

NO. 51  
FEBRUARY 1987

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TM

THE #1 MAGAZINE FOR ATARI® COMPUTER OWNERS

# ANALOG

COMPUTING



**Our Sixth  
Anniversary  
Issue**



# HE MAY BE SMALL, BUT HE HAS A LOT OF FRIENDS

Choose P:R: CONNECTION™ and suddenly hundreds of printers and modems are compatible with your 8-BIT ATARI Computer.



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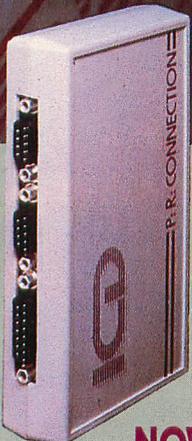
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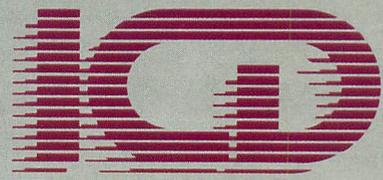
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## FEATURES

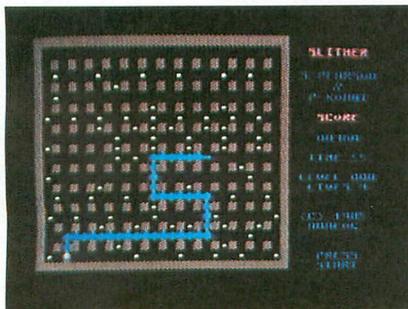
A history of ANALOG Computing . . . Diane L. Gaw 14  
An inside look at our origins: why we did it and how  
we've spent the last six years here in Central New England.

The Tablet Typist . . . . . Matthew J.W. Ratcliff 17



The easy way to add text to any of your own touch-pad generated pictures.

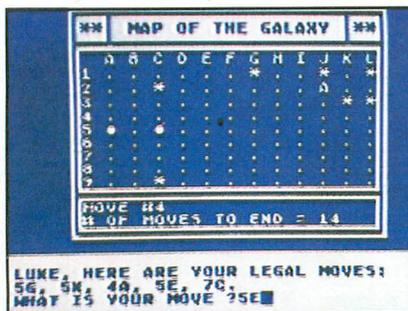
Slither . . . . . Steven E. Pearson and Paul Kohut 23



This month's machine language game offering combines constant motion with the need for strategy and careful planning.

ICD Future . . . . . Matthew J.W. Ratcliff 33  
Not only has ICD been supporting the Atari 8-bits for a long time, they continue to do it in style, as Matt found out.

Starlanes . . . . . Darin L. Delegal 39



Michael J. Fox imitators, this challenging game of interstellar stocks and bonds is playing your tune.

Keyboard Buffer . . . . . Nancy A. Durgin 51  
A type-ahead program giving your computer even more flexibility in performing its various tasks.

The BBK . . . . . Bryan Schappel  
Monitor . . . . . and Barry Kolbe 57  
This "permanent" monitor will take up residence in your computer's RAM.

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An Introduction to the . . . . . Allan E. Moose  
Vertical Blank Interrupt . . . . . and Marian J. Lorenz 65  
The secrets to those frequently-seen nifty programming tricks.

The System Rerun Button . . . . . C.F. Fogarty III 71  
"Rewire" your RESET key to rerun programs automatically.

ST Color Tuner . . . . . James Luczak **ST** 97  
Achieve animation on the ST through simple color rotation.

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A new bulletin board system packed with value and features.

Panak strikes! . . . . . Steve Panak 48  
**Chessmaster 2000** (Software Country) and the **Top Gunner Collection** (MicroProse) are the games reviewed this time.

The Great American Cross  
Country Road Race (Activision) . . . . . David Plotkin 64  
Race across America in this fast-playing simulation.

Atari Planetarium (Atari Corp.) . . . . . Bruce Frumker 74  
A fascinating, useful program with educational value, too.

MicroNet (Supra Corp.) . . . . . Matthew J.W. Ratcliff 76  
Lets up to eight Atari computers use one peripheral.

Family History (Direct Lines Software) . . . Jan A. Iverson 91  
Use your computer for genealogical research and tracking.

Phantasie (SSI) . . . . . Steve Panak **ST** 93  
Take the lead in this fantasy, with graphic battles and magic.

Strip Poker (Artworx) . . . . . Steve Panak **ST** 95  
An 8-bit cult favorite comes to the ST—how does it look?

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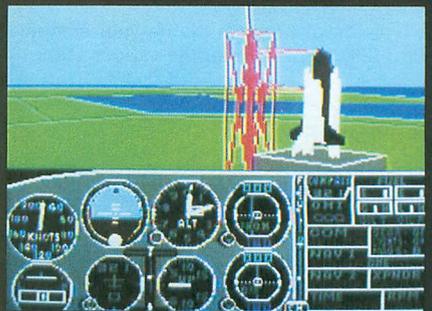
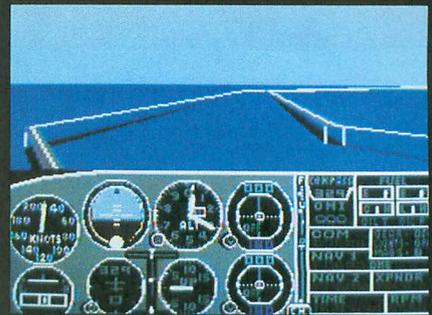
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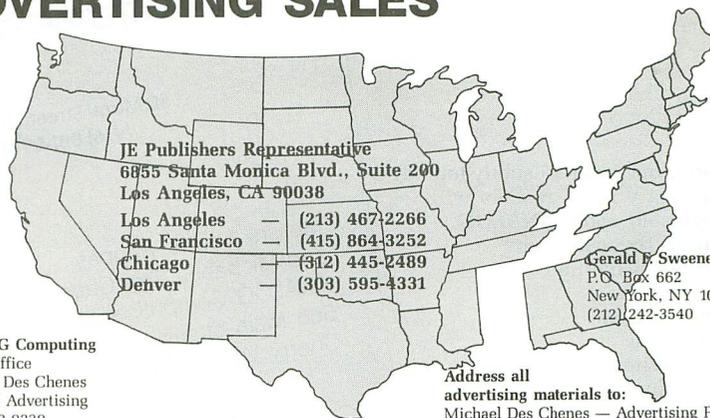
Correspondence regarding subscriptions, including problems and changes of address, should be sent to: **ANALOG Computing**, 100 Pine Street, Holmes, PA 19043, or call 1-800-345-8112 (in Pennsylvania, call 1-800-662-2444).

Correspondence concerning a regular column should be sent to our editorial address, with the name of the column included in the address.

We cannot reply to all letters in these pages, so if you would like an answer, please enclose a self-addressed, stamped envelope.

An incorrectly addressed letter can be delayed as long as two weeks before reaching the proper destination.

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Due, however, to many requests from Atari club libraries and bulletin board systems, our new policy allows club libraries or individually-run BBSs to make certain programs from **ANALOG Computing** available during the month printed on that issue's cover. For example, software from the July issue can be made available July 1.

This does not apply to programs which specifically state that they are not public domain and, thus, are not for public distribution.

In addition, any programs used must state that they are taken from **ANALOG Computing** magazine. For further information, contact **ANALOG Computing** at (617) 892-3488.

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# Editorial

This being our (ever-so-subtly-touted) sixth anniversary issue, readers will find enough said about **ANALOG Computing** in the article on page 14 to last a lifetime. It's a history of the whole venture, from conception to the current whirlwind of two magazines. Because we feel we've said a great sufficiency, we're turning this page over to Batteries Included. We were honored to receive this letter from them. See you next month!

**BATTERIES INCLUDED**  
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Messrs. Lee H. Pappas  
and Michael J. Des Chenes  
ANALOG Computing  
565 Main Street  
Cherry Valley, MA 01611

December 5, 1986

Dear Gentlemen:

I would like to take this opportunity to extend our congratulations and best wishes on the occasion of ANALOG Computing magazine's sixth anniversary. Batteries Included is very proud to have participated in the growth of your magazine. We sincerely believe that ANALOG magazine has been an integral part of the evolution of the Atari community, and that your readers are fortunate to have access to such a fine publication.

It is indeed an honor to be associated with your magazine, and we wish you continued success in the years to come.

Yours very truly,

Lindsay B. Swartz  
President and C.E.O.

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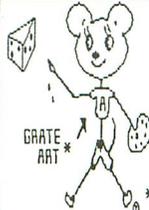
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# Reader comment

## **Black Patch strikes.**

November 7, 1986 — I want to register a complaint against a mail-order company which has advertised in your magazine. I ordered **CAD-3D** for my 1040ST from Black Patch Systems six weeks ago. I have not received the product, although I have paid for it. I am sure you know the FTC Mail Order Laws require these firms to deliver their products with thirty days.

I have attempted calling all three of their published phone numbers for two solid weeks, and have never been able to get anything but a busy signal. I wrote a letter asking about the status of my order two weeks ago, but have never heard from them.

Although you cannot do anything about it, I want you to know that an advertiser in your magazine is giving extremely poor service to your readership, and I will never order anything again from them—even if I do get my order.

By contrast, I have mail-ordered—and received promptly—many items from ST Plus. When I do call, they answer their phones. I'll stick with what works!

Sincerely,  
Ralph E. Freshour  
Rancho Palos Verdes, CA

October 16, 1986 — On March 27, 1986 I informed Black Patch Systems that the Atari 1050 disk drive I had received at the end of February had stopped loading programs in completely. I was informed to return the item under work order #32886, which I did promptly on April 1, 1986.

On April 16, I sent them a follow-up letter, due to the fact that it's impossible to get through to them by phone. The telephone company informed me that the receiver was being taken off the hook. On

April 23, the "800" number for Black Patch Systems was disconnected.

To this date, I have not received any credit, phone calls, letters—or any attempt to inform me of the status of this problem. In addition, I called the Better Business Bureau of Baltimore to try to acquire some background information on Black Patch. They informed me that they, too, had been trying for months to get some information, with no success.

I have since replaced the disk drive with another company, locally, and wish for a full credit to my account.

**Problem #2:** Also in February, I ordered from Black Patch Systems one **U-Print-A** interface for my disk drive. They advertised and quoted \$39.00. When shipment and billing came, it was for \$58.70. This additional charge was *not* authorized for my credit card, nor was I informed. When I called the company, they informed me that there was a new shipment of **U-Prints** in, at a higher cost. But that was *not* what I was quoted over the phone.

Sincerely,  
Vickie Huss Pack  
Woodbridge, VA

November 25, 1986 — With the increasing popularity of the Atari line, I am appalled at the treatment I and my friends are receiving from some of your advertisers. One case in point is Black Patch Systems.

Over two months ago, I ordered two programs from them for my newsletter publishing company. I explained to the company in a phone call that the order of **Megafont 2** was an important one, and asked to make sure that the program was in stock before I ordered. The clerk assured

me that they had plenty in stock. I then immediately ran out and purchased a postal money order, and quickly fired off an order for the software. That was over two months ago. Phone calls to the company were turned down on the toll-free line, and calls on their long-distance line were met by over four hours of busy tones, until I finally got through.

When I got through to the unfriendly phone jockey, I was told that my order had been sent to me yesterday. Well, since then I have made more than three such calls—and, each time, I was told that either the order had already left the day before, or the items were on backorder. After losing over \$350.00 in orders and placing more than \$30.00 in long-distance phone calls, I gave up and bought the programs from a local store—at twice Black Patch's advertised prices. I then fired off an angry letter to the store, to receive my money back and to complain about their practices. I still am waiting for my refund. Finally, out of despair, I have contacted the Postal Service and Attorney General.

What I think should take place if advertisers hope to please their customers are a few common practices (that would surely help businesses, should they try them):

(1) Toll-free numbers should be for taking orders and customer's questions.

(2) Order takers on the phone should remember who pays their paychecks, and treat their customers accordingly.

(3) Advertisers practicing deceptive advertising should not be allowed to advertise in your magazine.

(4) Order takers should be honest and not lie when asked to check if an item is in stock.

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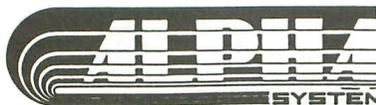
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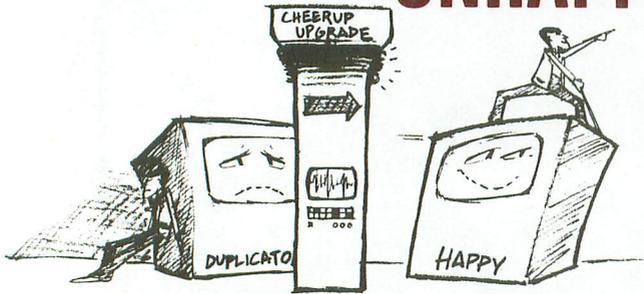
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# Reader comment *continued*

If a safeguarding scheme is not set up, then I believe that the customer is better off not always going for the cheaper prices, but paying the premium prices where you get proper service—and the owners seem to appreciate the business.

As for your magazine, I anxiously await it each month and read it several times until it's replaced by a new issue. Keep up the good work.

Sincerely,  
Jim Burroughs  
Fuquay-Varina, NC

*ANALOG Computing* ran advertising for Black Patch Systems of Arnold, Maryland from May 1986 through August 1986. *ANALOG* then informed Black Patch that we could no longer accept their ads, because, according to Lee Pappas, "We've received more Black Patch complaints in one day than we have concerning all of the other mail-order companies combined in the past six years."

A newsletter from the Clevatari User Group had this to say: "The word from people placing orders, however, is that they (Black Patch) may be cheap, but they don't have what they say—or it never shows up. The company is hard to reach when you have questions (or complaints)."

At one point, we received many calls from readers, including a user group president who'd ordered *Silent Service*. Black Patch reportedly said that the product had been on backorder for some time. A call to MicroProse, the manufacturers of *Silent Service*, informed us that this was not the case. Other companies supported this complaint against Black Patch, with similar situations happening in regard to their own products.

When the problems reached a certain point, we contacted the postal authorities in Boston, Massachusetts. Any of our readers who have problems with Black Patch Systems should contact the Inspector in Charge, P.O. Box 2217, Boston, MA 02205-2217.

The postal authorities are now informed of the circumstances. All letters we have received have been forwarded to them. Mail fraud and mail problem information can be obtained from: Consumer Advocate, US Postal Service, Washington, DC 20260-6320. —Ed.

### ST fever.

There is a dread disease among loyal Atari 8-bit owners. And it's eliminating hundreds of 800s, XLs and even XEs all around the world. Perhaps this letter will serve as a cure.

What is this plague? The new ST computers are the culprit. They've become one of the most tempting computers to purchase in recent years, so many 8-bit owners have abandoned and sold their "other" computer, and upgraded.

Of course, many ST owners, who once had only an 8-bit, still have that very computer. But, for those of you who now only have that shiny new ST, you simply don't know what you are—and will be—missing out on.

Ever since the introduction of Atari's 800 line back in 1979, the computer world was set on its ear. Here was, primarily, a video game company that put out the most powerful home computer of its time—and people recognized it as such.

There was simply not anything you couldn't do with it. Such things as speech synthesis without any extra hardware, digitized songs, sound and graphics, robot manipulation, a phenomenal array of machine language subroutine manipulation, and its graphics, sound generation and ease of use...these made it a computer unmatched by rivals.

Since that time, the introduction of the less powerful, less expensive and more advertised Commodore 64 stole a lot of the public (and software publishers) away from Atari. Soon, the C-64 was in more homes than any other computer. It wasn't easy for Atari then, but loyalty among Atari owners remained high. We've survived the Commodore invasion and, indeed, overcome it.

Ataris were selling strong again, then came another invasion: the ST. The entire Atari community was delighted and impressed, but little did we know that it would prove to be a threat to us 8-bit owners. The ST was no match for the XE line; it was never intended to go up against the XEs. But it has.

Although also infected, I survived the disease that has captured so many. The intoxication with the ST was strong in me—and still is. The loss of six years with my 8-bit system was too high a price to pay for the glory of an ST. Now, my friends all have their new and fantastic STs, but not a day seems to go by that one of them doesn't drop in to recapture some good times with my 130XE.

Everyone felt the fascination of seeing what the 8-bits could do next was gone. It seemed time to move on to bigger and better things. I believe that there is still fascination growing with the 8-bits, and that it will continue for some time to come.

A new ST will one day enter my house, but it won't be pushing the XE into the closet. Both are incredible computers. Both deserve the highest attention, and I'm going to see to it that both survive equally under my roof.

So, before you put the old 8-bit up for sale, consider, not what you'll be getting with the power of an ST, but what you'll be losing.

John Patuto  
SYSOP, SIBBS  
Millburn, NJ

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CIRCLE #107 ON READER SERVICE CARD



# 8-bit news!

## A NEW WORD PROCESSOR OUT FROM XLENT

The **First XLent Word Processor** by David Castell, sold through XLent Software, utilizes a joystick and icon interface. With this program, you can edit two documents simultaneously, obtain assistance from the on-line help screens, combine graphics and text on Epson or compatible printers, print double columns with XL/XE computers, customize your own

printer drivers, and print custom characters on-screen. This package is also compatible with XLent's **Megafont II+**, and it includes a print spooler for the 130XE. Two versions, for 48K and 64K, are included.

It's \$29.95; XLent Software, P.O. Box 5228, Springfield, VA 22150 — (703) 644-8881.

CIRCLE #139 ON READER SERVICE CARD

## OTHER NEWS

**Hard-to-find ribbons and ink rollers** for your Atari printers aren't anymore. They're now available for the Atari 820, 825, 1025, 1027, ST124/SMM804 and DMM304. Along with black, you can buy them in blue, green, brown, purple, yellow and red. Contact Type-rite Ribbon Mfg., Inc., 38-04 48th St., Long Island City, NY 11104 — (718) 784-3535.

CIRCLE #156 ON READER SERVICE CARD

## JAPAN ON \$19.95 A DAY

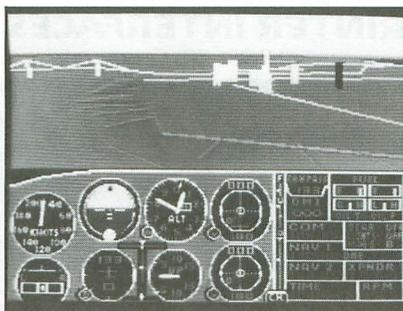
SubLogic is offering scenery disks for their 8-bit **Flight Simulator II**, adding new areas to explore via air. The San Francisco "Star" disk displays the Bay area in detail, for conventional visual flight and sightseeing jaunts. All the mountains, lakes and waterways are shown, in all the correct locations, as well as major buildings and many major structures in San Francisco, San Jose and Oakland.

Alcatraz Island, Fisherman's Wharf and the Golden Gate, Oakland Bay Bridge and Dumbarton bridges are all there, too. The airports are highly detailed; many include the hangars and refueling stations. All the local VOR and NDB transmitters are shown, as well.

The Japan Scenery disk supplies close-ups from Tokyo to Osaka, with both VFR and IFR cross-country navigation. Downtown Tokyo is depicted in great detail. While "touring" the city, be sure that you don't miss Tokyo Tower, the Palace grounds and the canal network. No, come to think of it, be sure to miss them; we don't want any collisions! Other tourist sights for your pleasure include Mt. Fuji, the Osaka-jō castle and Shin Kansen bullet train. There are also many mountains, lakes and clearly drawn airports for the user to be view via this remarkable software.

Each disk is packaged with a detailed sectional chart, and airport and nav-aid directories. Each is \$19.95, for use in conjunction with **Flight Simulator II**. SubLogic Corporation, 713 Edgebrook Dr., Champaign, IL 61820 — (217) 359-8482.

CIRCLE #102 ON READER SERVICE CARD



San Francisco's Fisherman's Wharf.

## CHIPMUNK BACK-UP SOFTWARE

The latest back-up software for 8-bits, this one unprotects many times when others fail. **Chipmunk** is said to work on any drive, includes copiers for any 8-bit of 48K or more—and has a special 130XE version, with one-pass capability. New parameters will continue to become available. Undelete, unlist and autorun utilities come in this package.

One interesting note on **Chipmunk**; check the disclaimer on the back. "By opening this package, you agree to be bound by the terms of this notice [referring to pirating]. If you are not willing to comply, please return the unopened program for a full refund." **Chipmunk** itself is not copy protected.

Retail is \$34.95, from Microdaft, 19 Harbor Drive, Lake Hopatcong, NJ 07849.

CIRCLE #132 ON READER SERVICE CARD

## WRITE YOUR OWN MUSIC VIDEO

With **Virtuoso**, you can now generate text, graphics and music. Full-color graphics can be created via keyboard, **KoalaPad** or mouse. Images can be moved at varying speeds, and enlarged, reduced or rotated 360 degrees.

Music can be simultaneously added to your graphics, and coordinated with them. The speed, melody and volume can be controlled as you change the graphics.

Multiple windows are feasible, so that any graphics can be intermingled with text. Thus, words, song lyrics or a story line can be displayed to accompany the pictures. All these images and sounds can be transmitted to other **Virtuoso** owners via modem or printer.

