on again. When the READY appears on the television screen, type, PRINT PEEK(195).

What happened? Remember, we said that the value of the error was stored in location 195 when the error occurred. No error has yet occurred, so the value when the computer is first turned on will be 0.

Error Code 1

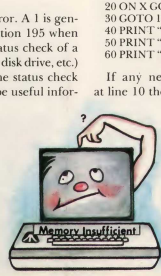
This is not really an Error. A 1 is generated and placed in location 195 when the computer makes a status check of a peripheral device (printer, disk drive, etc.) and simply means that the status check was successful. This can be useful information, especially when working with the Atari 850 Interface Module.

Error Codes 2: Memory insufficient

Although you can load or enter the program, your computer doesn't have enough available or free memory to run it. If you have made some modifications to the program, you may be lucky and have enough memory left to save it to disk or cassette. If not, your only recourse is to start over. This is one reason why it's a good idea to save your program occasionally while you are working on it. It won't be necessary to start from scratch if a fatal error occurs.

In most cases, you'll find that you can't trap Error Code 2, because the program will stop before the Trap can be sprung.

Read *De Re Atari* or check the *Atari Basic Reference Manual* for tips on how to conserve memory. There are also ways to gain needed memory by doing some reconfiguring of the disk operating system (DOS). Check that manual also.



Sometimes an Error Code 2 results from a failing Memory Module or Basic cartridge. Reseat the Basic cartridge and the RAM and ROM modules. Your error could be a simple case of poor contact between the card edge and the socket.

Error Code 3: Value error

Atari calls this a Value Error. This means your program was expecting a number within a certain range and received a different numerical input. For example:

```
10 INPUT X
20 ON X GOTO 40,50,60
30 GOTO 10
40 PRINT "LINE 40":END
50 PRINT "LINE 50":END
60 PRINT "LINE 60":END
```

If any negative number is entered at line 10 then Error Code 3 will result. Try it.

Also try this little experiment:

POKE752,1024.

Your computer was expecting a number in the range of 0 to 255. It didn't know how to handle a number larger than 255, so it awarded you with Error Code 3.

Atari calls this a Value Error. This means your program was expecting a number within a certain range.

Error Code 4:
Too many variables

Your computer is telling you that you have used too many variable names. Atari Basic allows you to use a maximum of 128 different variable names. Check your program listing. If you count less than 128 variables and you still receive an Error Code 4, that means you have some named, but unused, variables hidden away in the variable table.

Now, what's the variable table, you ask? That's a part of your saved program that contains what are called tokens. The table is at the beginning of the program. It is transparent when you list the program on the screen or a printer. The variable table keeps track of the names and number of variables you use.

It's a simple task to clear any unused variables from the variable table. Instead of saving your program, list it to cassette or disk. This creates a version of your program without tokens and strips away the entire variable table. Now type, NEW, and then enter your program. If you save the program now, a new variable table is created containing only those variables that you are currently using in your program.

Error Code 5:
String Length Error

This is an easy one. You have tried to put more data into a string than it can handle. Be sure that your string dimensions are correct.

```
10 DIM A$(6),B$(9)
20 A$="ERROR":
   B$="GENERATED"
30 A$(LEN(A$)+1)=B$
```

This short program generates an Error Code 5. But you can avoid it with a change in line 10: 10 DIM A$(15),B$(9).

Error Code 6: Out of Data

If you are using the Basic commands Read and Data, be sure that you have a matched set. There must be one Data statement for each Read statement. Error Code 6 can also arise if you are using the same data more than once in your program and neglect to Restore the line containing the data. Check your program.

The Restore command tells your computer that you want it to read the data at the Restored line. See the *Atari Basic Reference Manual* for more details on Read, Data, and Restore.

Error Code 7:
Number greater than 32767

You have used a reference to an illegal line number. Your Atari doesn't like it when you attempt to refer to lines that are over 32767 with GOTO, GOSUB, or Restore commands. Of course, maybe you want to create this error and trap it. For instance:

```
10 X=0:TRAP 30
20 X=X+10000:GOSUB X
30 (do something):END
10000 (do something interesting):
   RETURN
20000 (do something else interesting):
   RETURN
30000 (do something even more
   interesting):RETURN
```

After the fourth pass through line 20, X becomes 40,000. When our program tries to GOSUB to line 40000, then Error Code 7 results; the trap is sprung and the program goes to line 30.

Error Code 8: Input error

Input Statement Error: You've tried to input a string into a numerical variable. X cannot = X$. You can Trap the error and send the program back to the input line for the correct input.

```
10 TRAP 10
20 INPUT X
30 PRINT X
```

This simple little program will send the user back to line 10 if anything other than a number is entered.

Error Code 9:
Array or Dimension Error

This is one of the most common Basic Errors. Your computer is telling you that you have more than likely neglected to Dimension a string or a numerical array. Or perhaps you have tried to Dimension a string or an array a second time. You only get one chance ... and you cannot Dimension a numeric array for more than 5460 numbers or a string for more than 2767 characters. Your computer doesn't like it.

Error Code 10:
Argument Stack Overflow

You shouldn't see this error when programming in Basic. It is an assembly language problem. I'll leave the explanation to our Assembly language columnist.

Error Code 11: Floating point error

My high school algebra teacher had Ten Commandments of Algebra. One of them was, Thou Shalt Not Divide by Zero! Your computer feels the same way. It'll give you an Error Code 11 every time.

Error Code 11 also might occur if your program is using very large or very small numbers. Chances are that if this is the case, you already are aware of this error. Most programs do not use numbers in the ranges that will generate Error Code 11.

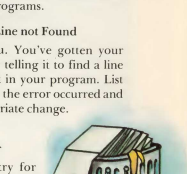
Checking for Error Code 11 can be useful in some programs.

Error Code 12: Line not Found

Shame on you. You've gotten your computer lost by telling it to find a line that doesn't exist in your program. List the line on which the error occurred and make the appropriate change.

Error Code 13:
No Matching For

Check the entry for For/Next loops in your manuals. Your program has stumbled a ross a Next



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statement without an appropriate For statement and has gotten lost.

This error can also occur if you have a GOSUB statement referring to the line having the Next statement. If you are using For/Next loops (particularly "nested" For/Next loops), take care how you use the Next portion.

Error Code 14: Line too Long

This one is tricky. Atari calls it a "Line too long" error. When a program line is converted into internal format (containing tokens), sometimes it becomes longer than the original. This is especially true if the statement includes a great many numbers. If this error comes up, break the statement into two or more lines.

Error Code 15:
GOSUB or For line deleted

You have inadvertently deleted a For statement in a For/Next loop or have deleted a GOSUB. Your program has tripped over the Next (or the Return statement and doesn't know where to go.

This error is similar to Error Code 13 and Error Code 16. It shouldn't come up when the program is first run, but may arise while you are working on your program and are testing your changes by running it.

Error Code 16: Return without GOSUB

Your program has been running merrily along, but has suddenly come across a Return statement and cannot find the appropriate GOSUB. This error will more than likely be generated the first time you run the program after loading it.

You've probably deleted or changed the line containing the GOSUB the last time you worked on the program and forgot to make the appropriate change to the rest of the program. Check your program listing.

Error Code 17: Garbage Error

This is our Garbage Error. Actually, you have quite likely made a syntax error in the line given. List the offending line to the screen. Directly after the line number, your computer says ERROR—then lists the offending line. Look along the line. Your Atari will show you where it detected the error in inverse video.

Remember, this may not be where you made the error, but where the error was detected. Check your statement or statements carefully. Also, remember to delete the ERROR—from the line. Otherwise, you will get another Error Code 17 and an ERROR—ERROR—.

Error Code 18: Invalid string character

You are trying to find a numerical value of a string character and the string (or that portion of the string being checked) contains no numbers. You can't take the value of anything other than numbers within a string. For example:

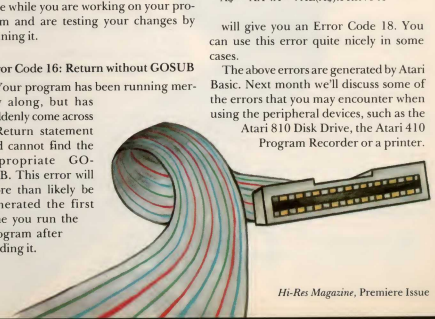
```
A$="12":A=VAL(A$):PRINT A
```

will return a 12. However,

```
A$="AA":A=VAL(A$):PRINT A
```

will give you an Error Code 18. You can use this error quite nicely in some cases.

The above errors are generated by Atari Basic. Next month we'll discuss some of the errors that you may encounter when using the peripheral devices, such as the Atari 810 Disk Drive, the Atari 410 Program Recorder or a printer.



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The Academic A

by Lloyd R. Prentice

Atari fans often shake their heads and mutter in disbelief when they find that their favorite computer is not number one in the schools — indeed, that it's not even number two or three. Apple, Radio Shack and Commodore share some 70 percent of the educational market for microcomputers. Atari claims a mere 15 percent.

It doesn't compute, the fans say. The 800 costs less and offers more than the leading brand A. And the 400, at the price, is no slouch. Its flat keyboard, admitted bane to touch typists, is just the ticket for the peanut-butter-and-jelly set. What's the matter with those educators? Don't they want the best for the kids? Why are these world-class computer also-rans in the classroom?

The answer is relatively simple: history. Apple, Radio Shack and Commodore beat Atari to the classroom by a good two years or more. This means that Apple, Radio Shack and Commodore preempted the attention and interest of those "agents" of educational change—the venturesome teachers and administrators who make things happen in the schools. These are the people who went on to design the computer literacy classes, write the educational software, develop the teacher-training programs and, not least, fill out the purchase orders for machines.

Lloyd Prentice heads Prentice Associates Incorporated, a software and book developer for major publishers. He was the founding editor of Classroom Computer News.

This means that Atari had a lot of brand A, B and C favoritism to buck when it finally went after the school market. As one administrator put it recently, "This is Commodore PET country around here. We've got users groups. We've got software exchanges. We've got teachers who know the PET. Even if we wanted to buy another brand of computer it wouldn't make sense." In this light, the fact that Atari has carved out 15 percent of the educational computing market in a short two years is nothing to sneeze at.

One of the major facts of life with which Atari must contend is the relative shortage of good educational software for the 400 and 800. I say "relative" because some good programs are out there and more are on the boards — but, at present, not nearly as much as the educators need.

Last summer my company did a detailed survey of the hardware and software available to educators. We found more than 1000 separate software products targeted for grades K through 12. Many of these products are in series and include as many as 30 different instructional units. These packages, produced by some 217 companies, include instructional software for art and music, computer literacy, early childhood, guidance, language arts and reading, library skills, mathematics, science, social science, special education and vocational and business education. Various instructional management and "authoring" systems also showed up in our results. Most of these packages were for the Apple, Radio Shack and Commodore computers.

Of these 1000+ packages, only 93 were available for Atari machines. Of the 217 software producers, only 21 were producing Atari software. Of the 93 Atari packages, 15, or nearly 16 percent, were produced and marketed by Atari itself. An additional 47 percent—nearly half—of the 93 packages were produced by just two companies: Dorsett Educational Systems, Inc. and Program Design, Inc. And, only two out of three of the 93 Atari packages were exclusively available for the Atari.

Here's how the educational software packages were distributed by subject area:

Subject	Number of Packages
Art/Music	3
Computer Literacy	1
Early Education	6
Foreign Languages	4
Language Arts	26
Lesson Writing	1
Life Skills & Guidance	1
Instructional Management	2
Mathematics	23
Science	5

Social Studies	8
Systems Software (Computer Languages)	1
Vocational & Business Ed	9
Other	3

Looked at this way, it's easy to see why Atari has not walked away with the school market. Despite the fact that Atari offers more hardware for the money, the marketplace does not offer more software for the classroom.

This summer my company is again updating its data base of educational software. It will be interesting to see how much new educational software has been produced for the Atari over the last year.

Will the Atari Compete?

Will Atari always be an also-ran in the education field? It's hard to say. But some interesting things are brewing. In recent months the home market for personal computers has flared up like a Topanga Canyon brush fire. Hardware price wars and parental desire to provide greater educational opportunities for the kids are fueling the boom. In this market, the Atari 400 is a formidable competitor, stacking up well against the Texas Instruments 99/4A and the Commodore VIC 20, the other main contenders for the home market.