At \$49.95. Virtuosonics Corp., 123 Duke Ellington Blvd., New York, NY 10025 — (212) 316-6744.

CIRCLE #155 ON READER SERVICE CARD

DataSoft has also just announced several new titles. **Tobruk**, a recreation of the desert battle that threatened England's presence in North Africa, is a tank simulation with arcade sequences. **Bismarck** puts you in command of the infamous German battleship or the Royal Navy. **Swords & Sorcery** is a role-playing fantasy game, taking the player into underground corridors on a dangerous quest. In **Saracen**, you're a young crusader journeying through 100 mazes of increasing complexity, in an attempt to find and destroy the evil **Saracen** warrior. And, last, **Black Magic** is also a 100-screen adventure that pits good against evil. Prices on these have yet to be announced.

CIRCLE #158 ON READER SERVICE CARD

OSS has announced a new line of software. **Bareware**, with prices reputed to be under \$25.00—many including source codes. **Bareware** will be supported by mail only, and all documentation will be on disk. None of the products are to be copy protected.

Authors whose programs fit this concept should send a SASE for the submissions kit. Optimized Systems Software, Inc., 1221 B Kentwood Ave., San Jose, CA 95129 — (408) 446-3099.

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CIRCLE #108 ON READER SERVICE CARD



Meet the crew of *ANALOG Computing*. . . From the top left, clockwise: Michael J. Des Chenes, Charles Bachand, Lee H. Pappas, Douglas Weir, Robin Levitsky, Edythe Stoddard, Patrick J. Kelley, Clayton Walnum, Connie Moore (and Garrett), and, in the center, Diane L. Gaw. You have no idea of the diatribes delivered to get these photos of our staff—holding still—for publication.



# A history of **ANALOG** Computing

## And the future looks bright, indeed.

by Diane L. Gaw

STAR DATE. . . No, actually, that's going too far *back*. But the publishers of **ANALOG Computing**, Michael Des Chenes and Lee Pappas, did meet at a Star Trek convention in New York City in 1978. Finding that they were from neighboring towns in Central Massachusetts, they developed a comradeship based on shared interests. One of these was a love of gadgets, specifically, computers.

Although neither one really had a "background" in computers, Lee had put together a MITS Altair, the first microcomputer available, way back in 1975. A graduate of Worcester Polytechnic Institute, he'd taken only one computer course, in high school. Mike's first computer was a 400, but he had always been a gifted putterer, building all sorts of models, taking things apart and working on cars. Both were fascinated by computer games and the inner workings of the computers themselves.

The duo found very little information available to assist Atari owners who actually wanted to use their computers—for something other than playing games. Being tinkerers and talkers, our dynamic duo had an edge in understanding computers—and in meeting and drawing ideas from other users. So the concept for **ANALOG Computing** was born, at about the same time that the two decided to open an Atari

dealership just outside of Worcester, Massachusetts, in a section of Leicester called Cherry Valley (really).

Charles Bachand and Patrick Kelley had joined Lee and Mike early on in the project, during 1981. When the four weren't defending cities from enemy missiles on-screen, they were kept busy researching costs and sources for publication, and setting up and running the dealership. Charlie and Lee, with basic computer knowledge, set out to write programs and find material for the magazine, while Pat manned the Atari store and Mike became *de facto* business manager. It was a hectic time, but one filled with dreams and hard work.

The first issue appeared on the market in February of 1981. Called **A.N.A.L.O.G. 400/800 Magazine**, the acronym stood for "Atari Newsletter And Lots of Games." The dealership thrived, luring customers and browsers from paper delivery boys to Mick Jagger (who looked in during his stay at a nearby recording studio).

By the end of 1981, the A.N.A.L.O.G.ers had found that, although buyers were originally attracted to Ataris for its entertaining video games, new Atari owners soon became aware of—and curious about—the business and educational functions of the equipment. In early December of that year, Lee founded a users' group, to keep people informed about new developments and new uses for their computers.

**A.N.A.L.O.G. 400/800 Magazine**, natu-

rally, lead the pack in bringing out utilities and tutorials for the interested public. And there was far more interest than even Mike and Lee had suspected. From 4,000 copies of the first issue, they were up to 20,000 copies by the fifth issue, in early 1982. (*Holy hackers, Batman!*)

Those early editions included tips on how to get around the bugs in your machine, rumors of what was happening in the computer industry, games like **Maze Rider** and **Maniac!**, articles on the vertical blank interrupt and player/missile graphics, and straightforward reviews of all the new software—reviews that never minced words.

Springfield, Missouri's Tom Hudson was able to join the technical staff via mail for issue 2. He moved to Massachusetts as a full-timer in May of 1982. What Charlie could tell you about computer hardware, Tom could make happen with software. In issue 4, Jon Bell's artistic talents entered **A.N.A.L.O.G.**'s pages. He also moved up from Missouri, in January 1982, to be a full-time crew member. Craig Patchett was a part of the technical staff for a time in 1982, and Brian Moriarty signed on for issue 10, in 1983. The "newsletter" was gaining a staff—rapidly becoming more and more professional.

From the start, the magazine had gained a reputation for honest reporting. Whether a software publisher was an advertiser or not, readers *knew* they could depend on

# ANALOG's history *continued*

A.N.A.L.O.G. to tell them whether a program was worth the price or fit only for the trash can.

In issue 6, the publication's name was altered; it became the now-familiar **ANALOG Computing**, but the magazine's spirit remained the same. It was a part of the Atari adventure, a means to communicate with fellow Atari owners. It was an adventure in itself.

Those of us who worked in "real" businesses watched Mike and Lee with admiration and envy. At that time, I was the manager of the composition house which did their typesetting. My bosses thought the ANALOGers were just crazy; I (who'd been fascinated by computers and science fiction since junior high) was *positive* they were crazy, but I knew their timing was good. Yet how, we asked ourselves, could these two put out such a successful publication—and still be found, on occasion, playing **Star Raiders**?

The answer: the staff of **ANALOG Computing** was motivated. They would band together to get the magazine done, often working late into the night. The rest of the time, it was their *job* to explore, to play, to communicate with fellow users, to come up with new ideas.

When Lee was sending alien spaceships down in flames, when Tom was glued to the monitor, when Jon was attached to his **KoalaPad** for hours—they were all hard at work. To anyone who had worked in, say, an insurance office, it seemed as if they were playing. But Mike's and Lee's inherent business sense could be seen in the personnel they recruited and the success of **ANALOG Computing**.

Issue 11 brought the magazine into the world of more regular publication. It was released for April/May 1983 and included Tom's first data-checking for type-in programs, **C:CHECK**, as well as his **Moving Missiles in BASIC** and Brian's **Adventure in the Fifth Dimension**. Tom, a natural at photography, and Jon, with an artistic imagination, collaborated on many covers, swathing the offices with black shrouds to obtain their special effects.

With issue 15, January 1984, **ANALOG Computing** became a monthly. Its circulation had risen from 58,000 a month for the previous year to 70,000. The 600XL, featured on that cover, had just come out, and **ANALOG Computing** reviewed it to usher in the "new era" of products.

Mike and Lee were truly publishers now, contributing artistic and subject ideas, but having almost no time for actual writing. Mike's time was taken up more and more with the organizational and advertising efforts; Lee took on the work of public relations and author assignments. Jon had become Managing Editor, while Brian was now the Technical Editor, with Pat in control of distribution. Kyle Peacock and Tony Messina were frequent contributors, and

Braden Griffin began **Griffin's Lair's** educational software reviews.

To anyone watching from outside, it was still a motley crew. . . but it was definitely a team. **ANALOG Computing** had found a niche in the industry. The dreamers and hackers had grown along with Atari, and had helped their readers develop and learn along with them.

Lee, Mike and Jon insisted on being first with news of the Atari community—even if that meant working late and delaying a deadline. And the magazine was the only one to tell readers *exactly* what was happening behind the scenes. **Whither Atari?** and **Darkness at Noon** were critical pieces which took realistic looks at that company's future—even when the truth hurt.

**ANALOG Computing** was first to feature the 520ST on a cover, the May 1985 issue. This was no mean feat; the ST really hadn't been released at the time of the photo. The resourceful crew managed to bring readers their first glimpse of the 16-bit machine via a mock-up. **ANALOG Computing** was also the first to give impressions of the 16-bit Atari, in issue 32, July 1985. It was literally snatched up at that June's CES; everyone wanted to read about the new ST. The staff was proud to see that their magazine remained the real Atari resource.

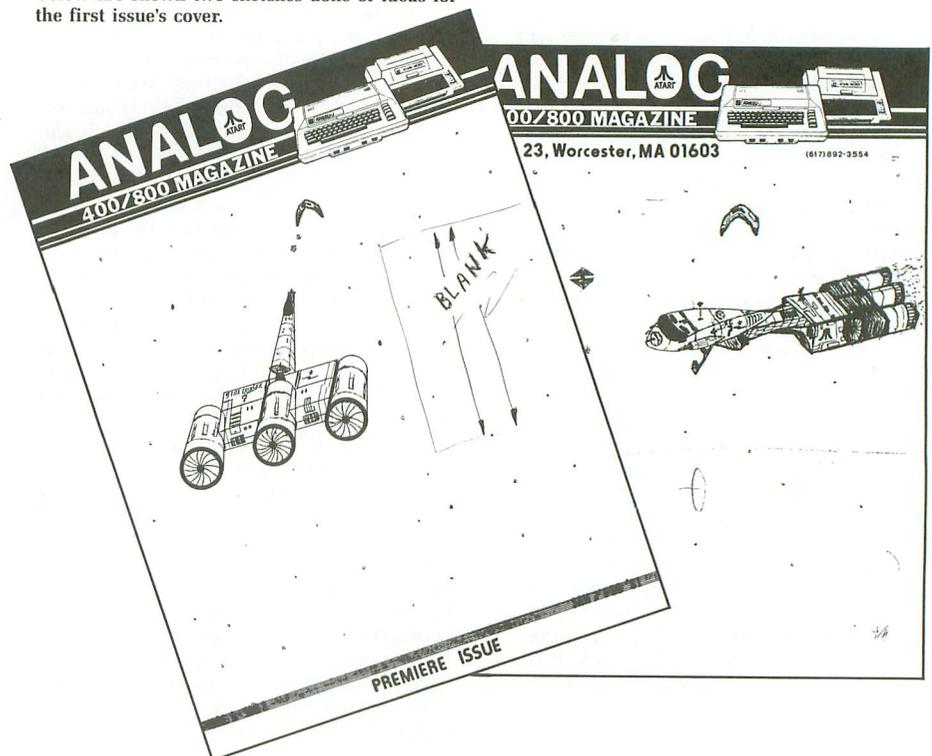
Eventually, some original staff members grew restless, eager to move on. Remember, these are people who truly want "to boldly go where no man has gone before." Brian left for Infocom, to write the impres-

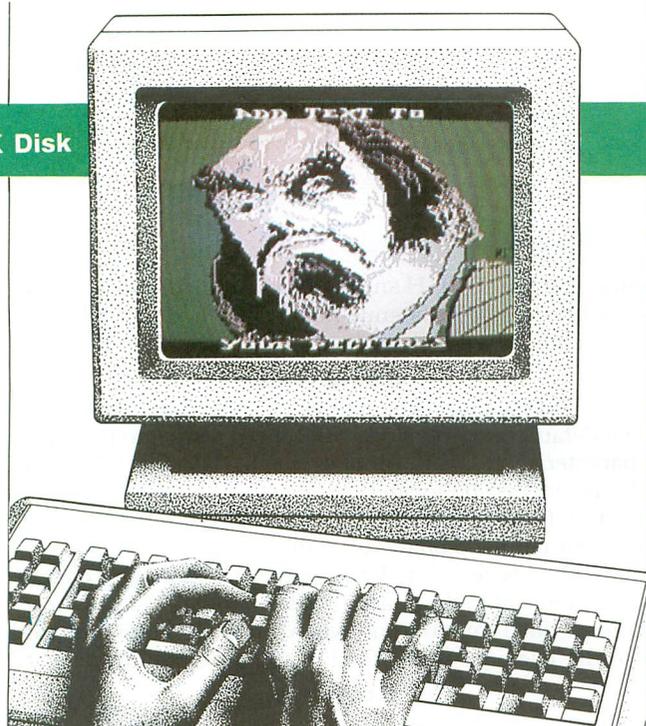
sive **Wishbringer** and **Trinity**. With his departure, I joined the group as Production Editor. Robin Levitsky came along a bit later, to help out with accounting chores for the business.

Tom, whose programming and graphic skills no reader will question, made the move into independent programming. His success with **DEGAS** (which started out as **HUDdraw** in these very offices) for Batteries Included has assured his place in that world. When Jon headed back to Missouri with Tom, I took over as Managing Editor. Edythe Stoddard was hired to help with production, and the inimitable Clayton Walnum was recruited for our technical staff. Shortly afterward, Douglas Weir came on-line to help meet the increasing demand for ST material. Connie Moore, our graphics specialist also started at that time, while Jane Sullivan helps as needed with editing and proofreading chores.

For Mike and Lee, **ANALOG Computing** has become a way of life. Just when they think they might like to move on to a different venture, there seems to be a new idea in the offing. . . like a separate magazine devoted solely to the ST computers. The publishing world never runs out of challenges to be met. It's an exciting, often controversial field, where you need all of the skills you may ever have used in a video game—and more. Dodging aliens' blasts is tame, compared to maintaining the #1 Atari magazines. **A**

Below are shown two sketches done of ideas for the first issue's cover.





# The Tablet Typist

**Enter text on your illustrations,  
with varied fonts and colors — even multicolor.**

by Matthew J.W. Ratcliff

The main problem with **Micro Illustrator** (as in **Micro Painter**, **KoalaPad** and the **Atari Artist**) is the fact that you cannot easily title your works. To sign your masterpiece, you must write freehand. To prevent fatal goofs, you must save the work before attempting this last step, because if you slip up, you'll have to reload the picture. Also, it would be nice if you could put text over some graphics screens — for VCR titling, for example. This is where **The Tablet Typist** comes in.

### The bridge.

The **Typist** will load an "uncompacted" picture file and allow you to type in either of two font sizes on the picture. The program supports custom character sets, letting you label your picture in many different fonts on a single display. Different character colors are easily selected, and even multicolor characters can be "typed" directly onto your picture.

To prevent tedious saves and loads, this program has instantaneous (well, almost) picture backup and restore *in memory*. It emulates the Atari text editor (i.e., control arrow cursor positioning), regardless of which font size is in use. A joystick can be used to fine position the cursor—and subsequent characters—anywhere on your picture. The resultant "labeled" picture may be saved, then reloaded into your version of **MicroIllustrator** (**MI**) for further graphics development. It may be sent to the printer with your favorite graphics dump utility (such as Jerry Allen's **Print Wiz**), or recorded on your VCR for impressive title screens. Sound interesting?

### Mr. D:PICTURE.

The Koala and Atari touch tablets save their picture files in "compacted" format, while the joystick version, **Micro-**

**Painter**, always saves in an uncompacted format. The **Typist** will load an uncompacted file called "D:PICTURE" for editing. With **MicroPainter**, give your save file this name. If you have a Koala or Atari tablet, you need only press the greater-than (>) key to save the picture to disk as an uncompacted file. The file created is automatically named PICTURE on drive 1. To load D:PICTURE back into either of these versions of **MI**, just press the less-than (<) key.

### Typing It In.

The first listing is the BASIC program, **The Tablet Typist**. I suggest that you type it in, verify it and save it to a fresh DOS disk as *D:TABLETYP.BAS*. This program gets its speed and versatility from four (count 'em, four) machine language USR routines. To avoid a long initialization delay or cryptic machine language string equates, the **Typist** uses a "system" file. When the program is run, it looks for a file called *D:TYPE.SYS*, which contains three of these USR routines. (You will have to type the one in Line 180, but it's only seven characters.)

Type, verify and save Listing 2. This program creates the *TYPE.SYS* file when run. Now, copy all your favorite character sets to this **Typist** disk. Give them a .SET extender. The custom character set feature will be covered in more detail below.

### The menu.

When run, the **Typist** will inform you that it's loading the *TYPE.SYS* file. After a few seconds, the program menu will appear. Study it before continuing. Press RETURN to exit to the graphics editing screen. Anytime you need a little "Help," just press CTRL-H. The current graphics display is automatically backed up (see below) before displaying this menu again. To continue editing, press RETURN, at which point the graphics screen and picture are restored.

## The text entry.

Loading and editing a picture is entirely optional. If you like, you can immediately begin typing text. This could be saved and have graphics added to it later, with your favorite version of **MI**. The edit screen first appears as your typical graphics mode 8+16, a blue display with a tiny flashing "cursor" in the upper left. "But I thought **MI** used a custom mode 7+ display," you say? True, just type a key. The first time you add something to the screen, a routine is called to convert the mode 8 display list to mode 7+. This is a "feature" best appreciated when you load a file (see below).

*Technical note:* The mode 7+ screen is a four-color one, 160 by 192. There is no GRAPHICS command for this mode on the 400/800 machines, but it's mode 15 on the XL/XEs. I used the display list modification technique for special effect and compatibility with all 8-bit Ataris.

The program defaults to font size 1, an equivalent to Atari graphics mode 1 characters. Press a key, any key. Press the Atari logo key and type inverse characters, if you like. If you make a typing error, just press BACKSPACE. To "jump over" characters, you can use the CTRL-ARROW keys. INSERT and DELETE functions are not supported, however. Press the RETURN key to move to the beginning of the next line.

Use a joystick in port 2 to move the flashing cursor. It starts slowly and speeds up as you hold the stick. This allows for fine positioning and fast moves across the screen. Since **MI** assumes that your tablet is in port 1, there's no need to swap tablet and joystick between programs. The stick is best used for fine positioning of characters. Once you begin typing a line of text, the CTRL-ARROW keys are better for cursor positioning.

Any typeable character can be entered and displayed anywhere on the screen. If you want inverse or control graphics characters, type them just as you would on a mode 0 display. Some control keypresses are reserved for commands. You can type these keys on the screen by pressing ESCAPE first.

## The ins and outs.

Once in the edit mode, press the CTRL-L key to load D:PICTURE. The **Typist** will beep once, to remind you to get the disk ready. Press RETURN to execute the load. Any other keypress will abort, so you don't accidentally wipe out the current display. The file will be loaded into the "backup" buffer, "restored" to the mode 8 display, and then the mode 7+ conversion is completed. It's a quick process and an interesting special effect. Once you've typed to your heart's content, use CTRL-S to save. A double beep will be sounded as a prompt. Press RETURN to execute, or any other key to abort.

## Quick copy.

If you really goof a picture with typing mistakes, just press CTRL-R. Zap, the screen is restored to its original form. When you have a "really nifty" display, just press CTRL-B to make a backup. Anytime you plan to try something unusual, use the backup feature. If you don't like the result, CTRL-R will repair the damage *pronto*. Keep in

mind that the CTRL-H and CTRL-F commands exit the edit screen to display a menu. Before this is done, a backup is executed automatically.

## Sizing it up.

The **Typist** allows you to type in two different font sizes. The default is size 1. Press CTRL-Z to switch to the larger characters, which are "double width." Note that the small characters can be located at any pixel position, with the joystick (1 pixel resolution). When in the large font, you may notice that a character will shift a little to the left or right when typed. The USR routine for the larger characters rounds off to the nearest "byte boundary" (4 pixel resolution). Keep this in mind when using the large font, and use the backup/restore facility to best advantage.

## Multi-fonts.

Press CTRL-F for a directory of all the fonts on drive 1. These character set files should have a .SET extender. If you don't have any custom fonts, I suggest that you get a copy of **Create-A-Font** by Vince Erceg. It appeared in the February 1984 **ANALOG Computing** (issue 16) and is one of the best public domain character set editors available. You'll have the option to enable the standard Atari font or load and enable a new one. If one was already loaded, you'll have the option to re-enable it.

If you have a favorite character set, put it on your **Tablet Typist** disk with the name D:CHARR.SET. When run, the program will look for a character set file by this name, and install it for the edit mode, if found. Since you're editing a graphics screen, the display doesn't change when fonts are changed. This allows you to type each character in a different font, if desired.

## Digital crayons.

When you wish to change colors, first type the next character (not a space). Before typing anything else, press CTRL-C. The last character displayed will change colors. You have three distinct colors for the small font and fifteen colors and "patterns" for the large font. Keep pressing CTRL-C until the desired color is displayed, then continue typing.

The colors and patterns achieved with the **Typist** will be the same as they would appear on the **MI** display, with default colors. Experiment with the **MI** color menu on a screen full of mixed font sizes and colors. It will serve as an introduction to the **Typist** and the color schemes available. Use **MI**'s magnify feature to see how the multicolor large font characters are made up. You can use **MI**'s fill feature to change character colors, if desired.

## USR information.

The **Typist** uses a modified version of Tom Hudson's BASIC CIO routines, in Lines 130-190. It's used for all file input and output. The string A\$ contains a USR routine of mine called "GTIA Textwriter," which appeared in the November 1983 issue of *Compute!* magazine. This utility puts text on any Atari graphics screen from mode 0 (goofy stuff) through mode 15. It works best for mode 11 screens. It creates the large font characters in the **Typist**. The USR call format for "Textwriter" is:

```
A=USR(ADR(A$),ADR(T$),C,LEN(T$),Y,X)
```

In this, T\$ is the text to be written, C is the color, and Y,X are the coordinates. Note: That really is Y,X. This USR routine supports special defaults, thus the unusual call format. I suggest that you refer to the article for additional information. The USR routine in C\$ (and some code in page 6, Lines 1850-1860) is "Textplot II," by Mark Grebe (COMPUTE!, December 1982). It creates the smaller font. Its calling format is:

```
A=USR (ADR (C$) , A , C , X , Y)
```

Here, A is the ATASCII value, C is the color, and X,Y are the coordinates. The final routine is in the string MOV\$, a simple memory move utility:

```
A=USR (ADR (MOV$) , S , D , N)
```

S is the source address, D is the destination address, and N is the number of bytes.

### The end.

A touch tablet and a good graphics dump utility, coupled with the **Tablet Typist**, will give you a "complete" graphics package. If you're using the **Typist** for your displays, while recording on the VCR, press the CAPS key to disable the flashing cursor. When ready to continue editing, just press RETURN.

The **Typist** always displays its graphics and text in the "default" colors used by **MI** (POKEd in Line 580). I prefer to use the sophisticated color selection menu of **MI** for making the "final version" of my pictures. If you're recording on the VCR from the **MI** display, don't forget to try the rainbow special effects. **A**

The two-letter checksum code preceding the line numbers here is *not* a part of the BASIC program. For further information, see the *BASIC Editor II*, in issue 47.

Listing 1.  
BASIC listing.

```
DS 10 REM THE TABLET TYPIST, BY M. RATCLI
FF
RY 20 GOSUB 1670
PB 30 CLOSE #C1:OPEN #C1,C4,C0,"K:":GOTO
330
GZ 40 A=USR (ADR (MOV$) ,ADR (PIC$) ,SCR ,SCL) :
RETURN :REM RESTORE
SZ 50 A=USR (ADR (MOV$) ,SCR ,ADR (PIC$) ,SCL) :
RETURN :REM BACKUP
QQ 60 FOR W=15 TO C0 STEP -C1
DS 70 SOUND C0,40,C10,W: SOUND C1,42,C10,W
NS 80 NEXT W
EY 90 SOUND C0,C0,C0,C0: SOUND C1,C0,C0,C0
RL 100 POKE C16,64:POKE 53774,64:FOR W=C1
TO 40:NEXT W
WD 110 IF PEEK (CH) <> C255 THEN POKE CH,C25
5:GOTO 100
ZB 120 RETURN
JZ 130 IO=IO*C16:IOCB=832+IO:POKE IOCB+C2
,CMND
CI 140 ADH=INT (AD/C256) :ADL=AD-C256*ADH
KT 150 NMH=INT (NM/C256) :NML=NM-C256*NMH
UF 160 POKE IOCB+C4,ADL:POKE IOCB+C5,ADH
VJ 170 POKE IOCB+C8,NML:POKE IOCB+C9,MMH
RU 180 I=USR (ADR ("hhhLUV"),IO) :ERR=PEEK (
IOCB+C3)
PZ 190 POKE 195,ERR:RETURN
MZ 200 A=PEEK (560)+256*PEEK (561)
```

```
MI 210 SOUND C0,181,12,C5: SOUND C1,185,12
,C5
FW 220 POKE A+C3,78
NO 230 FOR I=A+C6 TO A+98:POKE I,14:NEXT
I
EK 240 POKE A+99,78
VL 250 FOR I=A+102 TO A+198:POKE I,14:NEX
T I
OK 260 SOUND C0,C0,C0,C0: SOUND C1,C0,C0,C
0
CQ 270 SCMD=C1:RETURN
SU 280 XD=PEEK (XC)+C256*PEEK (XC+C1) :YD=PE
EK (YC) :RETURN
SZ 290 GOSUB 60:A=A-C1:IF A<>C0 THEN 290
XR 300 A=PEEK (CH) :IF A=C255 THEN 300
KR 310 IF A=154 THEN GOSUB 60:GOTO 300
YL 320 GET #C1,A:RETURN
IH 330 GOSUB 340:GOTO 560
IT 340 GRAPHICS C0:POKE 752,C1
RD 350 ? "** Tablet Typist By Mat*Rat **"
BV 360 ? :? "This utility will load a fil
e"
CK 370 ? "created by KOALA/ATARI Touch ta
blets"
CQ 380 ? "(saved with 'greater-than' keyp
ress) :? "and all Micro Illustrator fi
les."
XN 390 ? "Filename D:PICTURE always used.
"
YR 400 ? "
BM 410 ? :? "Use the Joystick-2 or contro
l-"
YI 420 ? "arrow keys to move cursor."
LY 430 ? "Type any letters at cursor."
YW 440 ? "Use the control key commands:"
OE 450 ? "AL - Load D:PICTURE (beep promp
t)"
NF 460 ? "AS - Save D:PICTURE (double bee
p)"
LR 470 ? "AB - Backup current screen"
XB 480 ? "AR - Restore screen"
DL 490 ? "A - Font size 1, small"
JY 500 ? "AZ - Font size 2, big"
VU 510 ? "AF - Custom Font control"
UI 520 ? "AC - Change color of last char
typed"
JS 530 ? "AH - Help, This Menu"
ID 540 ? :? "RETURN to BEGIN";
TI 550 A=C1:GOSUB 290:RETURN
WE 560 GRAPHICS 24:SCMD=C0:ACC=C1:REM SCR
EEM MOD FLAG,ACCELERATION FLAG
TC 570 CTY=C256:CCT=C1:POKE 710,C0
RG 580 POKE 709,202:POKE 711,40:POKE 712,
0:POKE 708,70:POKE 710,140
FS 590 IF PCFL THEN GOSUB 60:GOSUB 40:GOS
UB 200
IJ 600 A=PEEK (560)+256*PEEK (561) :SCR=PEEK
(A+C4)+C256*PEEK (A+C5) :POKE 756,CC5
OH 610 POSITION XD,YD
FS 620 LOCATE XD,YD,A
LG 630 COLOR C1:PLOT XD,YD
LU 640 COLOR C2:PLOT XD,YD
MI 650 COLOR C3:PLOT XD,YD
K0 660 COLOR A:PLOT XD,YD
WB 670 S=STICK (C1) :IF S<>15 THEN POKE 77,
C0
ZA 680 DX=(S=C5 OR S=C6 OR S=C7)-(S=C9 OR
S=C10 OR S=11)
GP 690 DY=(S=C5 OR S=C9 OR S=13)-(S=C6 OR
S=C10 OR S=14)
LJ 700 IF DX+DY=C0 THEN 770
YH 710 XD=XD+ACC*DX:IF XD<C0 THEN XD=319
KS 720 IF XD>319 THEN XD=C0
YP 730 YD=YD+ACC*DY:IF YD<C0 THEN YD=191
KU 740 IF YD>191 THEN YD=C0
FB 750 ACC=ACC+C1:IF ACC>C16 THEN ACC=C16
:REM CURSOR ACCELLERATION
```

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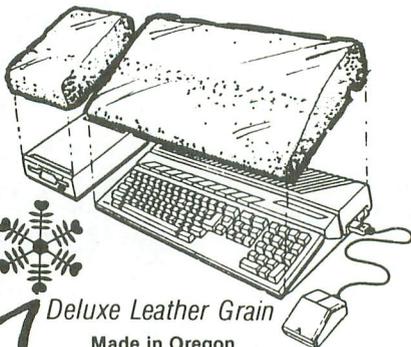
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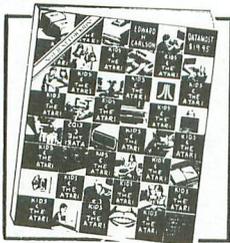
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# Tablet Typist *continued*

```

OH 760 GOTO 610
TQ 770 ACC=C1
DG 780 A=PEEK(CH):IF A=C255 THEN 610
ID 790 IF A=154 THEN GOSUB 60:GOTO 610:RE
M DISALLOW ^3, KEY-EOF
WL 800 GET #C1,A:IF A=27 THEN A=C1:GOSUB
290:GOTO 1450
YS 810 IF A=155 THEN XD=C0:DY=C8:OYD=YD:G
OTO 730
JE 820 IF A>=32 THEN 1450:REM TYPE NOW
IU 830 IF A=28 THEN DY=-C8:OYD=YD:GOTO 73
0:REM ^ARROW KEYS
5G 840 IF A=29 THEN DY=C8:OYD=YD:GOTO 730
NA 850 IF A=30 THEN DX=-C16*FNT:DY=C0:OXD
=(OXD+DX)*(XD>15):GOTO 710
IQ 860 IF A=31 THEN DX=C16*FNT:DY=C0:OXD=
XD:GOTO 710
MC 870 IF A=26 THEN FNT=C2:GOSUB 60:GOTO
610:REM ^A, FONT SIZE #1
MG 880 IF A=C1 THEN FNT=C1:GOSUB 60:GOTO
610:REM ^Z, FONT SIZE #2
ZD 890 IF A<>12 THEN 980:REM ^LOAD
AM 900 A=C1:GOSUB 290:IF A=155 THEN 920
UB 910 GOTO 610:REM NOT RETURN, ABORT
TL 920 FLT=C4:GOSUB 1590
VN 930 IO=C2:AD=ADR(PIC$):NM=5CL:CMND=CGE
T
AO 940 GOSUB 130:IF ERR=C3 THEN 960
UU 950 GOSUB 1620
MI 960 GOSUB 40:IF NOT SCMD THEN GOSUB 2
00
WN 970 PCFL=C1:GOTO 610
BA 980 IF A<>19 THEN 1040:REM ^SAVE
ZU 990 A=C2:GOSUB 290:IF A<>155 THEN GOTO
610
TG 1000 FLT=C8:GOSUB 1590
KO 1010 IO=C2:AD=SCR:NM=5CL:CMND=CPUT
DY 1020 GOSUB 130:IF ERR>127 THEN GOSUB 1
620
DM 1030 CLOSE #C2:GOTO 610
GI 1040 IF A<>C2 THEN 1060:REM ^BACKUP
TO 1050 GOSUB 50:GOSUB 60:GOTO 610
RR 1060 IF A<>18 THEN 1080:REM ^RESTORE
TI 1070 GOSUB 40:GOSUB 60:GOTO 610
UQ 1080 IF A<>C6 THEN 1360:REM ^FONT
FP 1090 GOSUB 50:GOSUB 280:GRAPHICS C0
TL 1100 CLOSE #C2:TRAP 1150
HP 1110 OPEN #C2,C6,C0,"D:*.*SET":? "Ch
aracter Set Directory **":I=C1
UY 1120 INPUT #C2,B$?:B$?:IF INT(I/C2)=I
/C2 THEN ? :GOTO 1140
JR 1130 ? "|";
SC 1140 I=I+C1:GOTO 1120
RJ 1150 CLOSE #C2:POKE 702,64:POKE 694,C0
:REM UPPER CASE,NORM VID
JF 1160 ? :? "Atari Font Enable"
ZT 1170 ? "Load & Enable new Font"
QK 1180 IF CST$(C1)="" THEN ? "Re-Enable ";C
5T$
TW 1190 A=C1:GOSUB 290
OJ 1200 IF A=65 THEN CC5=C50:GOTO 560:REM
ATARI SET
OD 1210 IF CST$(C1)="" THEN IF A=82 THEN CC5
=C5M:GOTO 560:REM RE-ENABLE
BS 1220 IF A<>76 THEN 1190:REM LOAD NEW 5
ET
YB 1230 ? "(RETURN only for another DIR)"
EO 1240 ? "Set Name Only (no DEV or EXT):
":INPUT B$
MZ 1250 IF B$="" THEN 1100
HO 1260 D$="D1:";D$(C4)=B$:D$(LEN(D$)+C1)
="."SET"
QU 1270 ? "Load Font file: ";D$
JS 1280 CLOSE #C2:TRAP 1290:OPEN #C2,C4,C
0,D$:GOTO 1320
QA 1290 ? "I/O Error ";PEEK(195)
HX 1300 ? "Press RETURN ";A=C1:GOSUB 290
MO 1310 CLOSE #C2:CC5=C50:GOTO 560
OC 1320 CST$=D$
ZO 1330 IO=C2:AD=C5M*C256:NM=1024:CMND=CG
ET
IF 1340 GOSUB 130:IF ERR<>C3 THEN CST$=""
:?"* Bad Font File *":GOTO 1300
NW 1350 CC5=C5M:GOTO 560
HN 1360 IF A<>C3 THEN 1420:REM ^COLOR
BU 1370 CCT=CCT+C1:IF CCT>15 THEN CCT=C1
IE 1380 IF FNT=C1 THEN IF CCT>C4 THEN CCT
=C1
CU 1390 IF CTY=C256 THEN GOSUB 60:GOTO 61
0
BH 1400 XD=OXD:YD=OYD
XL 1410 A=CTY:GOTO 1450
EB 1420 IF A<>C8 THEN 1450:REM ^HELP
WB 1430 GOSUB 50:REM BACKUP FIRST
HG 1440 GOSUB 280:GOSUB 340:GOTO 560
ZT 1450 CF=C0:IF A<>126 THEN 1480
CD 1460 CF=C1:A=32
CC 1470 XD=OXD:YD=OYD
WG 1480 B$=CHR$(A):CTY=A:IF NOT SCMD THE
N GOSUB 200:A=CTY:PCFL=C1
UQ 1490 OM FNT GOTO 1500,1510
ZK 1500 A=USR(ADR(C$),A,CCT,XD/C2,YD):GOT
O 1520
DX 1510 A=USR(ADR(A$),ADR(B$),CCT,C1,YD,X
D)
AC 1520 OXD=XD:OYD=YD
XW 1530 XD=XD+C16*FNT:IF XD>311 THEN XD=C
0:YD=YD+C8:IF YD>183 THEN YD=C0
US 1540 IF NOT CF THEN 1580
BY 1550 XD=OXD:YD=OYD
GI 1560 OXD=OXD-C16*FNT
YX 1570 IF OXD<C0 THEN OXD=C0:OYD=OYD-C8:
IF OYD<C0 THEN OYD=C0
QP 1580 GOTO 610
QB 1590 TRAP 1620
PC 1600 CLOSE #C2:OPEN #C2,FLT,C0,"D:PICT
URE"
AO 1610 RETURN
NW 1620 GOSUB 280:GRAPHICS C0:PCFL=C0
IS 1630 ? "I/O ERROR ";PEEK(195);" *"
HA 1640 ? "Press RETURN ";:POP
UQ 1650 A=C3:GOSUB 290:CLOSE #C2
QC 1660 GOTO 330
PK 1670 C0=0:C1=1:C2=2:C3=3:C4=4:C5=5:C6=
6:C7=7:C8=8:C9=9:C10=10:C255=255
LK 1680 XC=85:YC=84:XD=C0:YD=C0:CGET=C7:C
PUT=11:C256=256:SCL=7680:C16=16
IL 1690 DIM CST$(20),A$(410),B$(45),C$(35
4),D$(40),PIC$(5CL),MOV$(76)
YF 1700 C5M=PEEK(106)-C16:POKE 106,C5M:GR
APHICS C0:?"Initializing TABLET TYPIS
T 5Y5 file."
HC 1710 PIC$(C1)=" ":PIC$(5CL)=" ":PIC$(C
2)=PIC$:LOD=C0
DY 1720 C50=PEEK(756):CC5=C50:CST$=""
YU 1730 TRAP 1760:CLOSE #C2:OPEN #C2,C4,C
0,"D:CHAR.SET"
NO 1740 IO=C2:AD=C256*C5M:NM=1024:CMND=CG
ET:GOSUB 130:IF ERR<>C3 THEN 1760
WF 1750 CST$="D:CHAR.SET":CC5=C5M
WM 1760 A$(C1)=" ":A$(410)=" ":A$(C2)=A$
JF 1770 C$(C1)=" ":C$(354)=" ":C$(C2)=C$
UW 1780 MOV$(C1)=" ":MOV$(76)=" ":MOV$(C2
)=MOV$
NL 1790 CLOSE #C2:TRAP 1800:OPEN #C2,C4,C
0,"D:TYPE.SY5":GOTO 1810
AY 1800 POKE 106,160:GRAPHICS C0:?"NO TY
PE.SY5 FILE!":END
XM 1810 IO=C2:AD=ADR(A$):NM=410:CMND=CGET
:GOSUB 130:IF ERR<>C1 THEN 1800
GM 1820 IO=C2:AD=ADR(C$):NM=354:CMND=CGET
:GOSUB 130:IF ERR<>C1 THEN 1800
YZ 1830 IO=C2:AD=ADR(MOV$):NM=76:CMND=CGE
T:GOSUB 130:IF ERR<>C3 THEN 1800
ST 1840 PCFL=C0:CH=764:FNT=C1
JK 1850 RESTORE 1860:FOR I=C0 TO 21:READ

```

# Tablet Typist *continued*

```

X:POKE 1536+I,X:NEXT I:GOTO 1870
BC 1860 DATA 169,0,133,212,162,8,70,186,1
44,3,24,101,187,106,102,212,202,208,24
3,133,213,96
BK 1870 RETURN
HJ 6+I,X:NEXT I:GOTO 1870

```

Listing 2.  
BASIC listing.

```

BI 1 REM Tablet Typist SYS file Loader
YU 2 REM By Matthew J. W. Ratcliff
DW 10 DATA 0,1,2,3,4,5,6,7,8,9,0,0,0,0,0,
0,0,10,11,12,13,14,15
QU 20 DIM D$(90),HEX(22):RESTORE 32000
QT 30 READ LASTLIN,LMLST:RESTORE 10
EB 40 FOR I=0 TO 22:READ A:HEX(I)=A:NEXT
I
ST 50 LINE=990:RESTORE 1000:PASS=0:DONE=0
WT 60 GRAPHICS 0:POKE 752,1:? "CHECKING D
ATA:"
MT 70 LINE=LINE+10:LN=80:IF LINE=LASTLIN
THEN LN=LMLST:DONE=1
ZC 80 POSITION 2,4:? "LINE";LINE
RO 90 READ D$:IF LEN(D$)<>LN THEN 500
XK 100 DL=PEEK(183)+256*PEEK(184):IF DL<>
LINE THEN ? "LINE";LINE;" MISSING":
END
EP 110 FOR X=1 TO LN-1 STEP 2:D1=ASC(D$(X
,X))-48:D2=ASC(D$(X+1,X+1))-48:B=HEX(D
1)*16+HEX(D2)
TV 120 SUM=SUM+B:IF SUM>999 THEN SUM=SUM-
1000
EN 130 IF PASS THEN PUT #1,B
LT 140 NEXT X
LT 150 READ CK:IF CK<>SUM THEN 510
CR 160 IF NOT DONE THEN 70
NE 170 IF PASS THEN 210
WR 180 PASS=PASS+1:TRAP 600:CLOSE #1
EM 190 ? "DATA GOOD!":? "PRESS RETURN"
WHEN "Tablet Typist":? "DISK READY ";:I
NPUT D$:DONE=0
QN 200 SUM=0:RESTORE 1000:LINE=990:OPEN #
1,8,0,"D1:TYPE.SYS":POSITION 2,0:? "WR
ITING DATA ":GOTO 70
IK 210 CLOSE #1:? "ALL DONE *":? "WAR
NING Be sure to SAVE this loader"
KS 220 ? "as a backup, just in case!":GOT
0 520
JW 500 ? "DATA LENGTH ERROR IN LINE ";L
INE:GOTO 520
WE 510 ? "CHECKSUM ERROR IN LINE ";LINE
VQ 520 POKE 752,0:?:END
EF 600 ? "I/O ERROR ";PEEK(195);" AT LI
NE ";PEEK(186)+256*PEEK(187):GOTO 520
PU 1000 DATA A5C885DFA90185DEA55485E5A555
85E3A55685E4A657A90AE0059008A914E00790
02A92885EF68F0,383
XI 1010 DATA 30AA6885D56885D4CAF031686885
DFCAF02A686885DECAF023686885E5CAF01668
85E46885E3CAF0,484
JM 1020 DATA 136868CAD0FB18900BA9FD4CA4F6
A90085E385E4A5E585E9A5EF85ECA90085E6A2
080A26E606E990,245
JL 1030 DATA 071865EC9002E6E6CAD0EF85E5A5
5885D8A55985D9A5E51865D885D8A5E665D985
D9A201A557C909,208
UH 1040 DATA B007A2024AB002A203A5E365E4F0
1946E466E3CAF00546E3CAD0FBE6E918A5E365
D885D89002E6D9,128
NB 1050 DATA A5D885E0A5D985E1A90085E2A200
A90095DAE8A5DF95DA0A0A0A0AE895DA05DBE8
95DAA4E2B1D4A2,222
LZ 1060 DATA 0086EAC9809004297FC6EAAA85EC
E060B00DA940E0209002A9E01865EC85ECA908

```

```

85E9A90085D7A2,695
DI 1070 DATA 080A26D706E990071865EC9002E6
D7CAD0EF85D618ADF40265D785D7A00084EBA0
0884EE18900318,671
LT 1080 DATA 90A9A4EBB1D6E6EB45EA85E8A900
85EDA90485E7A90085E9A00206E826E988D0F9
A6E9B5DAA4ED91,126
LF 1090 DATA D8E6EDC6E7D0E518A5D865EF85D8
9002E6D9C6EED0C4C6DED00160E6E218A5E069
0485E09002E6E1,863
AB 1100 DATA 85D8A5E185D91890A66068F00AC9
04F00DA6868CAD0FBA91685B94C40B96885C3
68C9809004297F,248
XC 1110 DATA C6C3AA8D1606E060B00FA940E020
9002A9E0186D16068D160668688D170668688D
1806C904900538,16
EM 1120 DATA E904B0F785D6C900F007A90438E5
D685D64E18064E180606D61868688D190685BA
A657A90AE003F0,548
DS 1130 DATA 08A914E005F002A92885CF85BBA5
5885CBA55985CC20000618AD180665CB85CB90
02E6CC18A5CB65,243
ZI 1140 DATA D485CBA5CC65D585CCAD160685BB
A90885BA200006A5D485CDADF40265D585CEA0
00A208A90085D1,494
YQ 1150 DATA 85D0B1CD45C348680A48900818AD
170605D085D0E001F00806D026D106D026D1CA
D0E4689848A000,192
AZ 1160 DATA 84D784D4A6D6F0583826D7CAD0FA
B1CB05D745D791CBA5D749FF85D7C8C8B1CB05
D745D791CBA6D6,860
YE 1170 DATA 06D126D4CAD0F9A00018B1CB65D4
91CBA90838E5D6AA84D446D066D4CAD0F9F002
D087A00218B1CB,801
RL 1180 DATA 65D491CB18A5D065D1A00191CB18
9009A5D191CBC8A5D091CB68A818A5CB65CF85
CB9002E6CCC8C0,778
E5 1190 DATA 08D0CE6068F00AC903F007AA6868
CAD0FB606885D56885D46885D76885D66885D9
6885D8A6D8CAE0,753
A0 1200 DATA FFD00E86D8A6D9D00160CA86D9A0
00F00286D8A000B1D491D6E6D4D002E6D5E6D6
D0D9E6D7D0D560,407
BJ 32000 DATA 1200,80

```



# Slither

**Survival of the fattest is the theme of this machine language game.**

by Steven E. Pearson and Paul Kohut

It is springtime. Things are really starting to buzz. Birds are singing, flowers are blooming, and the sun is shining. All the animals are returning, or emerging from their winter retreats, and they're ravenous. They haven't eaten a thing in nearly four months.