As a result, many developers and publishers are beginning to take the Atari seriously as a target machine for their software—particularly since Texas Instruments has essentially made it impossible for independent developers to produce cartridge-based software for the TI machine without first signing a severe distribution agreement with you know who.

At the recent Consumer Electronics Show in Las Vegas, a slew of prestigious companies announced their intention to produce quality "educational/entertainment" software for the home market. These companies included, among others, CBS, Walt Disney, Mattel, Milton Bradley, Scholastic and Xerox. Some of their software will feature familiar pop-culture characters such as Mickey Mouse, Benji and the Muppets. Many of these companies plan to release their software on Atari 400/800 cartridges and disks, and multimillion dollar marketing budgets are the norm.

If the Atari, with its outstanding graphics and sound effects, can maintain a significant position in the home market and, as a result, stimulate the development of a large corpus of quality "educational/entertainment" software, it will likely win greater respect among educators and a bigger piece of the school-market pie. Much will depend upon the educational value of the software now in the works.

In coming issues I'll be reviewing many of these exciting new software packages. If this software is half as good as I think it's going to be, the Atari will finally come into its own as an important "tool for learning." A

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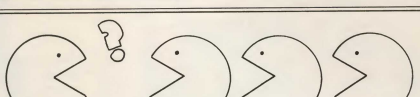

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THE COMING OF ARCADE ERIC

BY MARK S. MURLEY

MONDAY, 2:05 p.m.

Somewhere, indelibly hewn in stone, reads one of the great truisms: Know your limitations. Amen.

When the *Hi-Res* review editor tossed Data Age's *Journey-Escape* VCS cartridge across his desk, I was already formulating an angle to duck the assignment. The first rock group/arcade game fusion called for a different sort of reviewer. After all, the unpleasant facts had to be faced: At age twenty eight, I was beginning to feel that my rockin' days were rolling into the past.

A cursory examination of the game instructions confirmed my decision: Avoid groupies? Contact the Mighty Manager? And what was that business with the money? Sheesh. Whatever happened to plain ol' descending invaders?

Luckily, every puzzle has a solution. A single thought crackled through my mind like a neon beer sign: Find Arcade Eric.

Arcade Eric was half human and half wired, all mixmastered into an "intense" teenage concoction and poured into Levi's, flip-flops and a catsup-specked AC/DC 1982 World Tour jersey. I discovered him one night at Arnold's Atomic Arcade, one of the local video hangouts; he had just passed the hundred-thousand mark on "Stargate" (ordinarily, no big deal, except that Arcade Eric used only the toes on his left foot).

TUESDAY, 7:51 p.m.

My 19-inch Hitachi color television screen was still glistening from a fast windex job, when a single rap at the front door announced that Arcade Eric, "have-thumb-will-travel," had arrived.

"I'm ready for some serious playing," he said without preamble as he brushed past me and plopped down in front of the Hitachi.

"Drink?" I offered. "Coke, root beer, Perrier?"

"No, man," he said dourly, "just a joystick. And a couple of 'AA' batteries for my Walkman."

Inwardly, I smiled. I'd definitely found the right guy for the job.

Simply put, Arcade Eric (no one knew his real name) was the Killer Elite of all things video. No one, but no one, had ever seen Arcade Eric lose an electronic game, be it on a home computer, a VCS machine, an arcade upright or a hand-held.

But after *Qix* had been kicked, *Defender* defeated, and *Jungle Hunt* junked, Arcade Eric needed new challenges and more cash.

That's where I came in. He played, I paid. Strictly business. He earned a little change, and I got fodder for my reviews. Nice.

Arcade Eric stared intently at the blank but squeeky-clean television screen while I performed a battery-otomy on an old Polaroid camera. He installed the "AA's" in his Walkman and I hooked up the VCS. Pulling a warped spiral-bound pad from his jeans, he nodded: he was set.

I tucked the *Journey-Escape* cartridge firmly in place, toggled the power and the blank screen surged to life. I handed the joystick to my guest and settled into my favorite chair—a plaid recliner.

"Yeah!!!" exclaimed Arcade Eric.

Mark S. Murley writes documentation and ad copy for Adventure International. Among his credits are the story lines for Preppie! I *and* Preppie! II.

I met Eric at the door, my Windex in hand.

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pointing at the screen and showing the first vestige of actual emotion since his arrival. "It's the Scarab ship from the *Escape* album!"

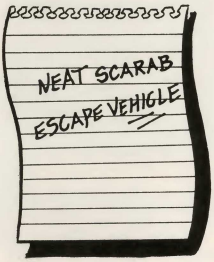
On the screen, all I could make out was a lop-sided figure-eight something moving diagonally against a backdrop of winking stars.

Arcade Eric tilted his head to match the angle of the Scarab ship. "Not baaad," he murmured, scribbling onto the small, worn out pad. "And check out that music . . . it's incredible!"

"That's your stereo," I corrected. I leaned over and pressed the STOP key on his walkman.

He looked perplexed for a moment and then grinned, revealing some orthodontia that sparkled like a chrome bumper on a '62 Cadillac.

"Man, I was wondering about that great separation. Anyway, let's have a view at the instructions." He shook the game package. A small pamphlet floated onto the carpet. For the next minute or so, Arcade Eric poured over the fold-out instruction sheet.



After digesting the information, he explained the scenario in his own colorful style.

"Aw, yeah," he said almost reverently, pulling his headphones down around his neck. "Here's what's goin' down. You gotta' lead all five guys in the band past reams of groupies, photographers, promoters and get 'em to their Scarab Escape Vehicle before time runs out. Plus you gotta' protect 50,000 buckolas from all of those weirdos."

"Protect money?" I questioned. "How does that work?"

Arcade Eric traced a finger across the instruction sheet, searching. "Simple," he replied, tapping the relevant paragraph. "All of these guys, the groupies, promoters, photographers — even the 'good guys' like the roadies and the Mighty Manager — scroll downward from the top of the screen. If your guy touches a 'pesky character,' as the instructions call 'em, bucks are deducted from your initial stash. But if you move through these freaks quickly enough, you'll make it to the Scarab Escape Vehicle . . . "

"The S.E.V.," I reasoned.

"No, man, the Scarab Escape Vehicle. Pay attention, willya'? Once you get to the Scarab Escape Vehicle, the next band member gets a crack at it. If all five dudes make it, you win. If even one doesn't make it in time, bad news — the next concert's

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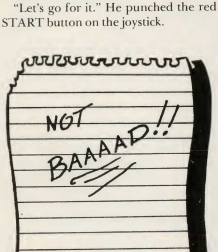
been missed and the game's blown."

Arcade Eric tossed the game instructions over his left shoulder and flicked the reset switch on the VCS. Instantly the figure-eight something and star field yielded to a carnival of figures and faces drifting toward, and disappearing at, the bottom of the screen. Also at the bottom of the screen was a pretty solid — if totally anonymous — representation of one of the Journey band members. Arcade Eric summoned all of his playing savvy and focused it at the screen.

"Let's go for it." He punched the red START button on the joystick.



Instantly, the musical score shifted and the anonymous band member sprang to life, his arms swinging wildly and his feet working against the tide of strange objects that streamed his way. Weird hearts with legs sprinted into the scene; mustachioed promoters with darting eyes floated down from the blackness and vanished; bars of pulsing flashbulbs winked on and off; solid walls—stage barriers—cleared swaths a full third the size of the screen. In fact, one was bearing down on the anonymous Journeyman at this very moment. I yelled for him to watch out.

Nonplussed, Arcade Eric produced his best Chef Tell impression. "No problem, no problem."

With a deft push-pull on the joystick the sprinting band member dropped back, cut hard to the left and bypassed the stage barrier in a wink. The flow of objects continued as did the sounds of play.

"Well," I asked, mopping perspiration from my forehead with the back of my hand, "what do you think?"

"Sssshh. Waitaminit. I think the Scarab Escape Vehicle is about to come up." Sure enough, a miniaturized version of the figure-eight something appeared just to the right of center screen. Arcade Eric slapped the joystick; in response, the Journeyman followed suit. The screen erupted, flashed. A second or two later, the scrolling objects reappeared, this time their movements appearing more erratic than before.

"Ah, ha," I guessed with growing interest. "You touched the Scarab Escape Vehicle—"

"—and now I've got to beat the buck buzzards with the other four Journey dudes. Very good, Sherlock."

Arcade Eric poked the start button again and returned to the challenge of dodging the old dangers that were now moving in new patterns. About twenty seconds into the game, the grinning visage of a new but somehow familiar object caught my attention.

"Did you see it?" I shouted, jumping from my chair and running over to the screen for a closer look. "I'd know that mug anywhere — it was the Kool-Aid pitcher!"

Arcade Eric stared at the screen, working the joystick handle to and fro. With condescension bubbling from his lips he said, "Nah . . . that was the Mighty Manager. Check the docs, man."

Sure enough, there it was, right under the Helpful Characters section. Seems that by touching the Mighty Manager a Journey band member can dash through the crowd full tilt straight to the waiting S.E.V.—er, Scarab Escape Vehicle, that is. Sort of a supercharge against the riff-raff.

"Kind of a lightweight game," Arcade Eric observed as he penciled something onto his note pad with a free hand. "But then again, I'm such a hotshot." He handed me the joystick and tapped the START button. "You try it, man."

Before I could even get my bearings, a brace of groupies had descended on my hapless band member, forcing him down to the bottom of the screen. (This is kid stuff?!) In direct response, my "money meter" at the top of the screen took a nosedive.

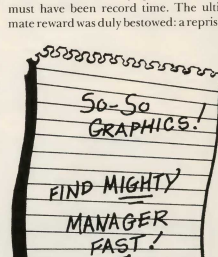
With a motion that would've driven Rudolf Nureyev nuts with jealousy, I sidestepped their advances and returned to my mission.

Arcade Eric shrugged, "Luck."

No way. I had the hang of it now. Stay as close as possible to the top of the screen (for maximum speed), but not so close as to blunder into everything that pops up. Where's that cussed Scarab Escape Vehicle? Only ten seconds left. . . five. . . three . . . one. Abruptly, my turn was over.

"That's it, Jack," Arcade Eric sniggered callously. You took too long — you blew it." He snatched the joystick from my sweaty hand. "Now, watch how a real man plays."

True to his boast, all five band members were led to their objective in what must have been record time. The ultimate reward was duly bestowed: a reprise



of the opening scene of the S.E.V. (I'll call it that if I want to) warping its way through the galaxy.

"Well, that's that. Total time to conquer this game—" he checked his watch—"seven minutes, thirty-seven seconds.

TUESDAY, 7:59 p.m.

Arcade Eric jotted down a few final notes and headed for the door. I pressed payment into his outstretched palm — a bag of tokens good at Arnold's Atomic Arcade. He tore a page from his note pad and handed it to me.

"Well, man. It's like Journey sez in one of their tunes, 'some will lose.'"

"What do you mean 'some will lose'?" I asked. Behind me the mantle clock chimed eight times. "You won, didn't you?"

He smiled as he snapped his headphones on and stepped into the night. "Yeah, but *I* didn't put down good bread to buy the game."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Atari founder Nolan K. Bushnell: "A big bear of a man with a child's passion for games."

ILLUSTRATED BY MARK SIMONSON WITH A JOYSTICK ON HIS ATARI 400 HOME COMPUTER

ATARI, INC. THE EARLY YEARS

(An Unauthorized History)

By Colin Covert

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Much has happened in the turbulent ten-year history of Atari. Hi-Res *wants to take this premiere opportunity to recap this corporate bantom-weight's emergence as a muscle-bound profit maker. The following is one of the best accounts we've read of how a spare change operation grew into a billion dollar entity.*

But much has happened since the article was written. Atari's market share for video games has dropped, just as its share of the home computer market has grown. Pre-release jitters and bugs delayed the entry of the 1200XL. And founder Nolan Bushnell, flush with cash from Chuck E. Cheese Pizza, is heading a new robotics firm. This year he will be free of his non-competitive agreements with Atari, and has indicated he will return to the video game market. The announcement didn't sit well with Atari. They promptly sued Bushnell, saying he unfairly came out swinging before the bell. Atari said that Bushnell has already sought financing for his competitive, but unnamed, product. Hi-Res *will be following closely the further exploits of Atari in follow-up articles.—Eds.*

Atari means "you are about to be engulfed." An Oriental equivalent of "Checkmate," it's the traditional endgame warning offered to one's opponent in Go, the Japanese game of strategy. Appropriately, it's also the name of the world's largest producer of video games. With *Pong*, a crude electronic variant of table tennis, Atari begat the new national pastime a decade ago. According to Wall Street investment analyst Richard Simon, Atari has been "the fastest growing company in U.S. history" ever since.