Slick is no exception. He just got back from his winter snake hole in the South of France, and there's only one thing on his mind: food! Lucky for him, his swamp has an enormous supply of turtle eggs, so he can devour all he wants. However, he can't just take his time chewing his food. A growing reptile needs all the energy he can get, or he just can't keep going. So, if Slick wants to make it to adulthood, he'd better make like a snake and **Slither!**

### Typing it in.

Listing 1 is the BASIC data used to create your copy of **Slither**. See the **M/L Editor** article on page 90 for typing instructions.

### Playing the game.

**Slither** is a one-player game, so plug a joystick into port 0 and boot up **Slither**. Take a deep breath, find a comfortable seat and push the START key to begin. The idea here is to move the snake around, through the maze, using the stick to guide him as he gorges himself on turtle eggs. To complete a level, Slick must eat all the eggs in a time limit of 90 seconds (the clock counts down 5 seconds at a time). Finishing a level changes the screen (there are three in all) and increases Slick's speed.

Now, each time Slick wolfs down an egg, he grows a new segment—by holding his tail in place, while his head moves forward one space. So, the more eggs he eats, the longer and longer he becomes. This would be great—if it weren't for the fact that, if he moves backward, he kills himself, or if he runs into his body, he gets stuck and dies. The scoring is 10 points per egg and 1,000 points for the completion of a level. An extra snake is awarded for each 10,000 points. You'll soon see how quickly this game becomes difficult. We think this makes it fun—and a great test of your hand-eye coordination. Enjoy! **A**

*Steven E. Pearson learned BASIC in high school, four years ago, and took FORTRAN, Modula-2 and assembly language (which taught him nothing but binary and hex) in college. His 6502 machine language is self taught.*

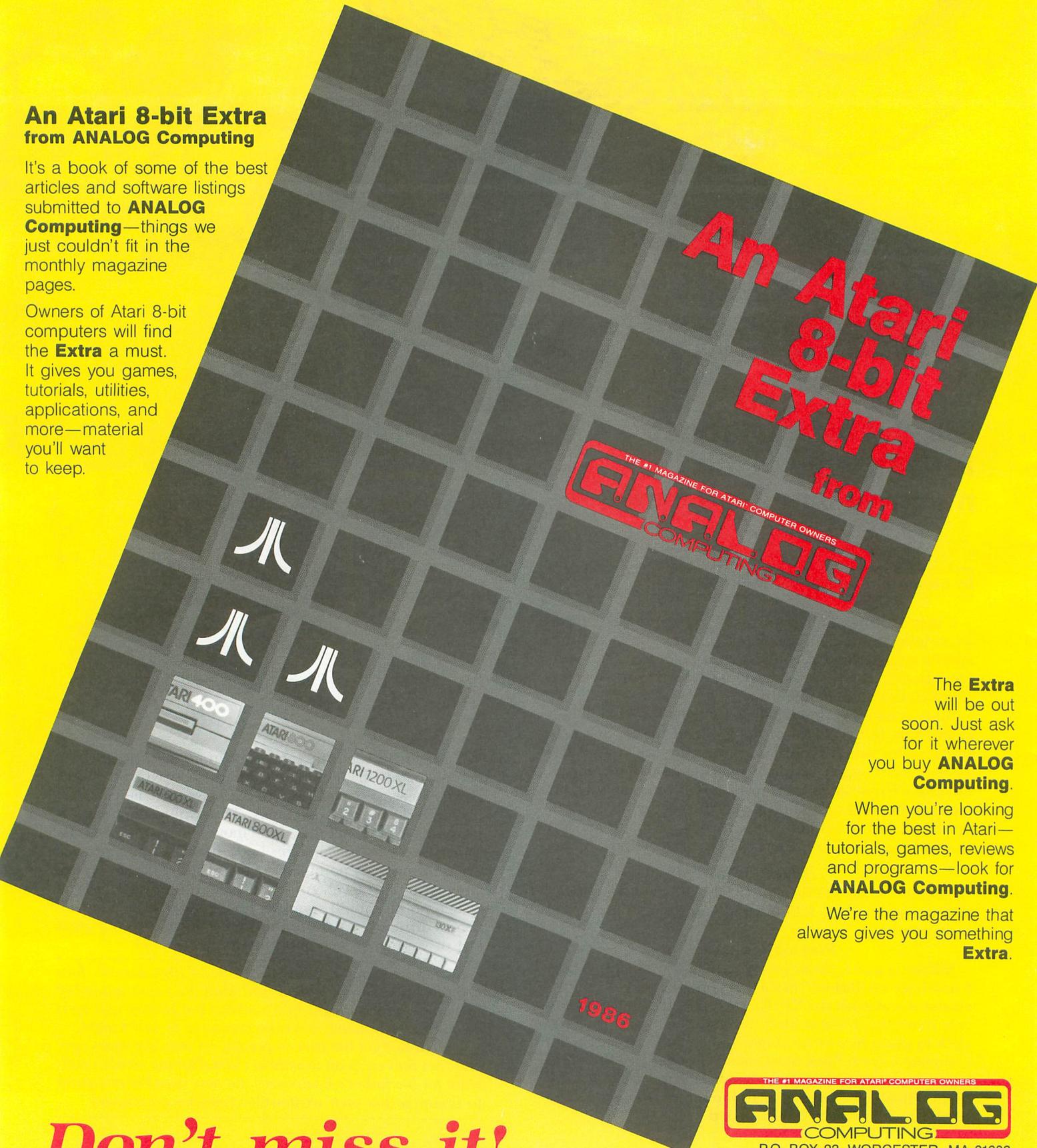
*Paul Kohut got his first computer, an 800, six years ago, and met Steven in an assembly class. Having written software for his father's businesses, he now uses his computer to organize his own wastewater treatment company.*

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Listing 1.

```

1000 DATA 255,255,0,53,251,53,169,1,14
1,255,52,32,229,57,162,0,5721
1010 DATA 134,143,134,156,142,0,210,16
2,88,142,244,2,32,1,58,32,2664
1020 DATA 74,58,162,32,134,82,162,36,1
34,83,162,21,134,84,162,32,4338
1030 DATA 134,85,162,0,134,86,169,170,
141,68,3,169,58,141,69,3,3370
1040 DATA 169,10,141,72,3,169,0,141,73
,3,32,86,228,173,31,208,5347
1050 DATA 201,6,208,249,162,21,134,84,
162,32,134,85,169,180,141,68,7621
1060 DATA 3,169,58,141,69,3,169,10,141
,72,3,169,0,141,73,3,932
1070 DATA 32,86,228,173,255,52,201,1,2
40,23,162,0,134,143,134,156,8074
1080 DATA 142,0,210,32,229,57,169,88,1
41,244,2,32,1,58,32,74,1958
1090 DATA 58,169,88,141,244,2,169,0,14
1,255,52,24,169,85,101,88,5718
1100 DATA 133,152,169,2,101,89,133,153
,24,169,44,101,88,133,154,169,6868
1110 DATA 2,101,89,133,155,24,169,136,
101,88,133,134,169,1,101,89,5313
1120 DATA 133,135,24,165,88,105,220,13
3,161,165,89,105,1,133,162,162,8164
1130 DATA 65,134,158,162,64,134,159,16
0,0,132,19,132,20,169,25,145,4536
1140 DATA 161,200,169,16,145,161,24,16
5,88,105,43,133,128,165,89,105,6351
1150 DATA 0,133,129,24,165,88,105,45,1
33,130,165,89,105,0,133,131,5183
1160 DATA 162,0,252,53,247,54,134,141,
162,7,134,138,162,239,142,1,8171
1170 DATA 210,169,31,133,160,160,0,145
,128,169,12,200,145,128,200,169,18
1180 DATA 13,145,128,160,1,169,18,56,2
29,19,141,0,6,41,1,201,1785
1190 DATA 1,240,7,169,16,145,161,76,52
,54,169,21,145,161,173,0,4906
1200 DATA 6,74,24,105,16,160,0,145,161
,173,0,6,201,0,208,3,3078
1210 DATA 76,184,56,162,0,134,77,166,1
58,32,216,57,169,0,141,0,4255
1220 DATA 210,173,120,2,133,140,162,0,
221,130,58,240,8,232,224,4,8366
1230 DATA 208,246,76,114,54,165,138,13
3,140,76,132,54,197,138,240,4,8181
1240 DATA 165,138,133,139,165,140,201,
15,240,4,165,140,133,138,165,140,9899
1250 DATA 201,15,208,4,165,138,133,140
,165,130,133,146,165,131,133,147,151
1260 DATA 165,140,201,14,240,15,201,13
,240,27,201,11,240,39,201,7,6731
1270 DATA 240,51,76,25,54,56,165,130,2
33,40,133,130,165,131,233,0,7735
1280 DATA 133,131,76,232,54,24,165,130
,105,40,133,130,165,131,105,0,5362
1290 DATA 133,131,76,232,54,56,165,130
,233,1,133,130,165,131,233,0,8246
1300 DATA 133,131,76,232,54,24,165,130
,105,1,133,130,165,131,105,0,4992
1310 DATA 133,131,162,0,161,130,201,10
,208,3,76,40,56,201,11,208,5516
1320 DATA 3,76,248,54,243,55,8,55,201,
12,208,3,76,184,56,197,6285
1330 DATA 160,208,35,76,184,56,32,54,5
5,169,80,141,0,210,32,27,2836
1340 DATA 57,165,143,41,3,168,230,156,
165,156,217,134,58,208,3,76,8168
1350 DATA 107,57,162,1,134,141,32,54,5
5,166,141,224,0,240,16,198,7395
1360 DATA 141,76,25,54,160,0,169,12,14
5,146,169,13,145,130,96,56,4844
1370 DATA 165,128,233,40,133,132,165,1
29,233,0,133,133,160,0,177,132,8297
1380 DATA 201,12,208,8,162,0,142,1,6,7
6,139,55,160,80,177,132,5043
1390 DATA 201,12,208,8,162,2,142,1,6,7
6,139,55,160,39,177,132,4491
1400 DATA 201,12,208,8,162,4,142,1,6,7
6,139,55,160,41,177,132,4541
1410 DATA 201,12,208,5,162,6,142,1,6,1
69,0,170,129,128,174,1,4006
1420 DATA 6,189,122,58,133,150,232,189
,122,58,133,151,108,150,0,56,6456
1430 DATA 165,128,233,40,133,128,165,1
29,233,0,133,129,76,225,55,24,6785
1440 DATA 165,128,105,40,133,128,165,1
29,105,0,133,129,76,225,55,56,5771
1450 DATA 165,128,233,1,133,128,165,12
9,233,0,133,129,76,225,55,24,6649
1460 DATA 165,128,105,1,133,128,165,12
9,105,0,133,129,76,225,55,56,5635
1470 DATA 165,128,233,40,133,148,165,1
29,233,0,133,149,160,0,177,148,8941
1480 DATA 201,12,244,55,239,56,208,7,1
60,30,132,160,76,31,56,160,5634
1490 DATA 39,177,148,201,12,208,7,160,
31,132,160,76,31,56,160,41,4282
1500 DATA 177,148,201,12,208,7,160,31,
132,160,76,31,56,160,30,132,4600
1510 DATA 160,160,0,165,160,145,128,76
,25,54,56,165,146,233,40,133,7073
1520 DATA 132,165,147,233,0,133,133,24
,165,146,105,40,133,148,165,147,8484
1530 DATA 105,0,133,149,162,0,161,132,
201,10,240,7,201,12,240,12,6829
1540 DATA 76,99,56,161,148,201,12,208,
12,76,158,56,161,148,201,10,6938
1550 DATA 208,3,76,158,56,165,146,2
33,1,133,132,165,147,233,0,8415
1560 DATA 133,133,24,165,146,105,1,133
,148,165,147,105,0,133,149,162,7670
1570 DATA 0,161,132,201,10,240,7,201,1
2,240,12,76,169,56,161,148,7555
1580 DATA 201,12,240,12,76,169,56,161,
148,201,10,240,3,76,169,56,6513
1590 DATA 166,146,134,130,166,147,134,
131,76,25,54,166,139,134,140,166,8627
1600 DATA 146,134,130,166,147,134,131,
76,114,54,160,0,162,128,185,155,8611
1610 DATA 58,141,0,210,152,72,32,216,5
7,104,168,200,192,15,208,236,1337
1620 DATA 160,0,177,152,201,16,208,3,7
6,213,57,56,233,1,145,152,7263
1630 DATA 165,88,133,148,165,89,133,14
9,160,0,177,148,201,12,240,15,8228
1640 DATA 201,13,240,56,235,57,240,11,
201,30,240,7,201,31,240,3,7624
1650 DATA 76,1,57,169,0,145,148,200,19
2,40,208,226,24,169,40,101,8103
1660 DATA 148,133,148,169,0,101,149,13
3,149,232,224,24,208,206,76,209,2392
1670 DATA 53,160,3,177,134,201,25,240,
6,24,105,1,145,134,96,169,6097
1680 DATA 16,145,134,160,2,177,134,201
,25,240,6,24,105,1,145,134,5323
1690 DATA 96,169,16,145,134,160,1,177,
134,201,25,240,6,24,105,1,4181
1700 DATA 145,134,96,169,16,145,134,16
0,0,177,152,24,105,1,145,152,5961
1710 DATA 177,134,201,25,240,6,24,105,
1,145,134,96,169,16,145,134,5927
1720 DATA 96,160,0,56,165,158,233,4,20
1,13,240,2,133,158,162,128,8818
1730 DATA 185,138,58,141,0,210,152,72,
32,216,57,104,168,200,192,17,8288
1740 DATA 208,236,230,143,162,0,134,15

```



# Slither *continued*

6,160,2,177,154,201,25,240,8,8624  
 1750 DATA 24,105,1,145,154,76,204,57,1  
 69,16,145,154,160,1,177,154,8014  
 1760 DATA 201,25,240,8,24,105,1,145,15  
 4,76,204,57,169,16,145,154,6814  
 1770 DATA 160,0,177,154,201,25,240,6,2  
 4,145,154,76,204,57,169,16,6473  
 1780 DATA 145,154,32,63,57,32,74,58,76  
 ,209,53,76,28,53,160,255,5895  
 1790 DATA 136,192,255,208,251,202,224,  
 0,208,244,96,173,48,2,133,136,209  
 1800 DATA 173,49,236,57,121,58,2,133,1  
 37,169,68,160,3,145,136,160,7298  
 1810 DATA 6,169,4,145,136,200,192,29,2  
 08,249,96,169,3,141,66,3,6699  
 1820 DATA 169,8,141,74,3,169,0,141,75,  
 3,169,71,141,68,3,169,3831  
 1830 DATA 58,141,69,3,32,86,228,169,11  
 ,141,3,6,141,66,3,162,3021  
 1840 DATA 29,134,82,162,39,134,83,162,  
 0,169,217,141,68,3,169,71,6273  
 1850 DATA 141,69,3,169,232,141,72,3,16  
 9,0,141,73,3,32,86,228,4721  
 1860 DATA 96,69,58,155,162,0,134,82,16  
 2,28,134,83,162,0,134,84,4960  
 1870 DATA 134,85,134,86,165,143,41,3,1  
 0,168,185,209,71,141,68,3,5192  
 1880 DATA 185,210,71,141,69,3,169,155,  
 141,72,3,169,2,141,73,3,3241  
 1890 DATA 32,86,228,96,122,58,189,58,1  
 61,55,177,55,193,55,209,55,7807  
 1900 DATA 5,6,9,10,106,104,106,105,0,6  
 0,53,50,47,60,53,47,9501  
 1910 DATA 47,64,53,53,60,60,60,60,0,0,  
 200,200,0,220,220,0,4996  
 1920 DATA 240,240,0,255,255,255,255,0,  
 80,82,69,83,83,83,84,65,6086  
 1930 DATA 82,84,32,32,32,32,32,32,3  
 2,32,32,0,88,251,88,985  
 1940 DATA 0,0,0,0,0,0,0,0,12,12,12,1  
 2,0,12,0,2672  
 1950 DATA 0,51,51,51,0,0,0,0,0,51,63,5  
 1,51,63,51,0,6534  
 1960 DATA 12,63,48,63,3,63,12,0,0,51,3  
 ,12,12,48,51,0,5251  
 1970 DATA 12,51,51,51,204,204,204,51,0  
 ,12,12,12,0,0,0,0,6917  
 1980 DATA 0,15,12,48,48,12,15,0,0,60,1  
 2,3,3,12,60,0,4530  
 1990 DATA 17,68,17,68,17,68,17,68,0,0,  
 0,40,40,0,0,0,5182  
 2000 DATA 60,255,255,255,255,255,255,6  
 0,60,255,215,215,215,215,255,60,8050  
 2010 DATA 0,0,0,0,0,12,12,0,0,3,3,12,1  
 2,48,48,0,3921  
 2020 DATA 0,63,51,51,51,51,63,0,0,12,6  
 0,12,12,12,63,0,5698  
 2030 DATA 0,63,51,3,63,48,63,0,0,63,3,  
 63,3,3,63,0,5810  
 2040 DATA 0,51,51,63,3,3,3,0,0,63,48,6  
 0,3,3,60,0,5460  
 2050 DATA 0,63,48,63,51,51,63,0,0,63,3  
 ,3,12,48,48,0,5821  
 2060 DATA 0,63,51,63,51,51,63,0,0,63,5  
 1,63,3,3,3,0,5666  
 2070 DATA 0,0,12,12,0,12,12,0,0,0,12,1  
 2,0,12,12,48,3702  
 2080 DATA 0,3,12,48,12,3,0,0,0,0,63,0,  
 0,63,0,0,3967  
 2090 DATA 60,60,60,60,60,60,60,60,0,0,  
 255,255,252,88,207,89,9152  
 2100 DATA 255,255,0,0,85,85,85,85,85,8  
 5,85,85,0,63,51,51,1108  
 2110 DATA 63,51,51,0,0,63,51,63,51,51,  
 63,0,0,63,51,48,7744  
 2120 DATA 48,51,63,0,0,60,51,51,51,51,  
 60,0,0,63,48,60,7775  
 2130 DATA 48,48,63,0,0,63,48,60,48,48,