Atari, launched on an initial investment of $500, is now a billion-dollar-a-year leviathan synonymous with high-tech rec. Still the only company that manufactures both coin-operated games for arcades and home video-game consoles, Atari has initiated a revolution in America's leisure-time habits whose eventual impact can only be guessed at today, creating a generation for whom computers are a part of the scenery of everyday life. It's caused something like masss hysteria among denim-clad teenagers and pinstriped stockbrokers alike. Atari is now a subsidiary of Warner Communications, Inc., but if it were an independent company, its revenues would put it somewhere around 290 in the Fortune 500.

Atari's emergence as a corporate colossus may be the most perverse success story since the 1969 New York Mets. Founded in 1972 by Nolan K. Bushnell, a flaky, games-obsessed engineer who was subsequently given the bum's rush by his own board of directors, Atari today controls the lion's share of the $3-billion-a-year home and arcade video game market.

It wasn't easy. Atari almost went bankrupt shortly after it was founded in 1972. It weathered a calamitous power struggle among warring management factions after Warner acquired it for 28 million in 1976. When Atari's idiosyncratic managers balked at the new owner's efforts to impose its buttoned-down corporate ethos on them, Warner's vice-president Emanuel Gerard, the prime mover in the takeover, was dumbfounded. "They really had no manufacturing, no sales, and no advertising or marketing expertise. Everything but research was lacking. It was amateur night in Dixie," Gerard groused publicly.

Years from now, earnest young business school graduate students will still be struggling to understand how Atari succeeded in spite of itself. This story is dedicated to them.

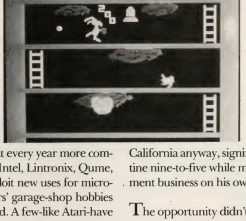
(Text Continues)

Colin Covert, Asteroids enthusiast and staff writer for the Detroit Free Press, *feels he's a major factor in Atari's success.*

1. Tom Swift in Silicon Valley

Once upon a time, not so long ago, California's Santa Clara Valley was an obscure, tranquil agrarian region like the farm country where Dorothy and Toto lived before the twister hit. A generation ago, the average businessman was a struggling apricot-, plum-, or cherry-grower; the typical laborer was a migrant fruit picker. The Valley, the rolling hill country of the peninsula between San Francisco and San Jose, was far from the mainstream of West Coast commerce. "The Valley of the Heart's Delight," as the chamber of commerce called it, was best known for producing half the world's prunes.

Then, in a cybernetic version of The Wizard of Oz, the technological twister passed through town. Today, the area is changed beyond recognition. Sleepy San Jose, the county seat, has become the bustling Emerald City of high-tech capitalism, growing to the size of Pittsburgh in the process. Today's typical Valley businessman wouldn't know his way around a plum orchard.



The companies that lead in developing profitable applications for high technology are scrappy young independents rather than new divisions of established corporate titans. The Valley's form of natural selection favors small, fast-moving companies that can spot opportunities sooner and strike more quickly than the competition. It's no surprise, then, that every year more companies with Oz-style names like Avantek, Intel, Lintronix, Qume, Rolm, Syntex, and Zilog spring up to exploit new uses for microchips. Fledgling firms leap from engineers' garage-shop hobbies to hot public corporations in a single bound. A few-like Atari-have grown larger in a decade tha the great Eastern industrial companies did in a hundred years.

The booming young industry has not had time to evolve many traditions, but one is to wax sentimental over the funky hole-in-the-wall lab where it all started, where the golden equation that launched the business was first calculated. It is Abe Lincoln's log cabin, California-style. Many of Silicon Valley's proudest firms share such humble beginnings. Atari was no exception.

Imagine a tacky Santa Clara tract house identical to the one next to it and the one next to that. Now imagine the lights in that special house burning late into the night, long after the neighbors switched off the Carson show and rolled over to sleep. Such was the cradle where today's video game industry was conceived and nurtured in 1969.

Nolan Bushnell, then a 26-year-old research engineer for the Ampex recording-tape company, began moonlighting that year on a project he'd kicked around for years, After a full day in the lab he'd eat a fast dinner with his wife and two daughters, then shut himself away in a workshop improvised out of one daughter's bedroom. A lapsed Mormon, he still kept the faith's belief in the value of hard, honest work. Long into the night he'd labor like young Tom Swift, poring over technical diagrams that covered every horizontal surface in the room. Slowly, often gripped by fatique, he was drawing up plans for the world's first commercial video game.

The schedule was punishing, yet fun in an arduous way. Otherwise the project might not have commanded Bushnell's attention. A big bear of a man with a child's passion for games, he was a fair chess hustler and quite good-for a non-Japanese-at Go. In fact, a large part of his waking energy was devoted to keeping himself amused. Even in college, while other engineering students at the University of Utah hustled summer jobs with Salt Lake City electronics firms, Bushnell worked on the midway of the Lagoon Amusement Park, guessing weights.

The job left young Bushnell ample time to pursue his own thoughts. First among them was an idea for a new kind of midway game, a notion he toyed with frequently during his amusement park summers. Bushnell and his classmates often used the engineering school's massive mainframe computer to simulate dogfights between spaceships on a video screen done up to look like deep space. The games were engrossing, and Bushnell felt certain they'd appeal to the public, but the economics were discouraging. It took an $8-million computer to play the games, and at a quarter a turn such a machine would take about a century to pay for itself. Even so, he didn't dismiss the idea, filing it away for future reference. He'd seen enough technological breakthroughs in his lifetime to know that today's impossibility is often tomorrow's snap.

When he left college, his dream job was a post in the research section of Disneyland. Disney wasn't hiring green engineering grads, but bushnell moved to California anyway, signing on with Ampex, where he put in a routine nine-to-five while mulling over ways to break into the amusement business on his own.

The opportunity didn't take long to arrive. The economic obstacles to a profitable computer-based video game vanished a few short years later, thanks to the plummeting price of minicomputer brainpower. Bushnell's electronic games became feasible, so he set to work designing one in the spare bedroom. To confront such a project was to curse, but he kept at it, doggedly weeding the bugs out of his prototype game the way a perfectionist groundskeeper might extirpate crabgrass from a vast golf course.

The game's basic operating mechanism was nothing more exotic than a standard black-and-white television set. The new wrinkle was a series of logic boards, elaborately wired mazes of transistors, diodes, and printed circuits forming a kind of computer inside the game. The boards displayed the playing field and controlled the game's action. The mechanism couldn't have been built a decade before, and not only because the cost was prohibitive. The small components simply didn't exist. To get the same game action on the screen would have required a package too large to get in the front door.

It was four o'clock in the morning, the sky just beginning to lighten, when Bushnell completed his work on *Computer Space*, the first commercial video game. Like today's top games, 1971's *Computer Space* pitted spaceships against flying saucers, and it was brilliantly lifelike for its time. The spaceship followed Newton's third law of motion-action and reaction-with uncanny accuracy. Bushnell proudly showed off his baby to his engineer buddies, who gave wolf whistles of appreciation.

II. Atari Is Born

Computer Space flopped. No one would pay to play it, and fewer than 2,000 were sold. Unlike Bushnell's technically sophisticated cohorts, the average guy in the bar was simply bewildered by the game. The public had never seen anything like it before. It was ahead of its time.

Bushnell went back to the drawing board with a vengeance. In 1972, he was a blur of motion. He scrounged $50,000 from family, friends and local banks, formed his own company, hired a bright young computer engineer to create the easiest computer game he could think of, and borrowed a confident term from Go for his reorganized business: Atari. The game he produced this time was simplicity itself, Ping-Pong on a video screen. *Pong*, for short.

Still smarting from his first ego-bruising brush with the business world, Bushnell cautiously test marketed his new creation. He put a sample unit in Andy Capp's Tavern in suburban Sunnyvale to see if anyone would play it. Twenty-four hours later, the owner called Bushnell in a rage and demanded that he get over to the bar with his tool kit as soon as possible-the prototype game had broken down.

When the machine was opened, the problem was obvious. The sawed off plastic milk jug that caught the quarters was inundated. Atari's first game was literally drowning in money.

The rest, as they say, is history. Atari was the first in the field to give the public what it wanted in a computer game. *Pong* was more than a game of Ping-Pong on a video screen. It was an expression of man's love-hate relationship with the machine. For a quarter, *Pong* would give a mere human a temporary sense of mastery over the almighty computer. The psychology was perfect. The game was a sensation, hailed as the thinking man's pinball. Even Carl Sagan was charmed by *Pong* and commended the game to his readers in The Dragons of Eden. "The game is very interesting," he wrote. "As a result of *Pong*, a player can gain a deep intuitive understanding of the simplest Newtonian physics."

When the game struck it rich, Atari didn't profit alone. Like the juke boxes and pinball machines before them, coin-operated video games sold to distributors for $2,500 to $3,000 apiece. The distributors lease machines to owners of arcades, taverns, and supermarkets for half of the gross revenue. The distributor keeps the machine in running order, cleans out the coin box when it threatens to back up, and splits the proceeds with the location's owner weekly.

Today, insiders in the coin-op industry date the decline of the pinball era from the year Pong made its debut. Pinball has the same fatal defect of every other electromechanical device — it's labor-intensive in manufacture and maintenance. Video games, on the other hand, use easily assembled solid state components that last for years. For cost-conscious distributors, cheap maintenance gave the games a decisive edge. Although *Pong's* temperamental logic boards required expensive repairs when they shorted out, it was clear to many that once the bugs were out, video games would achieve an important place in the market. Ed Adlum, of *Cash Box*, a trade magazine for the juke box industry, recognized the video machines' potential when they first arrived on the scene. "This trade," he said, "loves any machine that's easy to repair."

Inevitably, *Pong's* success brought problems. First, even though 100,000 *Pongs* were sold by 1974, only a tenth were genuine Ataris; the vast majority were American and Japanese counterfeits. Atari sold fewer *Pong* games than anyone else because it didn't have the cash to produce what the market demanded. Money is the climbing corporation's crampon, and a lot of it is needed for ascents on the dizzying slopes of High Technology. Second, Bushnell, flush with his first big score, was impatient to push on to greater heights. And for that Atari needed a major infusion of capital.

By 1974, *Pong's* coin receptacles stopped overflowing, and Bushnell bet the barn on a new race-car driving game called Gran Trak 10. Manufacturing snafus stalled the machine long enough to inflict a half-million-dollar loss, as much as the company had made in '73. Bushnell hesitated for three months, then cut the company back by almost half. Rattled, he turned operations over to Joseph Keenan, the president of a subsidiary.

Pong was beginning to look like a lucky fluke. Bushnell, loath to become a formerly promising young man trailing a brilliant future behind him, searched furiously for a comeback gimmick. The public wanted something new. And when an ill-considered attempt to expand into arcades in Hawaii and Japan failed, draining Atari's resources perilously, it was apparent Bushnell would have to find that something fast.

As it happened, a man named Ralph Baer, the chief engineer for a New Hampshire military equipment design company, had found it first. Like millions of Americans, Baer hated television. Unlike the rest, he had the know-how to wrest the box from "Gilligan's Island" reruns and make it dance to his commands. Baer approached Magnavox, the television manufacturer, with a game console attachable to TV sets that turned them into part-time toys. Magnavox liked the idea, licensed the concept under the name Odyssey, and had it on the market in time for Christmas 1972. Magnavox promoted the Odyssey console vigorously, offering it at half price with the purchase of a new television set, and sold 200,000 in the first three years.

None of this was lost on Bushnell. The home market looked like a logical area for expansion, so he ordered Atari's R&D team to work. They quickly discovered how to produce a facsimile of *Pong* on standard-issue TV sets. Bushnell trumpeted the news that Atari's first home game console would be unveiled at the next toy industry exposition. Now Bushnell simply had to finance the game's production.