48,0,0,63,51,48,7512  
 2140 DATA 48,63,63,3,0,51,51,63,51,51,  
 51,0,0,63,12,12,6466  
 2150 DATA 12,12,63,0,0,3,3,3,51,63,0  
 ,0,51,51,60,6107  
 2160 DATA 60,51,51,0,0,48,48,48,48,48,  
 63,0,0,51,63,63,7755  
 2170 DATA 51,51,51,0,0,63,51,51,51,51,  
 51,0,0,12,51,51,6898  
 2180 DATA 51,51,12,0,0,63,51,63,48,48,  
 48,0,0,12,51,51,6797  
 2190 DATA 51,51,12,3,0,63,51,63,60,51,  
 51,0,0,63,48,63,7851  
 2200 DATA 3,3,63,0,0,63,12,12,12,12,12  
 ,0,0,51,51,51,5611  
 2210 DATA 51,51,63,0,0,51,51,51,51,63,  
 12,0,0,51,51,51,7139  
 2220 DATA 63,63,51,0,0,51,51,12,12,51,  
 51,0,0,51,51,63,6987  
 2230 DATA 12,12,12,0,0,64,251,64,42,42  
 ,42,42,42,42,42,42,9155  
 2240 DATA 42,42,42,42,42,42,42,42,42,4  
 2,42,42,42,42,42,42,42,7952  
 2250 DATA 42,42,42,42,42,42,42,32,32,32,3  
 2,32,32,43,32,32,32,6955  
 2260 DATA 43,32,32,32,43,32,32,32,43,3  
 2,32,32,43,32,32,32,6920  
 2270 DATA 43,42,42,32,42,32,42,32,42,32,42,3  
 2,42,32,42,32,42,32,7283  
 2280 DATA 42,32,42,32,42,32,42,32,42,32,42,3  
 2,42,32,42,32,42,42,7432  
 2290 DATA 32,43,32,32,32,32,43,32,32,3  
 2,32,43,32,32,32,43,7049  
 2300 DATA 32,32,32,32,43,32,32,43,32,32,43,32,3  
 2,32,42,42,32,42,32,7195  
 2310 DATA 42,32,42,32,42,43,42,32,42,32,42,3  
 2,42,32,42,32,42,32,7368  
 2320 DATA 42,32,42,32,42,32,42,32,42,4  
 2,32,43,32,32,32,43,7330  
 2330 DATA 32,32,32,43,32,32,32,43,32,3  
 2,32,43,32,32,32,43,7122  
 2340 DATA 32,32,32,43,32,42,42,32,42,3  
 2,42,43,42,32,42,32,7478  
 2350 DATA 42,32,42,43,42,32,42,32,42,3  
 2,42,43,42,32,42,32,7518  
 2360 DATA 42,32,42,42,43,32,32,43,32,3  
 2,43,32,32,43,32,32,7210  
 2370 DATA 43,32,32,43,32,32,43,32,32,4  
 3,32,32,43,32,32,42,7267  
 2380 DATA 42,32,42,43,42,32,42,43,42,3  
 2,42,43,42,43,42,43,7966  
 2390 DATA 42,32,42,43,252,64,247,65,42  
 ,43,42,32,42,32,42,32,477  
 2400 DATA 42,42,32,32,32,32,43,32,32,3  
 2,43,32,32,43,32,7145  
 2410 DATA 32,32,43,32,32,32,43,32,32,3  
 2,43,32,32,42,42,43,7459  
 2420 DATA 42,32,42,43,42,32,42,43,42,3  
 2,42,43,42,32,42,43,7852  
 2430 DATA 42,32,42,43,42,32,42,43,42,3  
 2,42,42,32,32,43,32,7559  
 2440 DATA 43,32,32,32,43,32,43,32,32,3  
 2,43,32,43,32,32,32,7199  
 2450 DATA 43,32,32,32,32,32,32,42,42,3  
 2,42,32,42,32,42,32,7373  
 2460 DATA 42,32,42,32,42,32,42,32,42,32,42,3  
 2,42,32,42,32,42,43,7628  
 2470 DATA 42,32,42,32,42,42,43,32,32,3  
 2,32,43,32,32,43,32,7346  
 2480 DATA 32,32,32,32,43,32,32,43,32,3  
 2,43,32,32,43,32,32,7250  
 2490 DATA 32,42,42,32,42,32,42,32,42,4  
 3,42,32,42,32,42,32,7602  
 2500 DATA 42,32,42,43,42,32,42,32,42,3  
 2,42,32,42,32,42,42,7696  
 2510 DATA 32,43,32,32,43,32,32,43,32,4  
 3,32,32,32,43,32,32,7214  
 2520 DATA 32,43,32,32,32,43,32,32,32,4

3, 32, 42, 42, 32, 42, 32, 7470  
 2530 DATA 42, 32, 42, 32, 42, 32, 42, 32, 42, 4, 4  
 3, 42, 32, 42, 32, 42, 32, 7632  
 2540 DATA 42, 32, 42, 32, 42, 32, 42, 32, 42, 4  
 2, 43, 32, 32, 43, 32, 32, 7517  
 2550 DATA 32, 43, 32, 32, 248, 65, 243, 66, 32  
 , 32, 43, 32, 32, 32, 32, 72  
 2560 DATA 32, 43, 32, 32, 43, 32, 32, 32, 43, 4  
 2, 42, 32, 42, 43, 42, 32, 7732  
 2570 DATA 42, 43, 42, 32, 42, 43, 42, 32, 42, 4  
 3, 42, 43, 42, 32, 42, 43, 8068  
 2580 DATA 42, 32, 42, 43, 42, 32, 42, 42, 32, 3  
 2, 32, 43, 32, 32, 43, 7524  
 2590 DATA 32, 32, 32, 43, 32, 32, 32, 43, 32, 3  
 2, 43, 32, 32, 32, 43, 7371  
 2600 DATA 32, 32, 32, 42, 42, 32, 42, 32, 42, 3  
 2, 42, 32, 42, 43, 42, 32, 7746  
 2610 DATA 42, 32, 42, 32, 42, 32, 42, 32, 42, 4  
 3, 42, 32, 42, 32, 42, 32, 7712  
 2620 DATA 42, 42, 43, 32, 43, 32, 32, 32, 32, 3  
 2, 32, 32, 43, 32, 32, 32, 7233  
 2630 DATA 32, 43, 32, 32, 32, 43, 32, 32, 43, 3  
 2, 32, 32, 43, 42, 42, 42, 7762  
 2640 DATA 42, 42, 42, 42, 42, 42, 42, 42, 42, 4  
 2, 42, 42, 42, 42, 42, 42, 8352  
 2650 DATA 42, 42, 42, 42, 42, 42, 42, 42, 42, 4  
 2, 42, 42, 42, 42, 42, 42, 8362  
 2660 DATA 42, 42, 42, 42, 42, 42, 42, 42, 42, 4  
 2, 42, 42, 42, 42, 42, 42, 8372  
 2670 DATA 42, 42, 42, 42, 42, 42, 42, 42, 42, 3  
 2, 32, 32, 32, 32, 42, 32, 7622  
 2680 DATA 43, 32, 32, 32, 43, 32, 42, 32, 43, 3

2, 32, 32, 43, 32, 42, 32, 7560  
 2690 DATA 43, 32, 32, 32, 42, 42, 32, 42, 32, 4  
 2, 32, 43, 32, 42, 32, 42, 7775  
 2700 DATA 32, 42, 32, 43, 32, 42, 32, 42, 32, 4  
 2, 32, 43, 32, 42, 32, 42, 7788  
 2710 DATA 32, 42, 42, 43, 244, 66, 239, 67, 42  
 , 32, 42, 32, 42, 32, 42, 43, 805  
 2720 DATA 42, 43, 42, 42, 32, 42, 42, 43, 42, 4  
 3, 42, 32, 42, 32, 42, 32, 7982  
 2730 DATA 42, 43, 42, 42, 32, 32, 43, 32, 43, 4  
 2, 32, 43, 32, 42, 32, 32, 7732  
 2740 DATA 43, 32, 43, 32, 32, 42, 32, 43, 32, 4  
 2, 43, 32, 43, 32, 32, 42, 7808  
 2750 DATA 42, 32, 42, 42, 42, 42, 42, 32, 42, 4  
 2, 42, 42, 42, 32, 42, 32, 8062  
 2760 DATA 42, 42, 42, 42, 42, 32, 42, 42, 42, 4  
 2, 42, 32, 42, 42, 32, 43, 8158  
 2770 DATA 32, 32, 32, 32, 43, 32, 43, 42, 43, 3  
 2, 32, 43, 32, 32, 43, 42, 7890  
 2780 DATA 43, 32, 43, 32, 32, 32, 32, 43, 32, 4  
 2, 42, 42, 42, 42, 42, 42, 8174  
 2790 DATA 42, 32, 42, 32, 42, 32, 42, 32, 42, 3  
 2, 42, 32, 42, 32, 42, 32, 7782  
 2800 DATA 42, 42, 42, 42, 42, 42, 42, 42, 32, 4  
 3, 32, 32, 32, 32, 43, 7798  
 2810 DATA 32, 32, 32, 42, 32, 43, 32, 42, 32, 3  
 2, 32, 43, 32, 32, 32, 7480  
 2820 DATA 32, 43, 32, 42, 42, 43, 42, 42, 42, 3  
 2, 42, 42, 42, 42, 42, 42, 8400  
 2830 DATA 42, 32, 42, 32, 42, 42, 42, 42, 42, 4  
 2, 42, 32, 42, 42, 43, 8378  
 2840 DATA 42, 42, 32, 42, 32, 32, 43, 32, 3

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2,43,32,43,42,32,43,7930  
 2850 DATA 32,42,43,32,43,32,32,43,32,3  
 2,32,42,32,42,42,43,7984  
 2860 DATA 42,43,42,43,42,32,42,43,42,3  
 2,43,32,42,32,43,32,8032  
 2870 DATA 42,43,42,32,240,67,235,68,42  
 ,43,42,43,42,43,42,1279  
 2880 DATA 32,42,32,42,32,42,32,42,32,4  
 2,42,42,42,42,42,42,8342  
 2890 DATA 42,42,32,42,32,42,32,42,32,4  
 2,32,42,42,43,42,43,8282  
 2900 DATA 42,32,42,43,42,32,43,32,43,3  
 2,32,32,43,32,43,32,7870  
 2910 DATA 42,43,42,32,42,43,42,43,42,4  
 2,32,42,32,42,32,42,8208  
 2920 DATA 32,42,42,32,42,32,42,42,42,3  
 2,42,32,42,42,32,42,8152  
 2930 DATA 32,42,32,42,32,42,42,43,32,3  
 2,32,43,42,43,32,32,7976  
 2940 DATA 43,42,32,32,43,32,32,42,43,3  
 2,32,43,42,43,32,32,7973  
 2950 DATA 32,43,42,42,32,42,42,42,32,4  
 2,32,42,42,32,42,32,8104  
 2960 DATA 42,42,42,32,42,32,42,42,32,4  
 2,32,42,42,32,42,8222  
 2970 DATA 42,43,32,32,42,32,42,32,42,3  
 2,43,42,43,32,43,32,8113  
 2980 DATA 43,42,43,32,42,32,42,32,42,3  
 2,32,43,42,42,32,42,8168  
 2990 DATA 43,42,32,42,43,42,32,42,42,3  
 2,42,42,32,42,42,8368  
 3000 DATA 32,42,43,42,32,42,43,42,32,4  
 2,42,43,42,32,42,43,8460  
 3010 DATA 32,32,42,43,42,32,43,32,42,3  
 2,43,32,42,43,42,32,8208  
 3020 DATA 32,43,42,32,42,43,42,42,32,4  
 2,32,42,42,42,42,8490  
 3030 DATA 32,42,32,42,236,68,231,69,43  
 ,42,43,42,32,42,32,42,1107  
 3040 DATA 42,42,42,42,32,42,32,42,42,3  
 2,43,32,43,32,32,7986  
 3050 DATA 43,32,43,32,42,32,43,32,42,3  
 2,43,32,43,32,32,7927  
 3060 DATA 43,32,43,32,42,42,42,42,42,4  
 2,42,42,42,42,42,8716

3070 DATA 42,42,42,42,42,42,42,42,42,4  
 2,42,42,42,42,42,42,8782  
 3080 DATA 42,42,42,42,42,42,42,42,42,4  
 2,42,42,42,42,42,42,8792  
 3090 DATA 42,42,42,42,42,42,42,42,42,4  
 2,42,42,42,42,42,42,8802  
 3100 DATA 32,32,32,32,32,43,32,32,32,4  
 3,32,43,32,32,32,43,7936  
 3110 DATA 32,43,32,32,32,43,32,43,32,3  
 2,32,42,42,32,42,42,8198  
 3120 DATA 42,42,42,32,42,32,42,32,42,3  
 2,42,32,42,32,42,32,8132  
 3130 DATA 42,32,42,42,42,42,42,32,42,4  
 2,32,43,32,43,32,42,8378  
 3140 DATA 43,42,43,42,43,42,43,42,43,4  
 2,32,42,43,42,32,42,8630  
 3150 DATA 32,43,32,43,32,42,42,43,42,3  
 2,42,32,43,32,42,32,8279  
 3160 DATA 42,32,43,32,43,32,43,32,42,3  
 2,42,43,32,32,42,32,8169  
 3170 DATA 42,43,42,42,32,42,43,42,32,4  
 2,42,42,43,42,32,42,8614  
 3180 DATA 42,42,42,42,32,42,43,42,42,4  
 2,32,42,43,42,32,42,8602  
 3190 DATA 42,43,32,32,232,69,227,70,42  
 ,32,32,43,32,32,42,43,1013  
 3200 DATA 32,32,43,32,32,43,42,32,32,4  
 3,32,32,42,32,32,43,8137  
 3210 DATA 42,42,32,42,42,42,43,42,43,4  
 2,42,42,42,42,43,42,8923  
 3220 DATA 43,42,42,42,42,42,43,42,43,4  
 2,42,42,32,42,42,32,8659  
 3230 DATA 43,32,32,32,42,32,43,32,43,4  
 2,43,32,32,32,43,42,8365  
 3240 DATA 43,32,43,32,42,32,32,32,43,3  
 2,42,42,43,42,42,42,8608  
 3250 DATA 42,42,32,42,42,32,42,32,42,4  
 2,42,32,42,32,42,42,8532  
 3260 DATA 32,42,42,42,42,42,43,42,42,3  
 2,43,32,32,32,32,43,8356  
 3270 DATA 32,42,43,32,32,32,43,32,32,3  
 2,43,42,32,43,32,32,8147  
 3280 DATA 32,32,43,32,42,42,42,42,42,4  
 2,42,42,42,32,42,32,8625  
 3290 DATA 42,42,42,42,42,42,42,32,42,3

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2,42,42,42,42,42,42,8822  
 3300 DATA 42,42,42,32,43,32,32,32,43,3  
 2,32,42,32,43,32,43,8316  
 3310 DATA 32,43,32,43,32,42,32,43,32,3  
 2,32,43,32,32,42,42,8318  
 3320 DATA 32,42,42,42,42,42,42,32,42,3  
 2,42,32,42,32,42,32,8422  
 3330 DATA 42,32,42,32,42,42,42,42,42,4  
 2,32,42,42,43,42,32,8726  
 3340 DATA 32,32,32,42,43,42,32,42,32,4  
 2,43,42,32,42,32,42,8568  
 3350 DATA 43,42,32,32,228,70,208,71,32  
 ,32,42,43,42,42,32,32,997  
 3360 DATA 43,42,42,42,43,32,32,32,42,4  
 3,32,32,32,43,42,32,8321  
 3370 DATA 32,32,32,43,42,42,43,32,32,4  
 2,42,32,42,42,42,32,8583  
 3380 DATA 32,42,42,42,43,42,32,42,42,4  
 2,32,42,43,42,42,42,8920  
 3390 DATA 32,32,42,42,42,32,42,42,32,3  
 2,43,42,32,42,42,43,8719  
 3400 DATA 32,32,32,43,32,43,32,43,32,3  
 2,32,43,42,42,32,42,8512  
 3410 DATA 43,32,32,42,42,43,42,32,42,4  
 3,32,32,32,42,32,42,8499  
 3420 DATA 42,42,32,42,42,42,32,42,32,3  
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 2,42,43,42,32,43,32,8635  
 3440 DATA 43,32,42,43,42,42,32,42,32,4  
 3,32,42,32,42,42,32,8587  
 3450 DATA 42,42,42,42,42,43,42,32,32,3  
 2,43,42,42,42,43,32,8764  
 3460 DATA 32,32,42,43,42,42,42,42,3  
 2,42,42,43,32,32,8609  
 3470 DATA 32,32,32,32,43,42,42,32,32,4  
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3480 DATA 32,32,32,32,32,32,43,42,42,4  
 2,42,42,42,42,42,42,8989  
 3490 DATA 42,42,42,42,42,42,42,42,4  
 2,42,42,42,42,42,42,9202  
 3500 DATA 42,42,42,42,42,209,71,192,72  
 ,0,64,155,66,0,64,54,3311  
 3510 DATA 69,125,32,32,32,32,32,32,  
 32,32,32,32,32,32,211,949  
 3520 DATA 204,201,212,200,197,210,32,3  
 2,32,32,32,32,32,32,32,1487  
 3530 DATA 32,32,32,32,83,32,80,69,65,8  
 2,83,79,78,32,32,32,1289  
 3540 DATA 32,32,32,38,32,32,32,32,3  
 2,32,80,32,75,79,72,439  
 3550 DATA 85,84,32,32,32,32,32,32,3  
 2,32,32,32,32,32,32,8059  
 3560 DATA 32,32,211,195,207,210,197,32  
 ,32,32,32,32,32,32,32,2199  
 3570 DATA 32,32,32,32,32,32,32,48,4  
 8,48,48,48,32,32,32,8802  
 3580 DATA 32,32,32,32,32,32,32,32,3  
 2,32,32,32,84,73,77,9995  
 3590 DATA 69,32,48,48,32,32,32,32,3  
 2,32,32,32,32,32,32,8091  
 3600 DATA 32,32,76,69,86,69,76,32,48,4  
 8,48,32,32,32,76,73,828  
 3610 DATA 86,69,83,32,52,32,32,32,3  
 2,32,32,32,32,32,32,8343  
 3620 DATA 32,32,32,32,32,32,32,32,3  
 2,32,32,32,32,40,67,8652  
 3630 DATA 41,32,49,57,56,53,32,32,3  
 2,65,78,65,76,79,71,1677  
 3640 DATA 32,32,32,32,32,32,32,32,3  
 2,32,32,32,32,32,32,7992  
 3650 DATA 32,32,32,32,32,32,32,32,2  
 26,2,227,2,0,53,0,873

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by Blake Arnold

**BBS Express!** is a new bulletin board system program written by Keith Ledbetter, the same person who wrote **1030 Express!** and **850 Express!** The program itself is written in compiled Action! (you don't need Action! to run it), and offers features and flexibility you won't find in any other Atari BBS set-up program. If you're already a SYSOP, you might want to take a look at some of the **BBS Express!** features. If you're in the market for BBS software, this definitely deserves some attention.

The documentation with **BBS Express!** is well thought out and carries you step by step through creating your own bulletin board system. Examples are given for almost all functions of the system editors; all you have to do is follow them. You'll be on-line in no time.

When I first saw the claim that the board never crashes, I didn't really believe it. But, after three weeks of on-line testing, I think it's true. The documentation does admit to two crashes in six months (on 24-hour-per-day boards); one was due to the power going out, and the second was due to a disk actually going bad.

Another surprise was the speed of the board. The "userlog" searches and message bases are surprisingly fast. During my testing, I ran both the userlog and message bases off a RAMdisk and off a floppy disk—and saw very little decrease in speed when using the floppy (with Sparta-DOS and a US Doubler 1050 disk drive).

The message bases are simple to configure; it's strictly a set-and-forget operation. The bases are organized by bytes per mes-

sage and maximum number of messages in each base. Once those options are specified, you'll never have to touch the bases again, since they self-compact by deleting the oldest message when the maximum number is reached. If you've structured a base and find you need to change its size or maximum, there's a "loadbase" utility which lets you create a new base and copy all the old messages into it. In this way, you don't lose any messages. Each message base may also have its own security level, handy if you need private bases for user groups, etc. And there's a utility included to edit the security level and name of a base, should you decide to change one of those features.

The userlog configuration is about as straightforward as any you'll find. You are prompted for the number of users (which should always be padded; enter more than you think you'll need) for your userlog and a disk to create it on. Can't get much simpler than that, can you? If you do find your userlog too small, it can be extended with the userlog extender utility. One of the **BBS Express!** userlog's most unusual features is that it keeps track of the users' time on per day. This allows you to set a daily time limit for users. Once they've reached their limit for that day, the BBS won't let them on again until the following day.

The main data file, which the BBS uses to keep track of "housekeeping" chores, also allows you to: set the security level and time limit for new users; set an upload/download ratio for users; and specify drive locations and pathnames (if applicable) for the messages bases, userlog file, uploads and downloads, and "help" files (which I'll get to further on). It also allows

you to set other variables, such as the call mode (ATASCII only, or ASCII/ATASCII), feedback mode (printer or E-Mail) and the security level for new uploads.

The help files are text files, including the BBS's menus, user status files, log-on and log-off messages, and so forth. The unusual thing about these help files is that variable tags can be placed anywhere in them. The tags are used to tell the system to display some type of information at that spot in the text file. There are a total of thirty-six variable tags, ranging from information about the number of messages on the system to the name of the last caller. Keep in mind: these tags can be placed in any text file the BBS displays. For example, you could place tags on the message board menu, telling the user how many active messages there are on the system, how much time he has left on-line and the current time.