Atari needed an investor willing to risk a fortune on an untried invention aimed at an uncharted market and produced by a one-shot company. The omens were not favorable. Many retailers overestimated the demand for the prior electronic craze, digital watches, and found themselves overstocked with slow-selling timepieces after the novelty wore off. Understandably, they were reluctant to place large orders for another gizmo that might become a disappointment. In such cases, though, there is sometimes a contrarian who hopes to make a killing by rejecting the conventional wisdom. A Sears Roebuck & Company toy buyer appeared on the doorstep of Atari's Los Gatos headquarters before the industry show opened. How many games do you plan to manufacture this year, asked the buyer. Oh, 75,000, responded Bushnell. Make

it 150,000 and give Sears the exclusive rights, said the buyer; we'll help arrange the financing to make sure we get delivery. Where do I sign, Bushnell asked.

The home version of *Pong* made its debut in the fall of 1975. Sears retailed the game through almost 900 outlets nationwide and picked up the tab for advertising it. Thirteen million home *Pongs* were sold in the next three years, and Atari attained that state of grace, a positive cash flow. In fiscal 1975, the company's revenues were about $39 million, and net income was a healthy $3.5 million. Not bad for a three-year-old.

By the bicentennial, Bushnell was on something of a roll. Atari scored big in 1976 with a reprise of the *Pong* idea called *Breakout*. Players used a paddle to bounce a pong ball against a wall, knocking away a brick with each bounce until all the bricks were gone. It sold 15,000 games, and Bushnell was feeling his oats. He'd established credibility as the canniest operator in the video-game industry, and some of the flaming chutzpah typical of the Silicon Valley mentality had rubbed off on him along the way. His Mormon upbringing—by now a fading memory—did little to shield him against the blandishments of success. As the owner of just over half the company's stock, he had amassed a considerable personal fortune. The press christened him King Pong, and he lived up to the name. He divorced his wife indulged his eye for the ladies. He assigned code names to games in development, usually the names of attractive female employees. A California newspaper account of Bushnell's high roller lifestyle showed him cavorting in a hot tub with a nubile young woman. He bought a slick 41-foot sailboat and named it-what else?-Pong. He was pugnacious with business adversaries, but he ran Atari with a carefree hand.

Atari became something like Bushnell's vision of Disneyland, the perfect place for creative, fun-loving engineers to work. The management style was California casual. At Atari, business and pleasure not only mixed, they were inseparable. It didn't matter if people showed up for work late or wore T-shirts in the office, as long as they had a lot of fun ideas. Skull sessions between top management and the engineering staff ran gonzo. Pajaro Dunes, a scenic Pacific Coast vacation resort a few hours south of Los Gatos, was the scene of marathon bull sessions where brainstorming about game theory and psychology was fueled by infusions of cannabis and Coors. Ideas were batted back and forth like hyperactive Pong balls. In Atari's funky San Jose factory, long-haired workers assembled components to the tune of piped-in rock music. And in the executive suite, Bushnell and his fellow executives found time to play their favorite games daily. "The day you go to lunch without playing a game to decide who pays," he told the *Washington Post*, "you know that game has lost your interest."

This radically unbusinesslike approach seemed to be working. It made sense, in a way. After all, could sober and serious businessmen far removed from the phantasmagoria of their own childhoods make toy come alive for the adolescent minds of Atari's clientele?

III. Shopping for Dollars

In 1976 demand overwhelmed the video game makers. There was an apparently insatiable demand for the games from armchair athletes, and Atari and Magnavox, the only home-game manufacturers the year before, were joined by a host of competitors. Ever since 1974, with economical microprocessor chips a reality, hundreds of circuits could be added to the games. The new consoles worked like a cassette tape recorder: to change the game, one merely inserted a different game cartridge, containing a semiconductor chip. Fairchild Instrument & Camera Corporation, then the number three manufacturer in the semiconductor industry, pioneered the programmable unit. RCA and Bally entered the fray in '76 and '77, introducing their own programmable video games.

As demand mounted, supply problems developed, beginning with a shortage of the complex integrated circuits that were the brains of the games. General Instrument Corporation, the only semiconductor manufacturer that made a major commitment to game circuits, rationed its production for six months in 1976. Lawsuits flew, alleging that GI unfairly allocated its circuits to favored clients. "The trouble is that demand is 50 to 60 percent higher than anyone anticipated," said Edgar Sack, vice president of GI's Microelectronics Group.

Competition for the home video game market heated up tremendously. The consoles had a short product life, even by the fast-moving standards of the electronics industry, as manufacturers leapfrogged each other's models with ever more sophisticated entries. First-generation Magnavox Odyssey 200 games that sold for $129 in Christmas 1975 were being sold off for $39 the following year. They were, in the words of one disgruntled retailer, "almost like a Stone Age game now." Atari's home *Pong* was equally simple, a "dedicated" game with a fixed internal logic. Like a music box with a single tune, it played *Pong* and only *Pong*.

The advantages of adding a strong home-games arm to the firm were obvious. There was only so much arcade space to be had, but with games attachable to home TV sets, every household in the nation became a potential customer. The players need never become jaded because new cartridges could be released monthly. Atari would become a vast marketing scheme, an ever-expanding system geared to keep even the most affluent kid one step behind. The day Dad broke down and bought an Atari console, he'd commit himself to a never-ending purchasing plan. Given this component approach, owning the complete system would be as distant a prospect as paying off the mortgage on a house.

Furthermore, creating new arcade games proved to be a laborious and risky process. It could take from three months to a year for a game to be programmed, prototyped, and produced. Some games were stalled in conceptual doldrums for months until someone suggested the right combination of sounds, action, and graphics to bring the idea to life. Devel-

opment costs could exceed a quarter of a million dollars for a single game. And, noted Don Osborne, vice president of Atari's coin-op marketing division, "for every eleven games you create, you only get one winner". An arcade video game with a manufacturing life of more than four to six months is a rare exception.

The options were clear: Raise the wherewithal to create a new line of games or replay the *Pong* episode, watching competitors walk off with most of the spoils. Once again Atari needed cash in a hurry. That meant either assuming huge loans, the uncertain prospect of going public, or selling out to a cash-rich, established company. Atari went on the block, displaying its wares to three companies "with some synergies," as Bushnell put it.

MCA, the entertainment conglomerate that owns Universal Studios, looked at the chaotic video game market and at Bushnell's fledgling company, and (to the everlasting regret of its stockholders) declined to acquire it. Irony of ironies, Disney followed suit. Third time lucky, Atari got an attractive offer from Warner Communications, an arch rival of the other companies in the battle for America's entertainment allowance.

Atari came along at a time when Warner could use a big score. Its biggest division-records and music publishing-was performing poorly. The record market was heading toward collapse in 1977. And without blockbusters, Warner's 1976 film production profits fell to the lowest level in years. And the company's ambitious investment in cable television-in partnership with American Express, Warner operates the country's fifth largest cable system-was not expected to show a profit until the mid-Eighties.

So the quarters that poured down Atari's coin chutes looked very tantalizing indeed. Warner's executive vice president Emanuel Gerard, an erstwhile Wall Street entertainment industry analyst who was charged with finding acquisitions, decided Atari and Warner belonged together, and set the deal in motion. The corporate Anschluss proceeded by inches for weeks while each firm's lawyers and managers performed an elaborate hesitation waltz. At one point, the former Mrs. Bushnell entered the fray with a suit challenging her ex-husband's claim to his shares, and it appeared that the various parties might tumble into a thorny thicket of litigation. On the advice of Warner's lawyers, however, she settled out of court for a comfortable sum. Four months after the merger was initiated, Atari was Warner's subsidiary.

"Business is the ultimate game, in which you keep score with money," Bushnell often said, and a look at the scoreboard showed him to be a big winner. He emerged from the Warner deal $15 million richer at age 33. According to the terms of the acquisition, he would stay on under long-term contract as board chairman. But the forces that were to dethrone King Pong promptly made themselves felt.

IV. Under New Management

Atari got the capital it needed. Warner's loans to Atari totaled $120 million at their peak, and with Warner's considerable investment behind them, Atari's engineers created the Video Computer System, a $200 programmable system with colorful graphics and plenty of game cartridges. Not only was the new system versatile, it promised to be wildly profitable. Each cartridge would cost less that $10 to manufacture and sell for $25 to $35.

VCS sales got off to a sluggish start, however. The system was introduced in time for Christmas 1977, but retailers were stocking up on hand-held electronic games for the holidays. Fairchild and Bally had programmable-but incompatible-consoles on the market, and confused consumers shied away from them. RCA couldn't sell its black-and-white Studio II game to color TV owners. Production and supply hitches held up the introduction of Mattel's Intellivision unit for two years. Atari ran into problems, too. Static electricity from a carpet could blow the circuitry of early VCS consoles, throwing them into a frenzy of lazer-beam firing that spoiled the fun for the human at the controls. The baseball game *Home Run* was delegated to an engineer who didn't understand the rules. He created a game in which a batter who swung and missed was credited with a ball instead of a strike. It went back to the drawing board for corrections.

During the next year, nobody's system sold very well. The charismatic Bushnell went on a road tour to tout Atari's new system, playing *Shootout* with reporters from the *New York Times* and the *Washington Post*. He seemed to be out to steamroll the competition with psychological warfare as well as to outsell them. "Nobody is going to take the programmable video-game business away from us now; all they can do is lose money," he declared. "We're the only ones with the guts to be a major factor." Still, throughout 1978, Atari was up to its corporate ears in unsold VCSs.

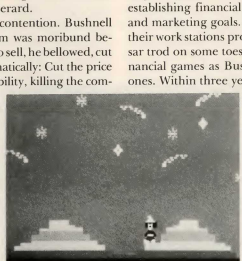
If the market was turbulent, the situation inside Atari was worse. Donald Valentine, an early underwriter of the company as head of the venture capital arm of Capital Research & Management and a member of Atari's board during this period, has called the state of the company "absolute chaos." Bushnell, who felt he had nothing more to prove, never planned to spend much time at Atari's helm after the Warner deal. He began arriving at the office only occasionally and shunned the more tedious aspects of corporate management: dealing with stockholders, the SEC, IRS, and the like. He left the day-to-day business of running the company to president Joseph Keenan, himself a low-key manager who emerged from the Warner windfall a millionaire. With the confidence truly extravagant wealth provides, Bushnell found it easy to concede, "I'm not a very good CEO." But his blithe acceptance of his own limitations failed to disarm Manny Gerard. The head of a company like Atari ought to be fun-loving, but there's a place where you've got to draw the line. With more than 100,000 VCS consoles gathering dust in Atari's warehouses, a confrontation was not far off.

Several weeks before the annual budget meeting in New York, Gerard proposed a reorganization plan. Keenan would assume the chairmanship; Bushnell would step down from

that post but continue as director. The new chief executive would be Raymond Kassar, head of the home games division for less than a year. A punctilious manager, Kassar knew virtually nothing about nuts-and-bolts electronics, but was adept at taking apart corporate balance sheets.

A kind of smoldering resentment had developed between long-time Atari personnel and the more structure-oriented newcomers from Warner. It flamed into open warfare at the budget meeting. What began as a harsh critique of Atari's performance degenerated into screaming, bare-knuckles confrontation between Bushnell and Gerard.

The VCS was initially the point of contention. Bushnell took the offensive, insisting the system was moribund because it was over-priced. If you want it to sell, he bellowed, cut the price. Gerard counterattacked emphatically: Cut the price now and you'll destroy the VCS's credibility, killing the component system in the cradle. The argument soon adopted language rarely heard in boardrooms. The meeting ended in palpable tension. Fun and games had become very serious business indeed.



The following day Bushnell agreed to Gerard's reorganization scheme. But when he returned to California he began to reconsider. Had he done the right thing in stepping aside? While he vacillated, Gerard called a special session of the executive committee of Warner's board, which ousted Bushnell in absentia. The official public explanation was that he had left the firm to return to his first love, inventing.

Marketing had always been Atari's Achilles heel. Bushnell, an engineer concerned with product development, had little feel for selling his products. In 1977 that didn't matter, because the company could sell every game it could make. Atari did a terrific business selling its coin-operated games in bars because it had the market almost to itself. Bringing in Kassar as operating head put a marketing man in a top position, shifting the real action in Atari from the engineering lab to the ledger books. And that's just the beginning of the changes it created. Kassar blew into Atari like a cool wind. Some would call his arrival invigorating. Others would say the effect was chilling.

Kassar, a suave man who runs a tight ship, gives the impression that he couldn't look messy or wear a vinyl penholder if he tried. Nor does he seem the type to hang around the lab after hours playing *Dungeons and Dragons* or discussing machines. Trim, dapper, and pewter-haired, he looks like a man who'd be comfortable playing high-stakes baccarat in Monte Carlo. Twenty-five years at Burlington Industries gave him a taste of order, organization, and efficiency. His efforts to revamp Atari along similar lines provoked substantial animosity.

Kassar arrived at Atari so innocent of the workings of the company's machines that he kept an old Scientific American primer on electronics in his desk drawer as an aide-memoire. For that reason alone, the technical staff might have considered him an outsider. And he gave them more reasons. Engineers who were pampered throughout the Bushnell era were outraged when Kassar dismissed them as overemotional prima donnas in a newspaper interview. An atmoshpere of science fiction top-secrecy was imposed in the research labs to protect confidential information. Engineers now must use magnetic ID cards to open the locked doors as they move from one secured corridor to another. And except for a few luminaries, their names are kept top secret, lest competitors lure them away.

Kassar put his conservative stamp on the rest of the corporation as well, recruiting experienced managers from other large corporations, creating formal reporting procedures, establishing financial controls, and outlining detailed sales and marketing goals. Employees were expected to arrive at their work stations promptly and to dress appropriately. Kassar trod on some toes, but he proved as clever at playing financial games as Bushnell had been at devising electronic ones. Within three years, bolstered by a massive advertising campaign, the Video Computer Systems that once glutted Atari's warehouses were in such demand the company had to ration them.

As Atari changed, so did the staff. Disaffected staffers began to drift away soon after Kassar's promotion. "There aren't many people around here from the Busnell era anymore," observes Margaret Lasecke of the company's public relations division.

A company's transition from the entrepreneurial to the managerial style is fraught with peril. That trickle of old-timers leaving the firm was a harbinger of trouble to come, for Atari's idea people were a select bunch. It takes a special kind of mathematical alchemy to translate the elaborate whimsy of a game like *Breakout* into a skein of logical connections in programmer's language and then midwife it through the electronics of a computer. The loss of key employees is more worrisome than the loss of trade secrets. "In this industry, people are the most important resource. People make or break you," said the head of one high-technology company. It was a situation that promised to be bothersome. But there was a more immediate problem at hand. America was being overrun by *Space Invaders*.

By the time *Space Invaders* arrived from Japan in 1979, the public was avid for complex new video games that would have stymied them not long before. The import was a huge success, largely because it was the first widely distributed game that was controlled by a microprocessor. A minicomputer about the size of a matchbox ran the show, directing a phalanx of alien tadpoles in an assault against a garrison defended by a movable laser cannon. Creating such a range of motion with logic boards for each task would have been a daunting project; the great breakthrough of *Space Invaders* was that its microprocessor brain merely had to be fed the rules of the game in order to play it.

Life imitated the game during the *Space Invaders* assault of 1979. A record-shattering 350,000 games were sold worldwide, 55,000 games in America alone. Atari, in danger of being overrun on its home turf, returned a weak salvo with forgettable games like Starship and Super Breakout. The implacable *Invaders* continued their seemingly inexorable advance.

The cavalry arrived in the form of Lyle Rains, an Atari veteran who joined the company in 1973 and now is vice president of engineering, coin-op division. Concerned about the success of *Space Invaders*, he retired to the lab and juggled some ideas for games with similar appeal. The most promising was *Cosmos*, an Atari space game that never quite got off the drawing board. *Cosmos's* theater of war was a field of stationary asteroids. But asteroids aren't static, mused Rains; they move. Eureka!

Asteroids was introduced in 1980. It was the counterattack that worked. it was also a technological watershed. In *Space Invaders*, a player's control was limited to moving a gun back and forth across a fixed axis along the bottom of the video screen. But *Asteroids* players send their ships flying to any point on the screen, thanks to a process Atari calls vector scanning. It made the game so complex it required twin microprocessors to do its thinking.

Atari pulled ahead of the Japenese invaders in the U.S., selling 70,000 *Asteroids* games at $2,700 retail. It finished second to the Japanese game worldwide, with 100,000 sales, but Atari had repulsed the enemy from its back yard. In a canny move, the company used its profits to buy the exclusive rights to *Space Invaders* for its home-games division. It became a multimillion seller, one of the industry's hottest cartridges.

V. The Three Faces of Atari

Nineteen-eighty was the year Atari's profits began to take off. Revenues more than doubled, to about $415 million, accounting for a third of the conglomerates's 1980 operating income (and far overshadowing the film division's $60 million profit).

Lee S. Isgur, voted America's number one financial analyst of leisure-time stocks for six years in a row by his Wall Street peers, has been recommending Warner's stock aggressively since 1974, and he thinks "it's got much further to run than it's run already." He likes companies that get a substantial share of their earnings from coin-operated video games. "This is one of the most rapidly growing markets in the world today," he told the nation last fall on Public Broadcasting's *Wall Street Week*. Clearly, the stock-buying public agrees. Buoyed by the 1980 statistics, Warner stock rose 35 percent in six months.

Atari's growing importance has made Warner stock volatile. As Warner's 1980 annual report admitted: "The major problem facing all of Atari ... is the ability to create the infrastructure and depth of management to handle the anticipated explosive growth." The games are subject to sudden, fickle vacillations in popularity that attend such fads, going from tutti-frutti to plain vanilla in six months or less.

The coin-op division isn't scooping out too much vanilla these days. After *Asteroids*, Atari brought out *Battlezone*, a tank vs. tank game played on an imaginatively simulated three-dimensional landscape. The effect is impressive. Roll forward and you see the countryside advance to meet you in perfect perspective. To achieve this illusion required some fancy mathematics and more than the usual amount of internal electronics. *Battlezone* is a three-microprocessor game, and a fair-sized hit. Some 25,000 were sold at a retail price of about $3,000, making it one Atari's top ten all-time best sellers. And then, heading quickly for the present, came *Missle Command*, *Tempest*, *Dig Dug*, *Space Duel*, and others, too fast to chronicle and too numerous to mention.

The all-time arcade champ at this stage of the industry's history is, of course, *Pac Man*, a Japanese import licensed in this country by Midway Manufacturing of Chicago. As the crowds at the arcades began to change in the last two years, with more adults and women beginning to play, *Pac Man* usurped *Asteroids*' position as the top-selling game in America. Atari's games lack the essential ingredient that makes *Pac Man* so addictive. They do not have a personality. *Asteroids*, *Battlezone*, *Missile Command*, and the rest, for all their technical finesse, are just games of marksmanship. *Pac Man* is cute. Atari is attempting to fight *Pac Man* with a game called *Centipede*. Like *Pac Man*, it's designed to appeal to the Little Miss Muffet in women as well as men's macho tendencies. Programmed by Atari's only female engineer, *Centipede* is akin to a computerized Raid commercial.

Today, all Atari is divided into three parts, and the three units operate more or less independently. Of the three, the coin-op arcade machine business and the VCS home versions account for the bulk of the profits. The arcades are still going strong. Despite a sick local economy, the number of quarter-gulping video game parlors in Detroit soared from 17 in 1980 to 3,545 in mid-1982. But the home market is where the fastest growth is expected—and Atari's VCS already accounts for three-quarters of the market. Eighty million U.S. households have televisions, but only 8.5 percent have bought video games. Some industry analysts predict that by 1985, fully half the households with TVs will own video games. And with a million home-game consoles sold so far in Europe, the overseas market is just beginning to open. Add the vastly profitable cartridge software market—industry analyst Richard Simon says console makers realize more profit from cartridges than the consoles themselves—and you have every reason to expect continued growth.

The third unit, which produces Atari computers, has been the weak sister since its inception in 1980. The division lost an estimated $10 million its first year out of the gate. It scrapped $2 million worth of business-oriented hardware and program development last year to focus on the home computer market. There it finishes a poor third to Radio Shack and Apple (begun by former Atari engineer Steve Jobs after Bushnell laughed off his proposal to build inexpensive general-purpose computers). Only recently has it edged into the black after several years of production delays, reliability problems, price-slashing promotional efforts, and disdain from computer mavens who called its model 400 and 800 computers "Aturkeys." Nvertheless, Chairman Kassar believes the embryonic division may prove to be Atari's biggest and most profitable arm in a few short years.

Financial analyst Michele Preston thinks Atari's policy of keeping its video-game products and computer operations seperate is a sound strategy. After 1983, many observers believe sales of home video consoles will give way to sales of home computers that can be used for games. "Keeping (the two divisions) separate enables Atari to offer a more powerful

home computer now," Preston said in a recent interview with the *Wall Street Journal.* "Over time, computers will replace many video games, and Atari is the only one to realize that by constantly moving to upgrade its computer business."

Isgur concurs. "In the Eighties one of the most interesting areas is going to be a merging between the video game and the personal computer. I think this is going to be very, very important."

Virtually alone in the field, Atari believes the time is ripe to push personal computers to the public. By making its computers cheap ($200 for a 16K model to $600 for a 48K) and simple enough so that almost anyone can use them, Atari hopes to make the devices as common as Cuisinarts. Its products are easy for nonprogrammers to understand; users just snap in a program cartridge and type two command words to operate the machine.

"Consumers are impatient," Kassar says. "The computer has to be as easy to operate as a typewriter and television. Data access has to be simple as dialing the telephone or changing the channel. It's important to understand that people can get along without a home computer," he says pragmatically, and they "will not buy it until we effectively communicate benefit and value." With just such an educational purpose in mind, Atari is offering computers to schools at rock-bottom prices.

Despite his high hopes for the computer division, Kassar isn't putting all the company's eggs in the basket. While pressing forward into the vanguard of the information revolution, Atari has developed the 5200 Video Computer System games console with more sophisticated graphics. After all, if a mass market will emerge only after consumers have been taught in easy steps what a computer can do for them, games provide an easy introduction at a popular price.

VI: The Second Generation

Prospects for the future seem bright. Charles Lazarus, president of the New Jersey-based Toys "R" Us chain, was wowed by the last Christmas's sales figures. He hails video games as "the hottest thing around, the successor to the Ping-Pong table as a source of family fun."

Susan McKelvey, publicity director of the K Mart Corporation, agrees. "Anything that has to do with space is a really big thing, especially if it emulates the arcade games," she says, adding that video game sales were up in 1981 dramatically over 1980.

Still, size doesn't guarantee success. In a market so tough to judge, even giants may stumble. RCA folded its video game production in the shakeout of 1978. Fairchild lost millions on digital watches and video games despite its eminence in the semiconductor industry. Xerox tried to enter the microcomputer market in the Seventies and got its nose bloodied. Atari's time may come, and it may be Atari dropouts who beat their alma mater at its own games.

In 1981, Atari was traumatized when a group of key employees, having seen others get rich, decided they ought to get very rich themselves. Some valued programmers bailed out to create two software companies, Imagic and Activision, and went into business for themselves, designing games compatible with their former employer's products.

A top selling game will produce astronomical profits. Manufacturing costs are relatively modest. Each cartridge consists of a simple plastic housing plus a few small springs to anchor the chip that carries the game program. The total materials bill as some software companies is less than $4.

Activision, run by former recording industry executive James Levy, promotes its designers as if they were rock stars. In contrast to Atari's hushed secrecy, each Activision game is packaged with an instruction sheet that carries a picture of its creator, along with his tips on playing the game.

Activision had $5 million in cartridge sales in its first year. Levy predicted sales of $50 million in 1982. Imagic expected $10 million in sales in 1982, according to its president, William Grubb. And a number of large companies have approached the new firms with acquisition feelers as well.

Already, a second generation of small, aggressive video game companies has sprouted up. Up for grabs is a relatively new industry that knows few bounds. The newcomers may be in trouble soon, but then, so may that venerable ten-year-old, Atari.

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Strolling Forth

Continued from page 28

Dear Amazing Dr. Q,

I hope you can settle a question for us. We've been trying to figure out whether Forth is compiled or interpreted. We hear about the "interpreter" in Forth, but since Forth is so much faster than most interpreted languages, something must be up. What?