The feature I found most unique about **BBS Express!** was its "prompt" dataset. This is composed of prompts the user sees: the main [0 min] Command: prompt, the message base command prompts, and the others (over 150 in all). The unique thing is that it can be fully edited. It also allows use of the variable tags in the prompts. The main command prompt is set up to display the user's on-line time with a variable tag—but if you aren't happy with that, you can edit it to show some other piece of information, or nothing at all.

A bulletin board wouldn't be complete without a section for file transfers—and **BBS Express!** has one of the easiest to use that I've seen. When you browse the files, you will be shown the file's name, format (BASIC, machine language, . . .), and the



file type (game, picture, music, . . .). Xmodem and standard "capture" protocols are available for downloading files, while uploads can only be transferred with Xmodem. When uploading a file, you will be prompted for the type and format of the file. For the SYSOP, this takes some of the mystery out of new uploads.

From the user's point of view, the BBS created is extremely easy to use, even for a first-time caller. Messages automatically word wrap at 40 columns, so you'll never see another broken word again. The message editor is powerful and simple. It even has a "partial save" command, useful if you've gone over the maximum number of bytes per message. The partial save holds the message up to the maximum number of bytes and places a *continued next message* in the original. There's also a "quick-scan" command, to scan all the message boards and display new messages automatically. If you don't like switching message boards on your own, you'll get addicted to the "Q" command—fast!

The BBS does lack a few features, however. It can't be set to anything except 40-column mode, and passwords are gener-

ated by the system, with no option for any changes. (There is a reason: all passwords are generated by the system and follow its format; if a user enters a password that doesn't follow the format, the program will tell them that it's invalid, without actually searching the userlog).

If you're thinking of running a BBS for the first time, or if you're a SYSOP in the market for something new, **BBS Express!** might be just the thing you're looking for. The program is well worth the \$39.95 purchase price, and I think you'd have a hard time finding an easier BBS to work with.

If you'd like to try out **BBS Express!**, call Keith's Orion Express BBS (24 hours) at 804-276-6072, or the Midnight Express (24 hours) at 804-379-4156. **A**

*Blake Arnold, a college senior, started out with an Atari 800 (which he still has) back in 1981. He currently owns a 576K 130XE and a 1-meg 520ST, both of which he upgraded himself. His Delphi name is 1BLAKE.*

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# ICD future

The makers of SpartaDOS and the US Doubler let us in on their plans.

“Our new product is a multifunction parallel bus device. The MIO supplies RAMdisk from 256K to 1 meg.”

by Matthew J.W. Ratcliff

That upstart little company called ICD really gained a lot of attention at the CES held last June. Tom Harker, President, and Mike Gustafson, Vice President, took the time to talk with me about their company and its products.

**MR:** How long have you been around?

**TH:** Thirty-three years.

**MR:** How long has ICD been in business?

**TH:** About three years now; it was incorporated three years ago, January.

**MR:** When did *SpartaDOS* come about?

**MG:** About a year after that.

**TH:** That's when it came out. *SpartaDOS* was supposed to be part of our first project. That's why it's called *SpartaDOS*, because Mike was still with Spartan Software. The ideas were brought out of Spartan Software. At the time, Spartan was planning on doing a 1050 archiver chip copy device. There was another partner involved, and he was all for copy devices.

**MR:** How did *SpartaDOS* do when it first came out?

**TH:** Terrible. We knew we couldn't sell a disk operating system by itself. So, we designed the *US Doubler*, which was a subset of the proposed archiver chip. It was fairly easy to do the double-density modification. Then we made *SpartaDOS* support high speed. That was how it was planned, *SpartaDOS* packaged with the *US Doubler*. The package did great.

**MR:** Did you sell many copies of the 1.1 version, the one that works with the 400/800 machines, as opposed to the newer versions that work only with the XL/XE machines?

**TH:** No, we didn't. Our plan wasn't to sell a lot of that version, but to give it away with the *US Doubler* chip. That way, we let people know there were other disk operating systems. And it was the only high-speed support for the *Doubler*, which gave people a taste of it.

**MR:** That's right. When I first heard of the triple-speed I/O, it blew me away. But when I saw version 1.1 at last summer's CES and found that it wasn't compatible with DOS 2.0 (except for conversion utilities), I said, "Forget it; it'll never sell." Now you have version 3.2d, which supports just about any kind of drive, density, or DOS-format disk you'd ever associate with an 8-bit Atari.

**TH:** People generally get stuck in certain patterns. It's much easier to come up with a copy product. How many clones are there of Apples, and so on? It's a lot easier to sell those than break out something completely new. The *US Doubler* gave 1050 owners the true double density they really wanted. When they got a sample of the *Ultra Speed* I/O, it caught their interest, and they began to take a serious look at the DOS. It's selling well now.

**MR:** What does the company name, ICD, stand for?

**TH:** Right now, it stands for "I Can't De-

# ?! ICD future *continued*

cide." When we formed the company, we had several meetings of the three partners. We decided originally on the name Innovative Computer Designs. But we couldn't register that name, because it was already taken in the state of Illinois, so we shortened it to ICD.

**MR:** How many people are in your company?

**TH:** There are five right now. We expect eight or nine by this fall.

**MG:** There are a lot of people doing things for us outside the company—people who lay out our boards, build our circuitry.

**MR:** Mike, you do all the design work and the software?

**MG:** Yes. Tom pretty much handles the customers, distributors and the rest of the business side.

**MR:** Tom handles the repair work that comes in, too, right?

**TH:** We supply repair service on anything for which we make products that require some modification of the hardware. We started with the 1050 disk drives, and now we work on the 800XL and 1200XL computers, since we have the **RAMBO XL**.

**TH:** A lot of problems we see are with the Atari hardware, not just improper installation of ICD products.

**MR:** Are you an authorized Atari service center?

**TH:** No—mainly because, to become an authorized service center, Atari wants you to service all the computers, and you have to buy a start-up kit. I feel that we probably do a better job than most authorized service centers, because we do board repair, where most service centers just do board swapping. We have a lot of knowledge about how the hardware works. We've gone through the schematics in working on our own designs—and have even found mistakes on Atari's schematics and corrected them.

**MR:** Do you think that you'll start doing such "innovative" things for the ST in the future?

**MG:** We hope to do products for the ST. We're looking at it very seriously right now. We're considering expanding the ICD staff, with people who can help us on ST software and hardware design work. I don't know how much more we're going to do

on the 8-bit. We have four new products coming out for it now. Definitely, if something else is needed, we'll create it.

**MR:** Tom, can you give me a rundown on your new products coming out for the 8-bit Ataris?

**TH:** Yes. First, the bad news—as of July 1 we're raising the price of the **P:R: Connection (PRC)** to \$89.95, because it cost us more to make than we expected. We have printer and modem cables for \$14.95 retail now, to connect standard modems and printers to the **PRC** or 850. Hopefully, distributors and dealers will pick those up, because I see some outrageous prices of \$30.00 and more for those cables. We're coming out with a printer-only version of the **PRC**. It's called the **Printer Connection**. This tiny circuit board will be molded right into the cable.

Then we have our new product, which we call the **ICD MIO** board. The 256K version will retail at \$199.00, the 1-meg version for \$349.00. It's a multifunction parallel bus device. The **MIO** supplies RAMdisk from 256K to 1 meg. It provides a parallel printer interface, as well as a serial printer, or modem interface, with a built-in R:

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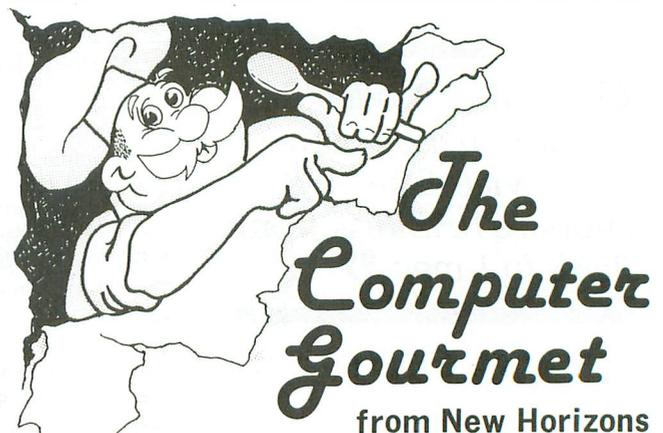
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handler. The interface acts as a printer spooler, where you can allocate as much of RAM as you want for a printer buffer. The MIO has a hard disk interface which supports both the SASI and SCSI standard hard drives. You can just plug in a hard disk with a XYBEC or similar controller, and you're ready to go. The MIO, under SpartaDOS 3.2, can support up to eight drives, with 16 meg apiece (that's really a limit of the disk operating system).

So we can support 100 meg, or more, on one 8-bit Atari. I don't really know why you'd want to, but I'm sure somebody will do it. You can put a 40-meg hard drive on there and partition it into 16-meg logical drives. There's built-in configuration software on the MIO.

You just press SELECT and hit RESET, and a menu pops up. That menu will configure all eight drives, the parallel and serial ports (including printer spooler setup), baud rates for the serial port and things like that. The serial port has a built-in 850 R: handler similar to that in the P:R: Connection.

Another product we're planning is SpartaDOS in a cartridge, our new "X" cartridge. It will have some new features, such

as 80-column support and Ultra Speed, with the Indus GT drives.

**MR:** I was going to ask if you would support the Synchronesh of the Indus GT drives; a lot of people would like that.

**TH:** It's not too practical in our SpartaDOS Construction Set (disk version), but in cartridge we can do it. It will support the high speed I/O for the new Atari 3½-inch drives that are coming out, and it will include a built-in database.

**MR:** The SpartaDOS X cartridge is a piggyback cartridge, similar to the RTIME, but has its own ROM?

**TH:** Yes, it controls the cartridge on top of it. The X cartridge will hold up to 64K by 8, (a 27512) EPROM. Right now, we're working on a 32K SpartaDOS X cartridge.

We're now going to be selling US Doublers, without the DOS, for people who wanted that. It will be called the US Doubler 1-4, retailing for \$39.95. The US Doubler with SpartaDOS Construction Set is still \$69.95.

We just dropped the price on the RAM-BO XL by \$10.00, due to lower manufacturing costs. As I said before, PaperClip 2.0 supports the full 256K now. They're

loading their whole spelling dictionary in there, and it works instantly.

A couple of features on the hard drive interface: you can use your floppy as any drive number in the system. You can swap drives, so basically you're loading the system to the max with that. You can run any DOS with some limitations, but SpartaDOS gives you the most storage and flexible support. Another feature of the MIO is that it has its own power supply, separate from the computer. You can swap the RAMdisk in as drive 1 and then reboot the computer off of that, if you want. It's sort of the ultimate hardware device for the 8-bit Atari. Another thing we're planning for the MIO device is an 80-column board that will piggyback on the MIO board, inside the case.

**MR:** Will that be software equivalent to Atari's 80-column card, the XEP80?

**TH:** Yes, you can use Atari's 80-column board if you want to. We thought we'd provide one for the MIO, to make it more complete if you want it. Atari is demoing a prototype here, while ours is still in the planning stage.

**MR:** The Atari 80-column card hooks into

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# ?! ICD future *continued*

the system as an E: device. Will yours work the same way?

**TH:** Yes. **SpartaDOS** in its present form will run 80 columns, so long as you don't use any of our menus. **SpartaDOS X** talks to an E: device. It will also be designed for 80-column support, including all the menus. One thing I've noticed in talking to an E: device is that it slows things down a little bit. What else would you like to see?

**MR:** A review copy?

**TH:** When we get a little closer, we'll see.

**MR:** What gave you guys the idea to develop the **MIO** board?

**MG:** I don't know; that's tough to say. Long before we heard of the Supra hard disk interface, I'd been playing around with trying to add a memory interface. Then we started doing some other projects, and that got put on the back burner. Finally, we just decided—what the heck, let's go ahead and try to put everything on there we can think of.

**TH:** It was a learning project, also—learning how to use that parallel bus interface.

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**“The Tramiel Atari is a lot more organized, as well as more decisive.”**

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**MG:** Particularly with the Atari, in the sense that it isn't exactly an easy system to try to add an external memory onto. There are RAM refresh problems. The board has to refresh its own RAM, and has to figure out when to do it and when not to. The computer refreshes its own RAM, but the RAM on the **MIO** board is in a window that never gets touched by the computer.

**MR:** Okay, you also have a UART on there that's a more standard RS232 interface than anything Atari does. Will that go to 19,200 baud?

**MG:** Yes.

**MR:** So it will run twice as fast as what anyone else has.

**MG:** Right. Of course, modems won't support that, but some printers will run at that speed. The capability is there if you want to do it. That's the whole concept of the board. There's a lot of overkill, but there's always somebody who wants extra. I mean, you can add eight hard drives. I don't think anyone's going to go do it, but you could have over 100 megabytes of hard disk storage on an XL/XE Atari.

**MR:** Your box is to hook into the system

through the parallel bus interface, which is supported by the XL/XE operating system, right?

**MG:** Right.

**MR:** So, if someone's converted their XL/XE back to an old 400/800 operating system with some sort of hardware modification, the **MIO** box won't work for them?

**TH:** The **MIO** board will not work with replacement operating systems like the Newell chips. If they have a “dual operating system,” where the XL OS is switch-selectable, then it will have to be switched in the XL mode.

**MG:** What the **MIO** needs is the parallel bus I/O software in the ROM of the computer.

**MR:** Did you see the series of articles in *Antic* on “The Parallel Bus Revealed”? Did you use that for reference when you designed the **MIO**?

**MG:** Actually, we built the interface and had it working, and then I remembered the articles on it. I went back to see how they did it. So, we learned how to do it and then compared our results with theirs.

**MR:** Did Atari provide any useful documentation on that? As far as I know, Atari never published any documentation on the parallel bus.

**TH:** Yes, that, along with other support. We've signed confidential nondisclosure agreements with them. They supplied us with all the schematics and things that we needed.

**MR:** So Atari was very cooperative in your development.

**MG:** Atari provided the information we needed: the listing of the operating system and the schematics of the computers. I could look at them and see how the parallel bus was designed to work.

**MR:** Was it the Tramiel Atari that was most helpful, as opposed to Warner Atari?

**TH:** Warner Atari was also helpful. The Tramiel Atari is a lot more organized, as well as more decisive.

**MG:** We really never had any problems with getting cooperation from Atari.

**TH:** The key to it is that we don't give out copies of schematics or documentation, or source listings. That keeps Atari cooperative.

**MR:** What's the official name for this new board?

**TH:** It's called the **ICD Multi I/O Board**, also known as **MIO**.

**MR:** It will be out when?

**MG:** It will be out in August of this year.

**TH:** I'd like to clarify that it's not really called a hard disk interface. The **MIO** is called a parallel device, because it really has four or five functions, depending on how you use it.

**MG:** Yes, most people will probably not use hard drives. They love the RAM, the 1 megabyte of RAM. It will be used mostly for RAMdisk and printer buffer.

**MR:** Will you make a version with CMOS RAM and battery backup?

**MG:** Well, the RAM refreshes on its own, even if the power to the computer is shut off.

**MR:** But you still have to provide power to that box.

**MG:** Right. You have constant refresh on dynamic RAM, which requires a lot of power. I think maybe some hacker could run it on a pair of 12-volt car batteries, regulated down to 5 volts and 15 volts.

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**“There are plans for a 10- or 20-megabyte hard drive, with controller, case and power supply.”**

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**MR:** Battery backup is something a lot of SYSOPs would like to see for their system disk—in this case a RAMdisk—so that, in the event of a power outage, their system wouldn't go down.

**MG:** With static RAM, you could use battery backup. Static RAMs are very expensive and take up a lot of real estate.

**MR:** If you get bored, and you have a little extra room on the **MIO** board, you could put a 1200-baud modem in there and make it R2: or something.

**TH:** They have 1200 baud on a chip right now, for about \$30.00. If you go through normal channels, it would add about an extra \$100.00 to the final product cost.

**MG:** I'm a firm believer in external modems, anyway, because then you can use them on different computers.

**MR:** One thing that might be interesting, since you have a UART on the **MIO** board which doesn't need concurrent I/O. . .

**MG:** A UART is concurrent I/O, in hardware?

**MR:** Right. . . then someone might like to write software to run a two-line BBS system.

**MG:** That's feasible, with the right software.

**MR:** Will you add an XIO command to your handler, so you can use the UART in the **MIO** at 19,200 baud?

**MG:** The 19,200 baud will be set with the current XIO 36-baud rate command. We'll just use the duplicate 9600-baud rate that's never used to request 19,200.

**MR:** Are you looking toward supplying a hard drive to sell with the *MIO*?

**TH:** There are plans for a 10- or 20-mega-byte hard drive, with controller, case and power supply.

**MR:** Are you considering a version with tape backup?

**MG:** We'll probably be looking at tape backup units. You'll be able to plug in one, but it's a matter of finding one that's reasonably priced, and writing the software to perform the backup and restore functions.

**TH:** It's a matter of what's practical, too. It's probably just as cheap to have a second hard drive for backup, and it wouldn't require any extra software.

**MR:** The *SpartaDOS X* cartridge is currently being built on version 3.2?

**MG:** For demonstration purposes of the cartridge hardware, we've thrown version 3.2 in there, to show we can do it. When we actually put *SpartaDOS X* in, it will have an integral database. It will have the Indus high-speed I/O support and handle the 3½-inch drive from Atari. Basically, all the things people have been wanting. We get calls constantly for enhancements, and we'll put as much in as possible.

The other thing—one of the key things—is we're going to build the menu on the command processor. When you execute a command from the menu, the actual commands you would enter into the command processor are displayed as it's executed, similar to a batch file. This will help you learn the command processor, which is faster than using a menu. It won't lack in features, or power, because of the menu.

**MR:** You said that pressing RETURN on an empty line toggles the menu on and off?

**MG:** Right, just hit a RETURN, and the menu will come up. You'll be able to put the cartridge in and use the menu right off the bat, without any documentation.

**MR:** Looking at the current version of *SpartaDOS 3.2d*, how many of its associated command files will be incorporated into the cartridge?

**MG:** We plan to put the most commonly used functions in the cartridge. For example, the INIT function and the sector copier, SCOPY. We will put in the UNERASE and TREE commands. We'll try to put as much as possible in the cartridge, making them internal commands. We have to see what we can put in the 32K that we have to play with. We currently have a 13K DOS, so we have a lot of room to work with.

**MR:** It'll be the world's fastest DOS then, right?

**MG:** Well, I don't know how fast, considering disk accesses for certain commands, but the commands built into the cartridge will be instant access. They'll come up fast, like TOS in ROM on the ST.

**MR:** It'll save you 32K of disk space, as well—in any instance where you want a full-blown system disk, too.

**MG:** That's right; you won't have to put DOS on a disk. Another thing we're going to improve upon: the batch files. You'll have parameter passing, like the IBM PC's DOS.

**MR:** Yes, I often find myself entering "C: filename", as you would on an IBM PC, instead of D1: just because *SpartaDOS* has so many of the same features.

**MG:** That was something we thought about at the time we started designing the DOS. But it wasn't the Atari standard, and we had to support D1:, D2: and so on (for compatibility).

---

## “There's going to be a database in the *SpartaDOS X* cartridge.”

---

**MR:** The only complaint I still have about *SpartaDOS* is that, if you use a comma to separate two filenames (because that's the way all other Atari DOSs do it) it botches your source file when doing a COPY.

**MG:** The comma is going to be just as valid as a space. That's something we're going to put in the cartridge's command processor. The X version will do a lot more checking, so that you can't create duplicate files, for example. (In Atari DOS, you can rename a file to match another file that already exists, which creates some nasty problems.) Also, with the COPY, you won't be able to copy something onto itself and inadvertently destroy a source file. We can afford to put more features in it, because of the room we have in the cartridge.

**MR:** Because of the bank switching and the way the DOS is designed to run in independent modules of code (such as the .COM files)?

**MG:** Yes, and the other key item is that there will be a database in the *SpartaDOS X* cartridge.

**MR:** What will the database be like?

**MG:** It's a binary type of database, which means that the lookups on 100,000 records should be in the neighborhood of five seconds or so. It will be extremely fast, faster than DBASE II. You create your records in a manner similar to that on DBASE II. But, with this, we have key files that keep everything in order automatically and prevent segmentation of your data.

**MR:** Then this will be like a built-in application?

**MG:** You'll have to use XIO commands to read records, add records, and so on.

**MR:** You're adding it to the DOS then, making it accessible from BASIC, or any other language on the Atari that can handle XIO commands.

**MG:** It isn't a database management system. It has calls that add records, look up records, position record pointers, and so on. It's more like DBASE II, but extremely fast. It doesn't get bogged down doing sorts on very large files.

**MR:** ICD has its own bulletin board. What is its primary function, technical support?

**TH:** Technical support basically and to let the computerists know we're there. We also provide them with update files for *SpartaDOS*.

**MR:** You put up the command files, but not the actual *SpartaDOS* itself then?

**TH:** Right. We try to provide fixes and updates whenever they're needed.

**MR:** You guys update software faster than any company I've ever dealt with—that's why you got two reviews of *SpartaDOS* in *ANALOG Computing*. The *SpartaDOS* review, then the *R-TIME 8* cartridge and the *SpartaDOS* enhancements coverage, as well (issue 39 and 45).