Chester Viorty, Tennessee

Dear Chet,

Forth, like the hermit crab, needs to flex itself a little bit to fit into a new shell or microprocessor. But not too much. For Forth, the flexing is performed by an interpreter of a few dozens of bytes. I don't know how the crabs do it. But any way, I myself prefer to think of Forth as the best assembler in the world, needing only to find the best processor in the world on which to run itself. And if I read properly the gleam in the eye of Mr. Charles Moore, who invented Forth in the first place, such a machine is coming. I think this device will do for hardware what Forth is doing for software. Take a heed, you venturesome capitalists! Until then, Chet, Forth is what you might call a little bit interpreted.

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% Hi-Res Magazine
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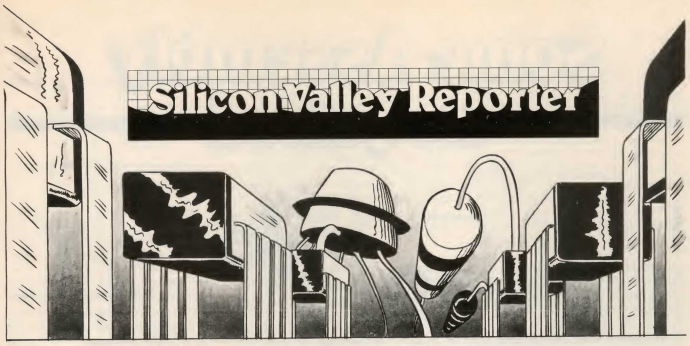
Orlando, FL 32810



By Bill Haslacher

According to Steve Wright, game programmer, the right grip on a joystick is as important as the weapon itself. Steve has an unusual style of gripping a joystick that is worth explaining.

Take your joystick and hold the base in your left hand. Grasp the joystick so that its corner is in your palm and the red button is under your thumb.

Take your right hand and put your thumb on the top of the joystick. Now overlap your fingers with the hand holding the joystick's base. In this grip position your thumbs do all the work.

The "All Thumbs" grip will feel unnatural at first. After a time, however, you will find that this grip gives you increased maneuverability in games where quick turns are essential. By the way, Steve Wright, the "All Thumbs" grip's leading advocate, is the designer of *Atari Pele Soccer*. You guessed it — *Pele Soccer* requires fast changes of direction.

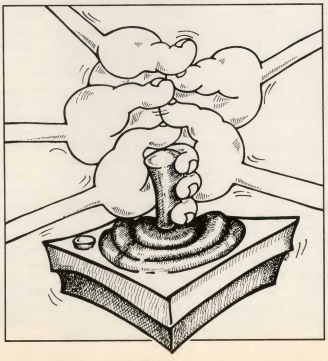
Wright's *Pele Soccer* claims a couple of Atari 2600 firsts. It's the first game with a scrolling playfield. *Pele Soccer* is also the first game with code that is there purely for the special effects. After scoring a goal you see a fireworks show with explosion sound effects. This special effect takes up a bit of machine code... but what the heck.

Shot down by a joystick?

There once was a game system called Channel F. It was put out by Fairchild. The graphics were as good as the Atari 2600. But one of its "features" was a really hard-to-handle controller. It was a grip with the left-hand-turn-the-knob-style thing. Can it be that a bad controller can kill a game machine? There are enough controllers out there to choke a gamer. I asked one expert what he likes.

Tim McGuinness, fellow *Hi-Res* columnist and game developer, owns every controller made, so I figured he knows what he's talking about.

McGuinness likes Discwasher's Point Master. Says it's easy to change directions and that having the fire button on the top is nice.



He's not too impressed with Le Stick. And has no use for the Zircon. It is interesting to note that the Zircon looks a lot like the old Channel F controller. Later research at the Software Emporium in San Jose shows that the Zircon Video Command is indeed the Channel F controller.

In fairness, I checked out the Zircon stick as well. My own conclusion is that if you want to give the monsters an even break, then use a Zircon. I can't seem to get the hang of the wrist action either.

Clyde Grossman, an Atari programmer, says that every person has his own special game. Perhaps it's the same with joysticks.

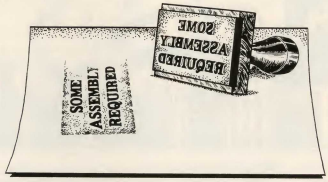
McGuinness says the Wico joystick is bad news on diagonals, but it's sturdy. I have known the joy of playing *Missile Command* with the Wico Trackball and it's great. A little expensive, but what the heck. Funny thing though—it simulates a trackball by using logic circuits to pulse the direction lines. This means that when you press the secret Control-T option the Wico does not work.

Atari built the trackball capability into *Missile Command* but never produced the trackball. McGuinness says that price was the main obstacle a couple years back. Today's game player is a different breed and McGuinness feels that an Atari trackball is coming soon. He says Atari Home Computer owners should watch for the new Atari Pro series of joysticks. He says they will fit nicely in your hand—like the Atari 5200 joysticks.

Bill Haslacher lives in the heart of Silicon Valley. He is a regular contributor to Hi-Res.

Some Assembly Required

by Robert A. Peck



Each month in this column I'll be showing you how you can get more out of your Atari computer. As with many other processors on the market, the real power of the computer is only accessible if you learn how to talk to it in the most direct way. This direct communication requires that you learn the language that the machine itself speaks—Assembly Code.

If you work with Basic or some other language for a while, you know that a program often takes a very long time to complete its task. Some of you may have learned various tricks to speed up the program. For example, one of the tricks is to disable the video output during long computations to avoid the video memory access time from slowing down the processor. Another trick is to make up as many compound statements as possible, because the more line numbers you have, the longer Basic could take to find the selected one.

The ultimate speed trick is to use as much Assembly code as possible. This gives you direct control of the computer. That's what this column is all about. What is Assembly code? It is an English-like language that represents the detailed steps that a processor goes through to perform a program. Every possible processor operation is represented by a set of instructions called "mnemonics" (pronounced nee-mon-ics). These are comparable to the keywords in Basic. You will see some mnemonics later in this introductory article.

Comparison with Basic

Before going further, it might be best to tell you why assembly language is useful, and exactly WHY it does speed up the program which is running. Let's compare it to Basic.

Most Basics are designed to be very easy for a beginning programmer. They are interpretive languages. An interpretive language keeps its program inside the computer in a form which is very easy to reconstruct. This means that the program can be listed directly from the instruction types that are stored in the memory.

If the user makes an error, Basic is very forgiving, it stops, tells you where the error is located and waits for you to tell it what to do next. In most cases, all you need to do is to type a new version of the offending line and run the program again. There is no need for a delay; it is ready to try again.

This interpretive nature of Basic is helpful to novice programmers because it provides immediate feedback. They learn from their mistakes, fix them and get the corrected result immediately.

But now that you are not a beginner any more, you are writing longer programs. You have seen what the arcade games are using screen graphics and how some of the business programs are performing calculations and updating the screen. You're finding that Basic alone just can't come close to their speed. And that's why you are reading this.

Just why is Basic slow? BECAUSE it is interpretive! Each time it runs your program, it must read each of the program statements and figure out what to do with them. A simple Goto statement is a good example.

If Basic is to perform a Goto, it must find out where the line number is located so it knows where to go. In other words, if your Basic encounters a Goto, Basic must start searching at the top of the program (first line) and look at the line number on each line to see if this is the one youre-quested. If it is not, it must go to the next one.

If this is the search method required because of the interpretive nature of the language, you can easily imagine that if a program had 5000 sequentially numbered lines, a GOTO 1 would execute much faster than a GOTO 5000, no matter where in the body of the program the Goto was issued. This is because the search always starts at the first line and proceeds towards the highest numbered one. (The second Goto should take about 5000 times as long to execute.)

If, instead of Basic, you used Assembly code, a GOTO *anywhere* would execute in the same amount of time (about 3 machine cycles) no matter where in the program the GOTO (in Assembly code JMP for Jump) was issued. That is a major difference. The Atari executes about 1.7 million machine cycles per second.

Assembly language is not as easy to use as Basic. For one thing, you will have to have access or "invent" some of the functions that are automatically built-in to a language like Basic. In addition, you will have to wait each time you change the program for the Assembler program to translate your English-like language into something that the machine can understand. And, unlike Basic, there is a chance that something you program can send the machine off into Never-never Land (because of your direct control over what the machine is doing).

But, on the brighter side, Assembly language, once translated into machine code, is ready to execute immediately each time. The machine does not need to read and interpret each line. Instead it will directly execute the statement, at the fastest possible speed. So that is the trade-off

(Text continues)

Robert Peck has published articles in a number of magazines. Currently he is writing a book on Atari Basic for Howard W. Sams. He is the author of several manuals for Atari, Inc. Bob lives and works in Sunnyvale, California.

If the user makes an error, Basic is very forgiving; it stops, tells you where the error is located and waits for you to tell it what to do next.

you will be making—you'll spend more time developing your program in exchange for maximum execution speed later.

This month's column will close with an example written in Atari Basic and the same example written in Assembly language. The machine codes are the translated...number you will see in the DUMP that follows the example. These are in the instructions which the machine itself understands. The example itself contains the Assembly language, that is, the English-like language which you are going to learn to read and use.

Because the Atari Assembler Cartridge is likely to be the most widely used among the readers, I'll show all examples in a format compatible with this assembler. As we go along however and some longer examples are required, I'll use some other assemblers for printout clarity.

We won't go into details this time on how to get the Assembly code example into your machine. If you have the Atari Assembler, or a friend who has any 6502 assembler, ask him or her to show you how to try the example.

Next month we'll begin to cover the Atari Assembler Cartridge, using this example as the basis of the article.

Some notes about the examples below. Both show a delay being performed. The first one, in Basic, performs the delay in about the minimum time possible where a For/Next can be used. Both the For and the Next occur on the same line, and the program is really short. This program takes about 140 seconds from the time it starts line 20 until it ends and prints the results.

By contrast, the assembly language program which follows it performs exactly the same function, merely a count from 65535 to zero. Before it starts, it zeros the Atari real-time clock location so it can later display what the loop time was on completion. These appear in A, X and Y, with Y showing the sixtieths of a second count.

This program shows an average of 15/60ths of a second (1/4 sec) to do the same function in Assembly Code. Different functions take different times, but it would seem that a factor of 560 to 1 in speed, at least for one example, may be enough to interest you in learning more.

By the way, in this column I'll try to respond to reader questions if possible. You will have the chance to ask just what you wanted to know about how to use Assembly code on the Atari. It won't be possible to go into really long examples, because I'd like to put out enough beginners info to bring them up to speed. But problems which might be answered by a small example of sorts are more than welcome. Well, see you next month with another installment.

BASIC PROGRAM TO COUNT FROM ZERO TO 65535
(using the FOR/NEXT function)

```
10  POKE 20,0:POKE 19,0:POKE 18,0
12  REM SET REAL-TIME CLOCK TO ZERO
15  PRINT "NOW I'M STARTING THE COUNT"
20  FOR N=1 TO 65535:NEXT N
30  SEC = (PEEK(19)*256+PEEK(20))/60
40  PRINT "THAT TOOK ";SEC;" SECONDS IN BASIC."
```

Listing 1. Basic program to count from zero to 65535 (using the For/Next function).

ASSEMBLY CODE COUNTER (from 65535 to zero)
Written and displayed in Atari Assembler Cart Format.

```
10  *=$5000
20  START LDA #$FF ;SET INIT VALUE
30  TAX
40  TXS ;SET STACK VALUE TO MAX
50  STA $0080 ;SET LOW BYTE TO FF
60  STA $0081 ;SET HI BYTE TO FF
70  LDA #0 ;ZERO TO A-REGISTER
80  STA $0014 ;ZERO TO 60THS OF A SEC
90  STA $0013 ;ZERO TO SECONDS COUNT
0100  STA $0012 ;ZERO to 255 × SECONDS CNT
0110  LOOP DEC $0080
0120  BNE LOOP ;COUNT LOW BYTE TO ZERO
0130  DEC $0081 ;DECREMENT HI BYTE ONCE EACH 256
0135  BNE LOOP ;TIMES THAT LO BYTE GETS TO ZERO
0140  LDY $0014 ;GET 60THS OF A SECOND
0150  LDX $0013 ;GET SECONDS
0160  LDA $0012 ;GET 255 × SECONDS
0170  BRK ;RETURN TO BUG, DISPLAY REGISTERS
0180  .END

Executes a total of 65535 loops, same as BASIC program,
displays A=00 X=00 Y=0F translates to 15/60ths of a
second to perform the counter loop.

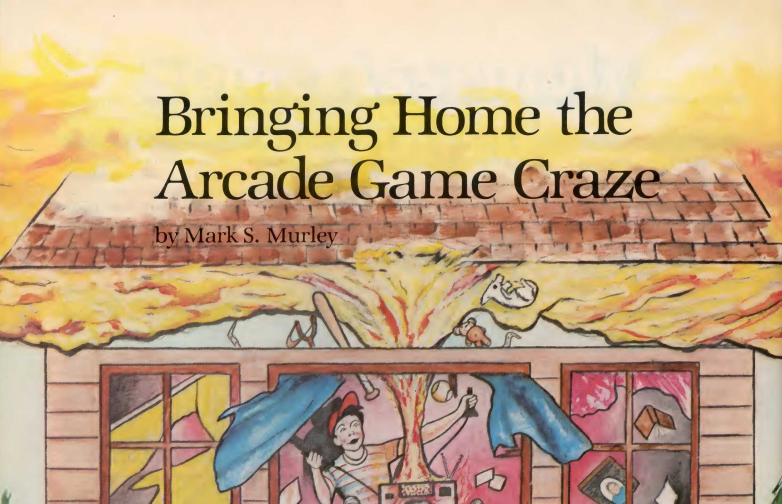
DUMP OF ACTUAL STORED MACHINE CODE:

5000: A9 FF AA 9A 85 80 85 81
5008: A9 00 85 14 85 13 85 12
5010: C6 80 D0 FC C6 81 D0 F8
5018: A4 14 A6 13 A5 12 00 00
```

Listing 2. Assembly code counter from 65535 to zero in Atari Assembler Cartridge format.

Bringing Home the Arcade Game Craze

by Mark S. Murley



Pocket those quarters, America. The arcade machines are vacating bars, malls and shopping centers for the comfort of your own living room. The popular coin-operated uprights are being compressed into palm-sized cartridges and pop-in disks that are compatible with the Atari home computers and the budget-priced VCS units. And much to the delight of joystick-pushers everywhere, your favorite arcade games are making the transition relatively intact.

For about the price of a good dinner for two, and in the quiet of your own home, you can battle the alien hordes of Roklan's *Gorf* or pluck falling humanoids in mid-drop via Atari's faithful rendition of their own popular coin-op, *Defender*. You say your earthbound sensibilities are shaken by otherworldly themes such as these? Then perhaps Parker Brothers' *Reactor* will be a bit more to your liking.

Whichever your choice, several of the most popular arcade games have been extracted from their former domain, reproduced for smaller personal computers and made available to the home user. In the next few pages, we'll be taking a close look at the home renditions of three of the best: *Gorf*, *Defender* and *Reactor*, and how they compare to their arcade counterparts.

Mark S. Murley writes documentation and ad copy for Adventure International. Among his credits is the saga of Wadsworth Overcash in Russ Wetmore's Preppie! *series.*

My *Defender* looks different

The primary challenge to a game designer who is converting, say, *Defender* to the Atari 2600 is largely one of making the most of available memory. For instance, the coin-operated *Defender* uses dozens of kilobytes of memory to bring the scads of alien ships and other graphic brouhaha to colorful life. However, the memory available to the Atari 2600 is only a fraction of that amount. Therefore, the converting programmer must redesign and trim the original program to fit in the available 4K of memory.

Unlike the ROM-powered programming for personal systems, the coin-operated machines use highly specialized microprocessing units to generate graphics. The microprocessor is designed to execute a single, specific game function, that is, creating a space ship or drawing a landscape. Since the microprocessor has only one task to perform, it generally does it quite efficiently — the end result being a highly detailed graphic or complex sound effect that would not be possible on a home system.

The Atari home computer does offer considerably more memory than the VCS unit, with the average game designed to run in 16K of memory, although 8K, 24K 32K, and even 48K games are not uncommon. As a rule, the greater the memory required for execution of the program, the more finely detailed the game screens.

VCS Gorf *manages to fill the holes left by reduced graphic details with some snazzy sound effects and nine separate skill levels.*

***Defender*: the arcade version**

When Atari introduced *Defender* in 1980, the game mesmerized arcaders everywhere. *Defender* embellished the basic blast-'em-fast theme with a horizontal scrolling landscape, fat sweeps of sound, and graphics that thumbed an electronic nose at virtually anything standing beside it at the local arcade. Interfacing the player to the action was a set of controls featuring a console-mounted joystick and separate buttons for such diverse functions as "thrust," "fire," and the detonation of "smart bombs." The result? A flashy, innovative game that deserved the steady stream of quarters that flowed into it.

Defender is a veritable clinic in game design that's simple but not overtly so. The basic idea is to prevent hovering alien "landers" from picking up the humanoid canisters (which rest on the planet's surface) and ascending to the top of the playing screen.

While the player contends with the advances of the pesky landers, a wide assortment of their alien buddies — aggressive and non — will appear as well. Once all of the player's humanoids have been appropriated, the planet explodes in a graphic burst that is nothing short of dazzling!

***Defender*: Atari 400, 800 and 1200**

Happily, the task of converting *Defender* to the Atari home computer has passed to those who, at least in theory, are most capable of the job — Atari itself. To be sure, Atari has done an admirable job of transferring nearly all nuances of coin-operated *Defender* to the home computer cartridge version.

Perhaps the most striking aspect of home *Defender* is the acute similarity to the arcade version. When you pop the cartridge into your computer and that opening screen flares to life, you know you've gotten your money's worth! And the gang's all here, folks — humanoids, landers, baiters, pods — each faithfully emulating the familiar rhythms of the original.

The basic game controls of home *Defender* have been pared down to three: (1) the joystick handle, which controls the direction and speed of the ship; (2) the joystick trigger button, which fires the weapon; and (3) the Atari space bar, which detonates the smart bombs.

Frankly, enough good things can't be said about home *Defender*. The pace is brisk; there's ample opportunity to enact a variety of strategic ploys (a good example of this would be exploding a smart bomb when a cluster of point-rich pods appears); and a choice of three skill levels greatly enhances the challenge.

A minor criticism: at times the action gets a bit too fast. Death can arrive with little or no warning in this deadly environment.

For the most part, home *Defender* meets or exceeds all but the fussiest critic's expectations. The graphics are tight, making the alien ships easy to distinguish, and the sounds are first rate. Well done, Atari!

***Gorf*: the arcade version**

First-time players of Midway's *Gorf* might well have felt that they had just squandered two bits on a gussied-up rehash of Nintendo's *Space Invaders*. Not so. True, the opening screen of *Gorf* is about as close as one could come to parroting the aging Japanese classic, but all doubts are soon tucked to rest with the appearance of three subsequent screens of alien dangers.

Gorf's theme encompasses a single objective: destroy the alien Flag Ship. To get a crack at the Big Cheese, however, the player has to go one-on-one with a deadly sampler of extraterrestrial nasties. This includes columns of descending ships in Mission One; more descending ships in Mission Two — this time varying their approach pattern; an interesting group of craft that attacks in spiral patterns in Mission Three; and, lastly, the Flag Ship in Mission Four. Dispatching this final danger earns one the right to repeat the four missions; this time at an accelerated pace.

Gorf is a powerful game, if for no other reason than the pace of the action. Many veterans of arcade heavyweights like *Defender* and *Tempest* quickly fall by the wayside when faced with the intensity of the various attacking buguboos.

***Gorf*: Atari 400, 800 and 1200**

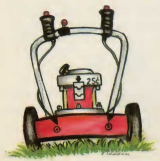
From the moment that the ominous message "THE EVIL GORFIAN ROBOT EMPIRE HAS ATTACKED!" scrolls across the playing screen, you know that *Gorf* has survived the passage from the arcade to your home computer.

The player connects to the action via the joystick handle and trigger button, which control the horizontal movement of the fighter base and the missiles respectively. The fun kicks off with the descent of six columns of bomb-dropping Gorfs and Droids. After clearing this screen, the battle picks up again with a Galaxian-like assault featuring attacking ships that peel from formation for kamikaze dives at the player's fighter.

Segueing into this is Spacewarp, the most visually and aurally dynamic of the four missions. The final mission, Flag Ship, demands a direct hit by the player on a small vulnerable area of the passing Flag Ship.

During any of the four missions above, the player can count on a continual barrage from the attacking craft. With each new skill level, the speed and intensity of the attack increases.

Roklan has done an exceptional job on the Atari home computer version of *Gorf*. The look and feel of the game is superb; it stands firmly on its own as a competent and entertaining piece of software.



Gorf: Atari 2600

Bringing the complexities of four separate screens of action home to the Atari 2600 is no mean feat. Luckily for *Gorf* lovers everywhere and for CBS Software, the publisher, Roklan Software agreed to tackle this conversion too. The result is a competent, de-frilled edition of *Gorf*.

A number of elements have been purged from VCS *Gorf*, including one you'll probably never miss — the scrolling message at the beginning of the game. Other moves at graphics economy include dropping the force field in Mission One and removing a number of the prompts and messages.

Interestingly enough, VCS *Gorf* manages to fill the holes left by reduced graphic details with some sriazzy sound effects and nine separate skill levels that should keep all but the sharpest arcader smiling. The graphics are smooth, the colors vivid, and there is an ample pause between screens to allow you time to catch a breath before the next battle begins.

Reactor: the arcade version

Like yesterday's soap opera or the latest hit novelty song, it seemed that anyone who even drove past an arcade was talking about Gottlieb's *Reactor* when it emerged. Featuring a Missile Command-like trackball controller and spewing a crowd-stopping synthesized guitar riff when fed a quarter, *Reactor* lost no time in creating an audience all its own.

True to its name (inspired by the (in)famous Pennsylvania nuclear installation, perhaps?), the game graphically re-creates a nuclear reactor approaching meltdown. As the reactor heats, its core expands, limiting the playing area and hampering maneuverability. Within this area, the player controls a small ship, which in turn deflects deadly "particles" into the surrounding energized walls and/or banks of control rods. The energized "kill walls" are quite unforgiving; should one venture too close, it will eliminate the player's ship as rapidly as the enemy particles.

Higher levels of *Reactor* feature variations on the Level One reactor setting, including invisible kill walls and an unprotected reactor core whose swirling energy vortex can make short work of the player's ship.

Reactor: Atari 2600

Parker Brothers recently hopped onto the VCS cartridge bandwagon with several original releases and a smattering of licensed versions of existing arcade favorites. Included in the latter category is Gottlieb's *Reactor*, which has received a, ah ... glowing reception from 2600 users.

Scaling down Gottleib's *Reactor* to VCS size must have proved quite a challenge for Parker Brothers. The arcade version is highly sophisticated and brimming with detailed graphics and sound routines — complex elements to pack into the limited memory format of a 2600 ROM cartridge.

Apparently the programmers at Parker Brothers thrive on such challenge; the resulting product is on par with the cream of the VCS crop.

VCS *Reactor* is Gottlieb's *Reactor* cleverly barbered down to the basics. And surprisingly, the game itself is scarcely the worse for wear. The setting is fundamentally the same: a central reactor core flanked by kill walls and two small bonus chambers. The enemy particles, as well as the player's ship move fluidly across the screen, just as if they had actual mass. The explosion that results from the player's ship touching a kill wall is startling! It's practically worth sacrificing a ship just to watch!

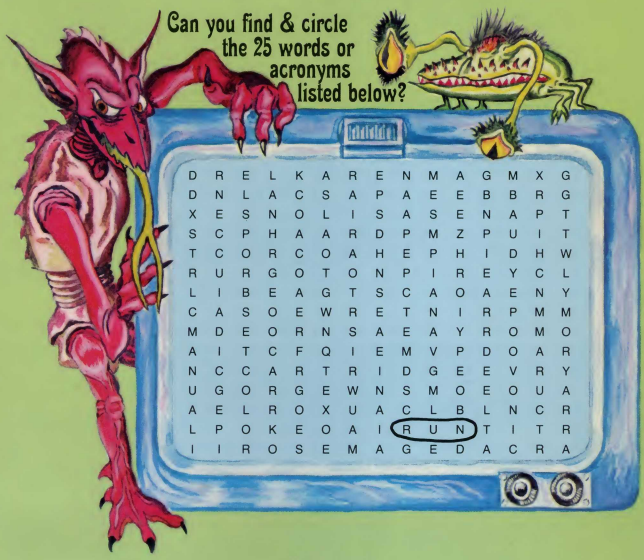
Options include eight skill levels — four one-player settings and four two-player levels. Arcade version buffs can rejoice: The brief synthesized *Reactor* "theme" begins each new round of play. Another leftover from the original version is the "decoy" feature that allows you to throw a graphic red herring into the fray.