**TH:** We just keep updating it. One of the problems with that is keeping the documentation up to date. We have a lot of little DOC files up on our bulletin board, explaining what the changes are.

**MG:** Since *SpartaDOS* is designed to be expandable, we can just keep adding commands. Right now, we're on version 3.2.

**MR:** Do you have a projected retail price for the *SpartaDOS X* cartridge?

**MG:** It will be \$79.95.

**MR:** When do you think it will be out?

**MG:** September, we hope. Making all the software changes takes a long time—and then getting the manual rewritten...

**TH:** With the original *SpartaDOS*, we spent maybe a month on the manual. Then when we went to the *SpartaDOS Construction Set*, we both worked 14-hour days for two or three weeks on the manual exclusively.

**MR:** So you have the *P:R: Connection*, the *MIO*, the *Printer Connection*, and the *SpartaDOS X* cartridge now. All of those will be out before the end of the year, correct?

**TH:** Yes.

**MR:** Then, when you guys get some sleep, what are you going to do next?

**MG:** I don't know, we have a few ideas.

**MR:** Is *SpartaDOS* selling really well now?

**TH:** It's really catching on like a landslide. That's why we're selling the *US Doublers* separately from the *SpartaDOS* now, because people are actually buying the DOS now. Before, they were buying the *SpartaDOS Construction Set* to get the *US Dou-*

# ?! ICD future *continued*

bler. But, now that they've gotten a taste of it, and it's received some really good reviews, people want to buy the DOS.

**MG:** Anyone who's been on an IBM PC and has used MS DOS can use **SpartaDOS** and suddenly get a new view of the Atari. The Atari DOS 2.5 menus are just not for some people. Anyone who's really into system design or programming, in general, and who likes that command processor type of DOS, it's ideal.

**MR:** Have you gotten any technical information on the Atari 3 1/2-inch drives, so you can support them?

**MG:** We're well aware of what's going on with the new Atari drives.

**MR:** So **SpartaDOS** will continue to be drive-smart at all times, then? No matter which drive you're talking to, what kind of disk you put in the drive, **SpartaDOS** can handle it.

**MG:** Right.

**MR:** That's what I find is the most unique feature of **SpartaDOS**; it supports all the popular disks and disk formats on the Atari at one time.

**MG:** Yes, it takes a different structured DOS to handle that. You couldn't put that

## ICD is continuing to support the 8-bits with "totally killer hardware."

on DOS 2.0. You'd really have to kludge it, to make it support different formats, disk types, and so on.

**MR:** I found something interesting while I was working on a program that would diagnose what drives you have on the system, so that you wouldn't try to talk to nonexistent drives. With Atari DOS, OSS DOS XL and similar DOSs, you could just check to see which drive buffers were enabled. On **SpartaDOS**, you enable all the drive buffers.

**MG:** Yes. There are no drive buffers in **SpartaDOS**; that has no meaning. There's a totally different scheme, where it just keeps vectors to buffers in memory. These can change at any time, in which case, **SpartaDOS** needs only to change its vec-

tors. In fact, **SpartaDOS** could handle up to eight drives, with only one drive buffer. It would slow down, but it would still work.

**MR:** What do you think about this year's CES?

**TH:** I think Atari deserves a lot of credit for this CES show. They gave us fairly major exposure, and there were no charges for us. They gave us space in their booth in a major traffic area.

**MG:** It benefits both of us. It really helps us sell our products. But it also helps Atari sell their computers, because the public sees all these vendors supporting Atari products. People will look much more seriously at the 8-bit Atari, when they see that they can hook up a hard drive to it.

**MR:** It's nice to know that Atari is encouraging you, even though some of what you're doing is in competition with what they're developing—their XEP80, for example, and your 80-column hardware in development for the **MIO** board.

**TH:** I don't think we're in direct competition, because theirs is a stand-alone device, where ours is part of a more expensive multipurpose device. We feel we have advantages to the way we're doing it, as opposed to the way Atari is doing it. We've also found from experience that Atari's markets are much different from ours. They're going through the mass merchandisers, people who want slick packages on the shelves, and a product you can just plug in and use. Our products are a little more technically oriented than that, for the more sophisticated user.

**MR:** Have you considered the mass market?

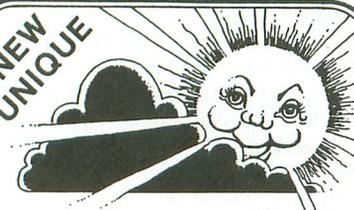
**TH:** We've tried the mass market, but the mass market buyers haven't responded at all.

**MR:** I think there's room in the mass market, for the **P:R: Connection**, especially.

**TH:** I definitely agree with you; it's just a matter of making the marketing connections.

ICD is continuing to support the 8-bit machines with "totally killer hardware" that enables you to do more than many sophisticated high-end computer systems costing ten times as much. If you have an idea for some really neat techno-stuff for the 8-bit Atari, let ICD know. They may design it, "just because somebody wants to do it." **A**

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# Starlanes

A game of galactic wheeling and dealing.

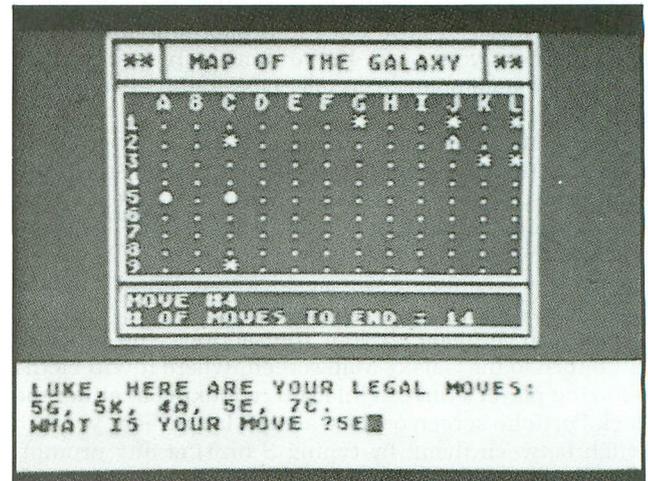
by Darin L. Delegal

**Starlanes** is a game of interstellar stocks and bonds. In it, you and up to three other people will buy and sell stock in five different shipping companies. During the course of the game, these companies will grow and merge, and the stock values will change accordingly. The five companies are called: Altair Starways, Betelguese Ltd., Capella Freight, Debola Shippers and Erni Expediters.

To start the game, type in Listing 1, save it, and then run the program. After a short initialization time, the title screen will show, and you'll be asked for the number of players. The display list interrupt for the screen colors was developed using the **Multicolor Screen Generator** program from **ANALOG Computing** issue 12. Once you've entered the number of players, their names and the number of turns in the game, the computer will decide who is to go first. He or she will be put at the "Galaxy Map" screen.

The Galaxy Map screen shows a graphic representation of the universe where the shipping companies will be. It is divided into rows 1 through 9, and columns A through L. The asterisks are stars, and the dots are open space. You will also be presented with five legal moves. The computer will wait for your response, which will be based upon the following criteria.

If you choose a place next to a star or an unattached outpost (discussed later), you will form a new company. As a reward for forming the company, you'll be given five free shares in that company. If you choose a space which is not adjacent to anything else, you'll form an unattached outpost. This isn't part of any shipping company, but can be merged in at a later date. If you choose a space next to an existing company, the chosen space will be added to that company, and the company's stock value will go up accordingly. If that space happens to be adjacent to an-



unattached outpost, the outpost will also be taken over by the company and added to the stock value.

The only other choice you'll be presented with is that of a space adjacent to two or more different shipping companies at the same time. This will cause a merger between the two companies, and the larger one will take over the smaller. Also, if the space is adjacent to an unattached outpost, the outpost will be added to the new company. During the merger, you'll be placed at a so-called "Special Notice" screen.

The Special Notice screen will show each player's name, how much stock the player had in the old company, how much it has been converted to in the new company and the bonus paid on the stock. The old stock is converted into new stock, two for one, and the bonus is the actual value of the old stock. When a merger has occurred, the company that's been merged out can be restarted somewhere else on the board, if someone gets the proper space in his choices.

Once a legal move has been selected, you'll be placed in the "Stock Portfolio" screen. This is the screen where actual buying and selling of stock is done. The display will show each of the active companies, the current price per share, the number of shares you own and the total number of shares owned in each company.

By comparing your holdings to the total holdings, you can see how well you're doing in relation to other players. This screen will also show which player's portfolio is being displayed. At the bottom of the screen, there will be a message telling you what your current cash is, what company you're currently working with, the company's stock price and how many shares you own in the company. The program will wait for you to input the number of shares you wish to buy or sell.

The buying loop automatically skips any companies in which you can't afford to buy stock on that turn. In order

to acquire stock in a company, just enter the number of shares you wish to buy, and the proper amount will be deducted from your cash. If you don't want to buy stock in the current company, you may pass to the next company by hitting RETURN.

Once you've gone past a company, you can't go back, so be sure that you want to pass before you do so. To sell stock in a company, you must enter a negative number when asked how many shares you want to buy. The proper amount will be added to your cash on hand. You can't sell stock in a company whose stock you cannot buy, because it will be skipped automatically.

Once you've made all your transactions, the program will return to the Galaxy Map screen, where it will be the following player's turn. While you're looking at either the Stock Portfolio screen or the Galaxy Map screen, you can switch between them, by typing S or M at any prompt. This can be useful when you're trying to decide which move to make.

The game continues for however many turns you had selected at the beginning, and then it flips to the "Game Over" screen. The final screen of the game, this will show the totals for each player. The value of each player's stock will be totaled, then added to the player's cash on hand, to give the final net worth. The player with the highest net worth at the end is the winner. **A**

Darin L. Delegal founded the Gainesville Atari Group (GAG). He's been working with computers since 1978, and has had his Atari 800XL for over four years. He's working toward a computer engineering degree.

The two-letter checksum code preceding the line numbers here is *not* a part of the BASIC program. For further information, see the *BASIC Editor II*, in issue 47.

Listing 1.  
BASIC listing.

```
SB 10 CLR :POKE 82,13:POKE 752,1:? "K":GO
SUB 1670:POKE LUMTAB+22,128:POSITION 1
3,5:REM BY D.L.D.
JQ 20 ? "*****":? "*"*****"
:? "*"STARLANES*"":? "*"*****"
*****":POKE 82,1:DIM P$(10)
QG 30 DIM M(10,13),S(5,4),S1(5),Q(5),M$(7
5),B(5),L$(8),P1$(10),P2$(10),P3$(10),
P4$(10),R$(5),C(5)
FN 40 M$="ALTAIR STARWAYS BETELGEUSE, LTDC
APELLA FREIGHTDEBOLA SHIPPERSERNI EXPE
DITERS":L$=".*ABCDE"
HK 50 FOR I=0 TO 5:FOR J=0 TO 4:S(I,J)=0:
S1(I)=100:Q(I)=0:B(I)=6000:NEXT J:NEXT
I
MI 60 FOR I=0 TO 10:FOR J=0 TO 13:M(I,J)=
1:NEXT J:NEXT I:FOR I=0 TO 5:C(I)=0:R(
I)=0:NEXT I
EQ 70 FOR I=1 TO 9:FOR J=1 TO 12:K=INT(RN
D(1)*50)+1:IF K>=23 AND K<=26 THEN M(I
,J)=3
AA 80 NEXT J:NEXT I:POKE 752,0
CY 90 TRAP 90:POSITION 1,13:? "HOW MANY
PLAYERS (2-4)":INPUT P1:IF P1<2 OR P1
>4 THEN 90
NV 100 ? :FOR I=1 TO P1
```

```
SZ 110 TRAP 110:POSITION 1,14+I:? "PLAYE
R ";I;" WHAT IS YOUR NAME "":INPUT P$
IH 120 IF P$="" THEN 110
QF 130 IF I=1 THEN P1$=P$
RJ 140 IF I=2 THEN P2$=P$
SN 150 IF I=3 THEN P3$=P$
TR 160 IF I=4 THEN P4$=P$
GF 170 NEXT I
XG 180 TRAP 180:POSITION 1,20:? "OF MO
VES BEFORE GAME ENDS "":INPUT EN:POKE
752,1
KX 190 EN=EN*P1:? :? "NOW I WILL DECIDE W
HO GOES FIRST...":GOSUB 1590:? "":
TN 200 P=INT((INT((P1*25)*RND(1))+1)/25)+
1:GOSUB 1480:? " WILL GO FIRST.":GOSUB
1590:K=0:P=P-1
NT 210 K=K+1:IF K>=EN+1 THEN 1600
BJ 220 P=P+1:IF P=P1+1 THEN P=1
NU 230 FOR I=1 TO 5
ZH 240 R(I)=INT(9*RND(1)+1):C(I)=INT(12*R
ND(1)+1)
AS 250 FOR J=I-1 TO 0 STEP -1:IF R(I)=R(J
) AND C(I)=C(J) THEN 240
SR 260 NEXT J:IF M(R(I),C(I))>1 THEN 240
PU 270 FOR J=1 TO 5:IF Q(J)=0 THEN 390
ZR 280 NEXT J:A1=M(R(I),C(I)+1):A2=M(R(I)
,C(I)-1)
XM 290 A3=M(R(I)+1,C(I)):A4=M(R(I)-1,C(I)
)
LF 300 IF A1>3 OR A2>3 OR A3>3 OR A4>3 TH
EN 390
UW 310 IF A1=2 AND A2<4 AND A3<4 AND A4<4
THEN 240
UP 320 IF A2=2 AND A1<4 AND A3<4 AND A4<4
THEN 240
TP 330 IF A3=2 AND A1<4 AND A2<4 AND A3<4
THEN 240
UA 340 IF A4=2 AND A1<4 AND A2<4 AND A3<4
THEN 240
WP 350 IF A1=3 AND A2<4 AND A3<4 AND A4<4
THEN 240
WI 360 IF A2=3 AND A1<4 AND A3<4 AND A4<4
THEN 240
US 370 IF A3=3 AND A1<4 AND A2<4 AND A4<4
THEN 240
UT 380 IF A4=3 AND A1<4 AND A2<4 AND A3<4
THEN 240
LW 390 NEXT I:GOSUB 890
WR 400 TRAP 400:POSITION 1,18:? "*****":
GOSUB 1480:? ", HERE ARE YOUR LEGAL MO
VES:"
DJ 410 FOR I=1 TO 5:? R(I):CHR$(C(I)+64):
", "":NEXT I:? "4.":?
PN 420 ? "WHAT IS YOUR MOVE "":POKE 752,0
:INPUT R$:POKE 752,1:IF R$(1,1)="M" TH
EN GOSUB 890:GOTO 400
CC 430 IF R$(1,1)="5" THEN GOSUB 1320:GOT
O 400
EJ 440 R=ASC(R$(1,1))-48:C=ASC(R$(2,2))-6
4:FOR I=1 TO 5:IF R=R(I) AND C=C(I) TH
EN 460
HF 450 NEXT I:? :? "THAT SPACE WAS NOT ON
THE LIST":GOSUB 1590:GOTO 400
YB 460 TRAP 40000:A1=M(R-1,C):A2=M(R+1,C)
:A3=M(R,C+1):A4=M(R,C-1)
LB 470 IF A1<=1 AND A2<=1 AND A3<=1 AND A
4<=1 THEN M(R,C)=2:GOTO 750
YN 480 IF A1<4 AND A2<4 AND A3<4 AND A4<4
THEN 610
GD 490 IF A1>3 AND A2>3 AND A2<>A1 THEN 9
60
HF 500 IF A1>3 AND A3>3 AND A3<>A1 THEN 9
60
JA 510 IF A1>3 AND A4>3 AND A4<>A1 THEN 9
60
IX 520 IF A2>3 AND A3>3 AND A3<>A2 THEN 9
60
KS 530 IF A2>3 AND A4>3 AND A4<>A2 THEN 9
```

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# Starlanes *continued*

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60
MI 540 IF A3>3 AND A4>3 AND A4<>A3 THEN 9
60
AN 550 IF M(R,C)>3 THEN 600
MA 560 IF A1>3 THEN I=A1-3
NG 570 IF A2>3 THEN I=A2-3
OM 580 IF A3>3 THEN I=A3-3
PS 590 IF A4>3 THEN I=A4-3
ZM 600 Q(I)=Q(I)+1:51(I)=51(I)+100:GOTO 6
50
KF 610 FOR I=1 TO 5:IF Q(I)=0 THEN 630
NG 620 NEXT I:IF M(R,C)<3 THEN M(R,C)=2:G
OTO 750
RL 630 GOSUB 1440:?"A NEW SHIPPING COMPA
NY HAS BEEN FORMED!";? " ITS NAME
IS: ";M$(I*15-14,I*15);"."
GD 640 S(I,P)=5(I,P)+5:Q(I)=1:GOSUB 1590
EM 650 IF A1=3 THEN 51(I)=51(I)+500
EX 660 IF A2=3 THEN 51(I)=51(I)+500
FI 670 IF A3=3 THEN 51(I)=51(I)+500
FT 680 IF A4=3 THEN 51(I)=51(I)+500
KX 690 IF A1=2 THEN 51(I)=51(I)+100:Q(I)=
Q(I)+1:M(R-1,C)=I+3
GV 700 IF A2=2 THEN 51(I)=51(I)+100:Q(I)=
Q(I)+1:M(R+1,C)=I+3
FU 710 IF A3=2 THEN 51(I)=51(I)+100:Q(I)=
Q(I)+1:M(R,C+1)=I+3
KD 720 IF A4=2 THEN 51(I)=51(I)+100:Q(I)=
Q(I)+1:M(R,C-1)=I+3
UB 730 IF 51(I)>3000 THEN T1=I:GOSUB 130
0
PR 740 M(R,C)=I+3
JA 750 ? "K":GOSUB 1320:FOR I=1 TO 5:B(P)
=B(P)+INT(0.05*5(I,P)*51(I)):NEXT I:FO
R I=1 TO 5:IF Q(I)=0 THEN 880
RM 760 TRAP 760:IF B(P)<51(I) THEN 880
RZ 770 POSITION 1,18:?"XXXXXXXXYOUR CURREN
T CASH = $";B(P)
UT 780 ? "↓HOW MANY SHARES OF ";M$(I*15-1
4,I*15):?" AT $";51(I);" EACH?":?"YOU
NOW OWN ";S(I,P);
AK 790 POKE 752,0:INPUT R$:POKE 752,1:IF
R$="" THEN 880
TK 800 IF R$(1,1)="M" THEN GOSUB 890:GOTO
760
QN 810 IF R$(1,1)="S" THEN GOSUB 1320:GOT
O 760
SB 820 J=VAL(R$):IF J<0 AND ABS(J)>5(I,P)
THEN ? "YOU MAY NOT SELL MORE THAN YO
U HAVE!";:GOTO 850
UM 830 IF J*51(I)<=B(P) THEN 860
EC 840 ? "YOU ONLY HAVE $";B(P);" - TRY A
GAIN";
JR 850 GOSUB 1590:GOTO 760
CO 860 IF J=0 THEN 880
BB 870 S(I,P)=S(I,P)+J:B(P)=B(P)-(J*51(I)
)
UK 880 NEXT I:TRAP 40000:GOTO 210
AB 890 POKE 82,6:?"K":FOR LINE=0 TO 17:P
OKE COLTAB+LINE,132:POKE LUMTAB+LINE,1
40:IF LINE=0 THEN GOSUB 1700
ER 900 NEXT LINE:FOR LINE=18 TO 23:POKE C
OLTAB+LINE,140:POKE LUMTAB+LINE,130:NE
XT LINE
QM 910 ? "↑
"*** MAP OF THE GALAXY ***":?"
"
IY 920 ? "ABCDEFGHIJKLMN":FOR
R L=1 TO 9:?"":L:FOR M=1 TO 12:?"
"
QS 930 ? L$(M(L,M),M(L,M)):NEXT M:?"":
NEXT L:?"
CE 940 ? "MOVE #";K:?"# OF MOVES TO EN
D = ";EN-K:POSITION 32,14:?"":POSITI
ON 32,15:?"
LP 950 ? "
KE 82,1:?" :RETURN
AI 960 F1=A1-3:IF F1<0 THEN F1=0