VCS *Reactor's* main flaw is not in the game itself, but the flexibility of the controlling joystick. The trackball controller of the Gottlieb version is gone, replaced by the lackluster Atari joystick. The stiffness of the joystick makes it difficult to direct your ship with any great degree of precision. This mobile precision is crucial at times, such as whenever moving close to the control rods or entering one of the narrow entrances to the bonus chambers. Joystick problems aside, VCS Reactor has a solid look and feel to it and the wide range of levels keeps the game fresh after repeated playings.

Wrap up

Those who suffer from that heretofore incurable malady, *arcadus withdrawalus*, can now stave off the pains of coin-op withdrawal in the dignity of their own homes. The major software companies have one eye on your favorite arcade machines and another on your VCS and Atari home computer. Most assuredly, the twain are meeting.

Cryptics



Example: RUN

Arcade Games	Cartridge	Goto	Micro	Ram
Array	CTIA	Graphic	Modem	Screen
Atari	Data	Manual	Pascal	Software
Baud	Disk	Map	Poke	Sound
Bug	Edit	Menu	Printer	Tape

Note: There are an additional five words or acronyms relating to Atari computers which are not listed. If you find them, send the list on a postcard along with your name and address to *HI-RES Magazine*, Maze Search, 933 Lee Road, Suite 325, Orlando, Florida 32810. We will draw one lucky winner's name for a free subscription.

Sooo...You think you know your ATARI 400/800!!!!

1) What does the abbreviation (CL.) mean?

A) CLOAD B) CLEAR SCREEN C) COLOR D) CLOSE

2) What does (LO.) mean?

A) LOCATE B) LPRINT C) LOS ANGELES D)LOAD

3) How many colors is your ATARI really capable of having on screen at any one time?

A) 5 B) 63 C) 128 D) 256

4) How many PLAYERS can be used in your ATARI programs at any one time?

A) 4 B) 5 C) 8 D) Football or Basketball Players??

5) In ATARI DOS 2.0s which of these commands will copy a file from disk drive #2 to disk drive #1?? After hitting (C)

A) D2:FILE.EXT,D1:FILE.EXT
B) D2:FILE.EXT,D1: C) D2:FILE.EX?
D) Why bother!, I have a tape drive!!! E) Both A & C

6) Are there five or six tab positions on the standard Graphic 0 screen?

7) Is it necessary to type (GOTO #) completely after an (IF THEN) statement for the program to go to that line or is the number enough?

8) Which one of the below will tell you how many bytes of memory is able to be used in your ATARI?

A) ?FRE(0) B) ?MEM C) What's a byte anyhow?
D) Memory...here memory?

9) At which locations in memory is the address of your display list?

A) $230,$231 B) 560,561 C) 564,565
D) 512,513E) Both A & B

10) (Save the hardest for last) What is the error given for a tape input checksum error?

A) 144 B) 165 C) 143 D) 19

Questions composed by Dan Horn.
Answers: See next page

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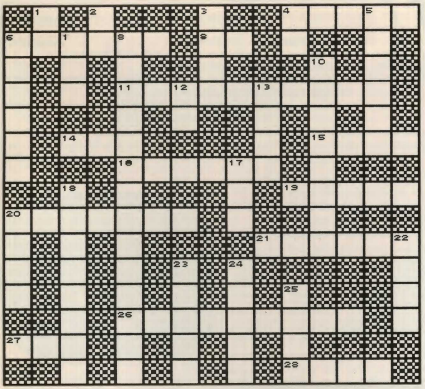


Sooo…You think you know your ATARI 400/800!!!!

Answers for Cryptic Quiz.

1) (D) - This Abbreviation is CLOSE
2) (D) - This is for LOAD
3) (D) - Using Display List Interrupts and timing to catch the scan line on the fly four times across the screen. Take that VIC and T.I.
4) (B) - By setting the missiles as one Player.
5) (E) - Try it!!!
6) (Six) - Five columns but six settings.
7) (No) - Using just the number is enough and saves some spare bytes
8) (A) - This will do it
9) (E) - The first uses the HEX notation of a dollar sign and the second is for standard decimal
10) (C) - I bet not many disk users remembered that one!!!

COMPUTER CROSSWORD

ACROSS CLUES

4. CIRCLE ON DISK
6. TEXT WINDOW UPWARD MOVEMENT
9. GOES WITH "THEN"
11. A PUZZLE IN WHICH WORDS FIT INTO A PATTERN OF SQUARES
14. RANDOM ACCESS MEMORY
15. INPUT OR OUTPUT CHANNEL
16. A PROBLEM DESIGNED FOR TESTING INGENUITY
19. DETAILED GRAPHICS
20. DEVICE USED TO MARK LETTERING ON PAPER
21. LAST NAME OF A NOTED FRENCH SCIENTIST
26. PROGRAM WHICH CONVERTS SOURCE CODE INTO OBJECT CODE
27. SMALLEST AMOUNT OF INFORMATION A COMPUTER CAN HOLD
28. BASIC COMMAND FOR STORING DATA

DOWN CLUES

1. AN ACRONYM FOR INTEGRATED CIRCUIT
2. IN/OUT TERM
3. EIGHT —— TO A BYTE
4. IC MANUFACTURER IN TEXAS
5. BLINKS ON SCREEN
6. SEGMENT OF A DISK TRACK
7. READ ONLY MEMORY
8. CREATOR OF CROSSWORD MAGIC
10. DRAWINGS AND ILLUSTRATIONS
12. POWER UP
13. HARD OR SOFT ——
17. LIGHT EMITTING DIODE
18. MEDIA FOR STORING SOFTWARE
20. PROGRAMMABLE READ ONLY MEMORY
22. RUNOUT BASIC PROGRAM
23. LOWEST LEVEL COMPUTER LANGUAGE
24. A COUNTER FOR MEASURING TIME
25. A SPOT ON A TV SCREEN

The puzzle above was created with the help of Larry Sherman's *Crossword Magic* software. If you've developed a computer or software related puzzle our editors would like to hear from you. Send it to the Cryptics Editor, *Hi-Res Magazine*, 933 Lee Rd., Suite 325, Orlando, FL 32810. *Hi-Res* will pay $25 each for puzzles and word games that appear in our pages.

Answers on page 35

Previews

The Blaster from Questar

Auto Fire Attachment

The Blaster is a plug-in, adjustable speed auto fire device for the Atari VCS, 400 and 800. The Blaster attaches between the game console and the joystick and turns your joystick into a rapid-fire automatic weapon with a single press on the trigger. You can adjust the speed from 20 shots per second down to a single blast. The price is $12.95.

Questar Controls, Inc., 670 NW Pennsylvania Ave., Chehalis, WA 98532.

Telesys Adds Home Computer Software

VCS manufacturer, Telesys Co., will release its popular video game cartridges *Fast Food*, *Cosmic Creeps* and *Demolition Herby* for the Atari 400/800/1200.

The company didn't submit a price, but their latest VCS releases for the 2600, *Star Gunner* and *Ram It* retail for $31.95.

Telesys Co., 43334 Bryant St., Fremont, CA 94539.

New Software and Books from Reston

Reston introduced two new books and four programs at last March's West Coast Computer Faire. *Genesis II* by Dale Peterson combines technical information about computers and the computer's interaction with the "artistic mind of man." The book includes an eight-page full color section depicting some of the more famous computer generated art on display in museums and galleries.

The author, Peterson holds a doctorate in literature from Stanford.

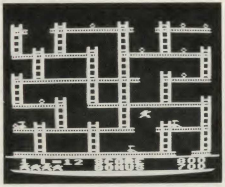
Space Knights, written by *Hi-Res* columnist, David Heller, combines a science fiction novel with nine game programs based on the book's scenarios.

Reston also introduced *Triple Brain Trust*, *Wordworx*, *Moviemaker* and *Time Tunnels*.

Build Your Alphabet Skills

PDI combined three new games for Atari owners with 16K cassette systems or 24K disk systems. *Alphabet Arcade*, a series of learning games written by Jenny Tessar and John Bayes, retails for $18.95 on cassette and $23.95 on disk.

PDI, 95 East Putnam, Greenwich, CT 06830.



Jupiter Jumpman *is new from Epyx*

Infiltrate Jupiter

Complete with music and color graphics, *Jupiter Jumpman* must scale ladders, girders and swing from ropes to infiltrate Jupiter's headquarters. Jumpman faces the bullets of enemy Alienators, robots, dragons, birdmen and flying saucers. With five difficulty options, Jumpman requires 32K of memory and costs $39.95.

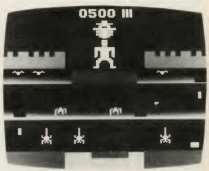
Epyx/Automated Simulations, 1043 Kiel Court, Sunnyvale, CA 94086.

New Enduro *roadrace from Activision*

2600 Auto Race

Enduro, one of Activision's newest cartridges for the 2600, is a road race game. *Enduro* tests your skills against other cars as they increase their speed and as the roadway congestion increases. *Enduro* sells for $31.95.

Activision, Inc. 2350 Bayshore Frontage Road, Mountain View, CA 94043.



Frankenstein's Monster *from Data Age*

Frankenstein Fans Take Note

Data Age, Inc. has released this graphic version of the nineteenth century classic Frankenstein. The beepers from Data Age have thrown tarantulas, poisonous spiders, vampire bats and acid pools in the

John Anderson's

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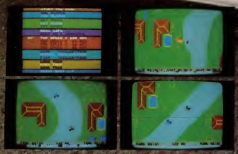

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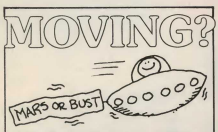

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way of this much-maligned hero. The price is $31.95.

Data Age, Inc. 62 S. San Tomas Aquinas Rd., Campbell, CA 95008.

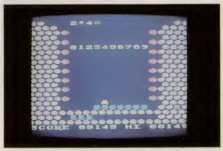
Five New Programs from APX

The Atari Program Exchange introduced six new programs in May. Charles Balthaser developed *Typit*, a new word processor. Glenn Faden's *Microsailing* is a nautical game for two players that offers four courses of varying difficulties.

Steve Robinson has written *Diggerbonk*, a game that seems designed to mitigate your aggressions. Using a joystick, you are invited to take a swing at anything in your path as you travel through a scrolling screen maze.

Diggerbonk *from APX*

Microsailing *from APX*



Escape to Equatus *from APX*

Escape to Equatus is an educational problem solver for children that tutors them in addition, subtraction, division and multiplication.

Math Mission by Dave Kosmal lets a youngster explore new planets while answering math problems about his or her fuel supply, etc.

APX 155 Moffett Park Dr., B-1, Sunnyvale, CA 94086.

Synapse Has the First Multi-user

Declaring it the first multi-user arcade space adventure, *Survivor* was created by Synapse for up to four players.

The multi-user game will sell for $34.95 and is one of 32 products scheduled this year from Synapse.

Synapse Software, 5221 Central Avenue, Richmond, CA 94804.

Survivor *by Synapse*

Marauder Now Available on the Atari

Sierra On-Line's *Marauder* is now available on the Atari. The two-part space game pits you against the defensive weapons of a distant planet. When you have broken through those defenses, you must land safely and destroy the planet's power source.

Available on disk for $34.95 from Sierra On-Line, Coarsegold, CA 93614.

Atari, Inc Readies Dig Dug

For the 400/800/1200 market, Atari is ready to ship its *Dig Dug* program. *Hi-Res* was offered a preview slide of the screen.

Fantastic action game for Atari*

The elite corps known as the Nightraiders are trying to bring freedom to a conquered earth. Since they are few in number, compared to the enemy, they must operate under the cloak of darkness. As the group's leader, your mission is to fly over enemy strongholds . . . identify targets of opportunity and destroy them thoroughly.

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