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CR 970 F2=A2-3:IF F2<0 THEN F2=0
FA 980 F3=A3-3:IF F3<0 THEN F3=0
HJ 990 F4=A4-3:IF F4<0 THEN F4=0
IX 1000 T=Q(F1):T1=F1:IF Q(F2)>T THEN T=Q
(F2):T1=F2
IA 1010 IF Q(F3)>T THEN T=Q(F3):T1=F3
KY 1020 IF Q(F4)>T THEN T=Q(F4):T1=F4
JZ 1030 IF F1=T1 OR A1<4 THEN 1050
FQ 1040 X=F1:GOSUB 1120
NQ 1050 IF F2=T1 OR A2<4 THEN 1070
GF 1060 X=F2:GOSUB 1120
RH 1070 IF F3=T1 OR A3<4 THEN 1090
GU 1080 X=F3:GOSUB 1120
KN 1090 IF F4=T1 OR A4<4 THEN 1110
GH 1100 X=F4:GOSUB 1120
QY 1110 GOTO 460
RG 1120 POKE 82,0:GOSUB 1450:?"M$(X*15-14
,X*15);" HAS JUST BEEN MERGED":?"INTO
";
TL 1130 ? "M$(T1*15-14,T1*15);"!":?"PLEAS
E NOTE THE FOLLOWING TRANSACTIONS:"
MP 1140 ? "
" OLD STOCK = ";M$(X*15-14,X
*15):POSITION 39,7:?" NEW STOCK = ";
AD 1150 ? " ";M$(T1*15-14,T1*15):POSITION
39,8:?"
"
AM 1160 ? "PLAYER OLD NEW TOTAL B
ONUS PAID"
"
QQ 1170 FOR I=1 TO P1:GOSUB 1530:POSITION
9,11+I:?"S(X,I):POSITION 14,11+I:?" IN
T((5(X,I)/2)+0.5)
FX 1180 POSITION 20,11+I:?"S(T1,I)+INT((5
(X,I/2))+0.5):X1=0:FOR I1=1 TO P1:X1=X
1+5(X,I):NEXT I1
XS 1190 POSITION 30,11+I:?" $";INT(10*(X
5(X,I)/X1)*51(X)):POSITION 39,11+I:?"
"
MO 1200 NEXT I:?"
" :FOR I=1 TO P1:5(T1
,I)=5(T1,I)+INT((5(X,I/2))+0.5)
XB 1210 B(I)=B(I)+INT(10*(5(X,I)/X1)*51(X
)):NEXT I
JY 1220 FOR I=1 TO 9:FOR J=1 TO 12:IF M(I
,J)=X+3 THEN M(I,J)=T1+3
RU 1230 NEXT J:NEXT I:Q(T1)=Q(T1)+Q(X):51
(T1)=51(T1)+51(X):IF 51(T1)>3000 THEN
GOSUB 1300
BA 1240 51(X)=100:Q(X)=0:FOR I=1 TO P1:5(X
,I)=0:NEXT I:POKE 82,1
MM 1250 F1=A1-3:IF F1<0 THEN F1=0
PA 1260 F2=A2-3:IF F2<0 THEN F2=0
RO 1270 F3=A3-3:IF F3<0 THEN F3=0
UC 1280 F4=A4-3:IF F4<0 THEN F4=0
UQ 1290 I=T1:GOSUB 1590:RETURN
NU 1300 GOSUB 1440:?" THE STOCK OF ";M$(
T1*15-14,T1*15);" HAS":?"
SPLIT 2 FOR 1!":51(T1)=INT(51(T1)/2)
ZH 1310 FOR I1=1 TO P1:5(T1,I1)=2*5(T1,I1
):NEXT I1:GOSUB 1590:RETURN
GQ 1320 POKE 82,0:?"K":FOR LINE=0 TO 3:P
OKE COLTAB+LINE,196:POKE LUMTAB+LINE,1
96:IF LINE=0 THEN GOSUB 1700
OZ 1330 NEXT LINE:FOR LINE=4 TO 15:POKE C
OLTAB+LINE,204:POKE LUMTAB+LINE,192:NE
XT LINE
KZ 1340 FOR LINE=16 TO 23:POKE COLTAB+LIN
E,200:POKE LUMTAB+LINE,192:NEXT LINE
UM 1350 POSITION 0,4:?"
" :POSITION 29,
5:?" HOLDINGS: "
QJ 1360 POSITION 5,6:?" STOCK":POSITION
17,6:?" PRICE/SHR":POSITION 27,6:?" Y
OURS/TOTAL "
MU 1370 ? "
"
FJ 1380 FOR L=1 TO 5:IF 51(L)=100 THEN ?

```

# COMPUTER CREATIONS

## YOUR ATARI 8-BIT SUPPORT CENTER



```

:GOTO 1410
AR 1390 ? M$(L*15-14,L*15):POSITION 18,7+
L:?"$";51(L):POSITION 28,7+L:?"$";5(L,P)
SR 1400 POSITION 34,7+L:J=0:FOR M=1 TO 4:
J=J+5(L,M):NEXT M:?"$";:NEXT L
VU 1410 POSITION 39,7+L:?"$";:NEXT L
RF 1420 ? "€";:NEXT L
STOCK CHART FOR:"$";:GOSUB
1480:POSITION 39,14
RY 1430 ? "€";:NEXT L
"€":POKE 82,1:?"$";:RETURN
JL 1440 POSITION 1,18:?"$";:FOR LINE
=18 TO 23:POKE COLTAB+LINE,0:POKE LUMT
AB+LINE,14:GOTO 1460
OM 1450 ? "€":FOR LINE=0 TO 23:POKE COLTA
B+LINE,66:POKE LUMTAB+LINE,78:IF LINE=
0 THEN GOSUB 1700
CY 1460 NEXT LINE:?"$";:NEXT L
OFFICE:"$";:RETURN
AJ 1480 IF P=1 THEN ? P1$;
BS 1490 IF P=2 THEN ? P2$;
BZ 1500 IF P=3 THEN ? P3$;
DI 1510 IF P=4 THEN ? P4$;
AP 1520 RETURN
NF 1530 IF I=1 THEN P$=P1$
OP 1540 IF I=2 THEN P$=P2$
PJ 1550 IF I=3 THEN P$=P3$
RJ 1560 IF I=4 THEN P$=P4$
OI 1570 IF LEN(P$)<6 THEN P$(LEN(P$)+1,7)
="€";:NEXT I
XV 1580 ? P$(1,6):RETURN
OK 1590 FOR D=1 TO 300:NEXT D:RETURN
RO 1600 GOSUB 1450:?"$";:POKE 82,0:?"$";:THE G
AME IS OVER-----:"$";:?"$";:HERE ARE THE FIN
AL STANDINGS:"$";:?"$";:NEXT I
MI 1610 ? "€";:NEXT I
PLAYER|STOCK VAL.|TOTAL CAS
H|NET WORTH|:"$";:NEXT I
YH 1620 ? "€";:NEXT I
"€";:FOR I=1 TO P1:?"$";:NEXT I
EXT I
WL 1630 ? "€";:NEXT I
JM 1640 FOR I=1 TO P1:FOR J=1 TO 5:Q(I)=Q
(I)+(51(J)*5(J,I)):NEXT J:NEXT I:FOR I
=1 TO P1:POSITION 1,9+I:GOSUB 1530
PS 1650 POSITION 8,9+I:?"$";:Q(I):POSITIO
N 19,9+I:?"$";:B(I):POSITION 30,9+I:?"$";:
Q(I)+B(I):NEXT I
KY 1660 POSITION 0,20:END
AC 1670 ? "€":RESTORE 1710:FOR D=0 TO 99:
READ X:POKE 1664+D,X:NEXT D:COLTAB=171
2:LUMTAB=COLTAB+24
YK 1680 D=USR(1693):POKE 512,128:POKE 513
,6:X=PEEK(560)+256*PEEK(561)
LO 1690 FOR D=X+6 TO X+28:POKE D,130:NEXT
D:POKE X+3,194:POKE 54286,192:?"$";:NEXT I
KQ 1700 POKE 710,PEEK(COLTAB):POKE 709,PE
EK(LUMTAB):RETURN
QV 1710 DATA 72,138,72,174,156,6,189,176,
6,141,10,212,141,24,208,189,200,6,141,
23
DF 1720 DATA 208,238,156,6,104,170,104,64
,25,104,169,7,160,168,162,6,32,92,228,
96
KD 1730 DATA 169,1,141,156,6,76,98,228,13
0,130,130,130,130,130,130,130,130,130,
130,130
JR 1740 DATA 130,138,130,142,140,138,136,
130,136,130,136,130,14,14,14,14,14,14,
14
UJ 1750 DATA 14,14,14,14,14,0,0,0,0,0,0,0
,0,0,14,0,0,0,0,0,0

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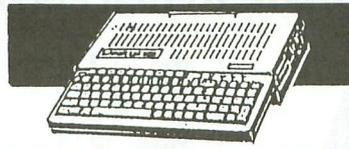
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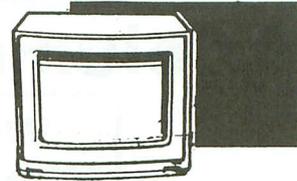
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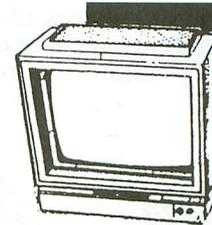
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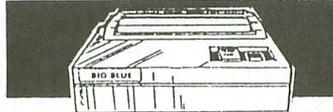
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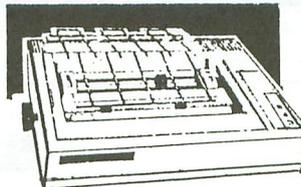
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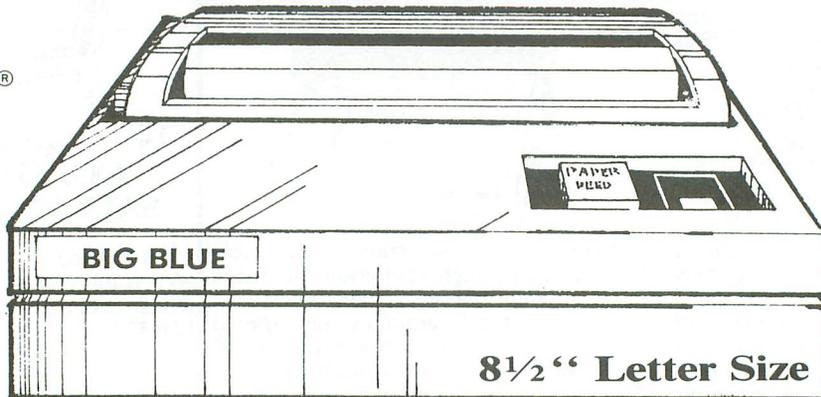
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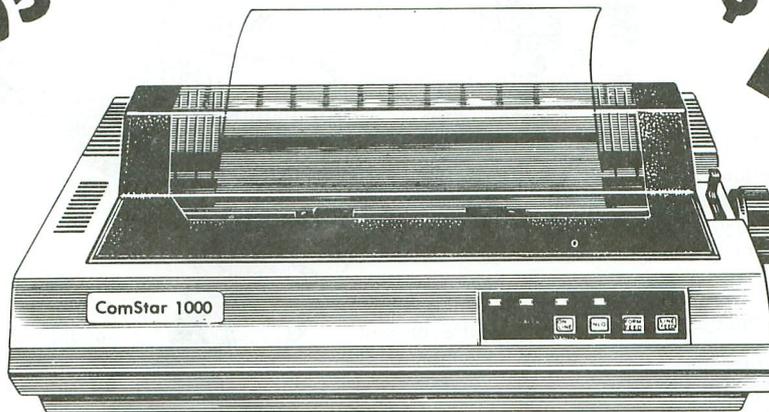
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# Panak strikes!

## Reviews of the latest software

by Steve Panak

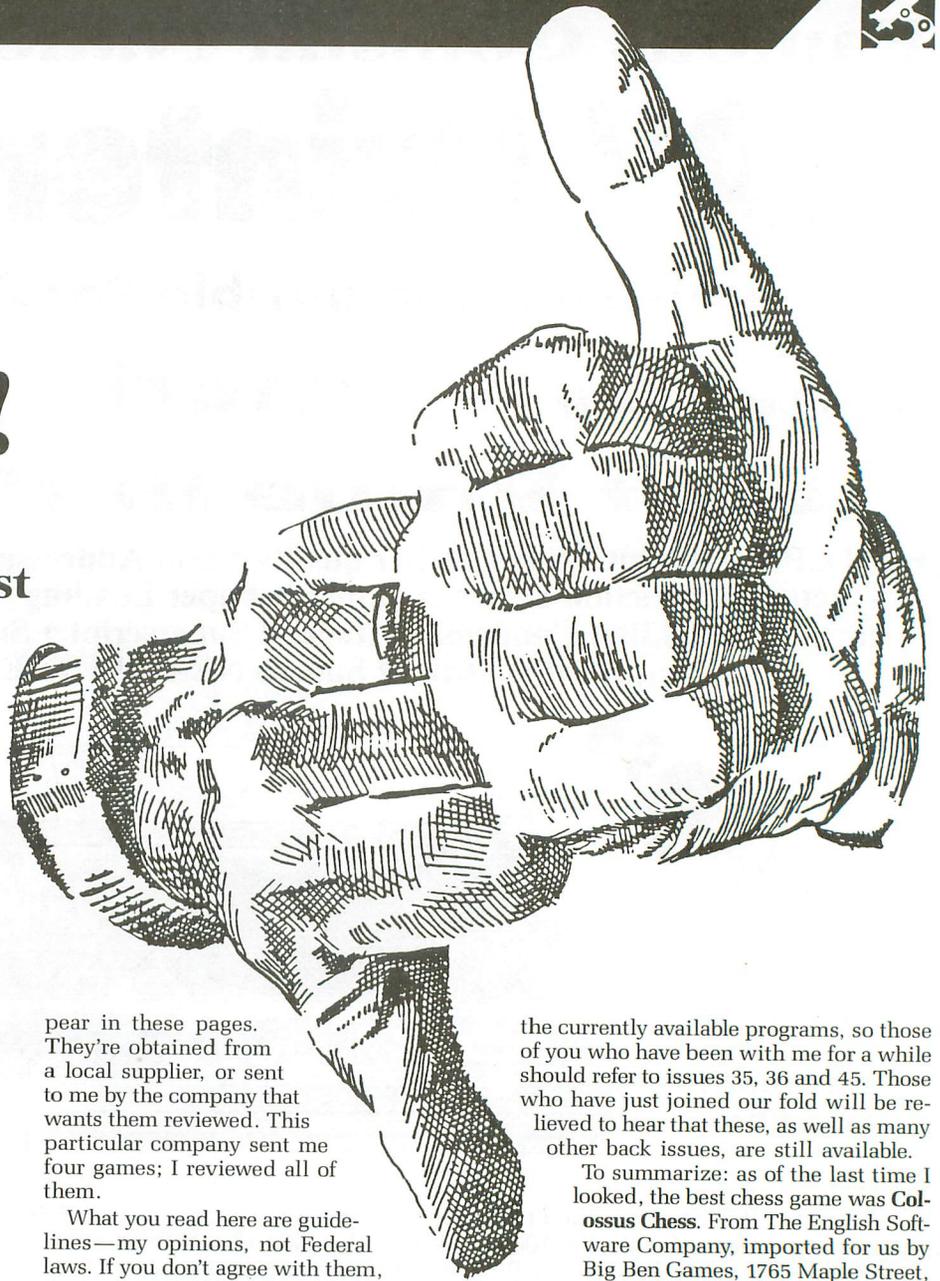
We preempt our regularly scheduled introduction to bring you the following special message.

On occasion, I receive criticisms from our readers—reviews of my reviews, as it were. I rarely respond, not because I don't care, but due to time and space limitations. However, I recently received a letter which compels me to vindicate myself. The topic was my review of a number of bargain games, which ran in issue 48 (I'll not mention the manufacturer again, since I was a bit rough on its games—I'm not a sadist, popular belief to the contrary).

Item 1: my opinions on the games I review... these are strictly my own. I would find it surprising (indeed, frightening) if someone out there agreed with everything I said. I feel I'm relatively accurate—first, because of the sheer bulk of games I play and evaluate (I know what's out there and what can be done on these machines); second, because I get comparatively few complaints (although this very statement is apt to produce more).

Item 2: I'm a very hard person to please... guilty as sin. I'm probably the *hardest* person to please. That doesn't mean I dislike all games (although I can and do find a fault in nearly every game—nothing's perfect, including myself). Anyone who follows my column knows that I do praise games, as well as pan them.

Item 3: I go out of my way to choose the weakest games a company puts out... on the contrary, I don't go out of my way to choose *any* of the games whose reviews ap-



pear in these pages. They're obtained from a local supplier, or sent to me by the company that wants them reviewed. This particular company sent me four games; I reviewed all of them.

What you read here are guidelines—my opinions, not Federal laws. If you don't agree with them, that's your privilege. If you want to write and point out the error of my ways, feel free. But a better thing to do would be to write the companies and tell *them* what you like. Or, even better, cast your vote with the almighty dollar. Come to think of it, one of the games that follow could be your next "ballot."

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I've reached the conclusion that, if there is one board game which has been "computerized" more often than any other, that game would have to be chess. Each year seems to bring a couple more computer chess games, a few more improvements. I lack the space to summarize (once again)

the currently available programs, so those of you who have been with me for a while should refer to issues 35, 36 and 45. Those who have just joined our fold will be relieved to hear that these, as well as many other back issues, are still available.

To summarize: as of the last time I looked, the best chess game was **Colossus Chess**. From The English Software Company, imported for us by Big Ben Games, 1765 Maple Street, Northfield, IL 60093, at the price of \$9.95 (now \$19.95), it offers all the options and difficulty levels one could want, at a price everyone can afford. It is the game to be matched by this new contender.

Created by Software Country and distributed by Electronic Arts, the **Chessmaster 2000** is billed as the finest chess program in the world. Before I address that claim, a couple of revelations about such programs.

Realistically, every commercial chess program is going to defeat about 99 percent of the chess-playing population, regardless of its number of difficulty levels. This is because the things just *do not* make mistakes, while most players do. So, what we really want to look at are the additional features a program has. And this one is full of them.

Perhaps the most distinctive is its screen display. Every other program I've seen dis-

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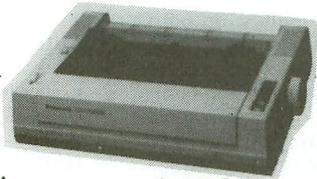


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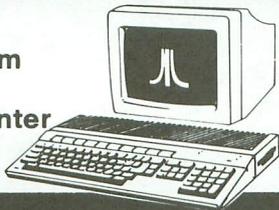
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## Panak strikes! *continued*

plays the board using a flat, top-view perspective. In **Chessmaster**, the board is presented in a 3-D perspective, and can be rotated and viewed from four angles. In the early part of a game, this view of a crowded board makes play difficult, but the situation improves in the end game, when few pieces remain. Fortunately, you can switch to and from the more conventional 2-D view. This is only the most obvious in a long list of features.

Twenty levels of play—including an infinite level, in which the program searches for the best move until you stop it—will defeat all who accept the challenge. In addition to the usual save game and board set-up features, the program can print out games on your printer, give you hints and teach you, act as a referee between two human opponents, and allow complete control over varying colors of the display. A separate games disk contains one hundred classic games for you to replay and analyze. I could go on, but suffice it to say that this program has all the features anyone will need, each easily initiated through a CONTROL-key sequence.

Unfortunately, the program falters slightly when it comes to entering your moves. Rather than using the joystick, the input method I prefer, you must enter information with the keyboard, using chess notation. This means you must hunch over the keyboard in order to play, rather than being able to simply lean back and enjoy the game. The on-screen coordinates available when using the 2-D view simplify this matter somewhat.

The documentation is superb. Inside the record-album-cover container are a manual and reference card which set new standards for clarity and completeness. Following an illustrated description of the rules of chess is a 7-page history of the game. Next comes a summary of the one hundred games available on the **Chessmaster** disk, as well as six chess problems and a bibliography. The reference card provides you with hardware-specific information on the game's operation.

I think I can fairly state that **Chessmaster 2000** is the best chess program available in its price range. It offers the multiple levels of play necessary to crush all but the greatest players on this planet, along with more features than most of us will ever use. And it should be out in an ST version, with unbelievable graphics and (I hope) mouse input, by the time you read this. Check out **Chessmaster 2000**, mates.

### Top Gunner Collection

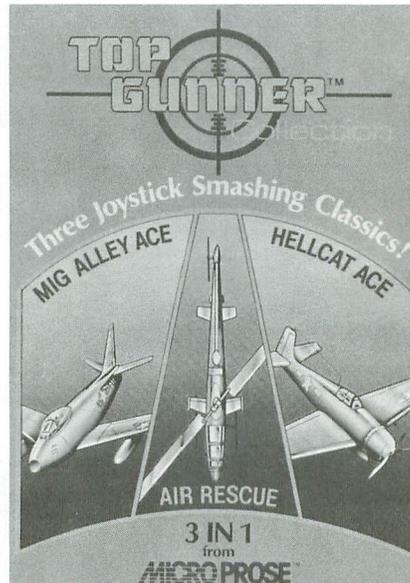
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This newest release from MicroProse,

undisputed leader in the field of arcade-war simulation computer gaming, takes the company back to its roots, down to the very solid foundation on which they have built their expertise and refined their skills. Unfortunately, **Top Gunner Collection** is not the game you might think that you'll be getting.

The **Top Gunner Collection** is not a new game, but, rather, a repackaging of three of MicroProse's separate games, on both sides of a single disk, at a special price (which happens to be less than any one of these games sold for previously). **Top Gunner** is not a war simulation, as are most of this company's other recent offerings. **Top Gunner** is a group of three dated arcade action games, which, while perhaps strong in their time, lack even the minimum government-recommended daily level of graphics action now. The three games in the collection are: **MiG Alley Ace**, **Air Rescue** and **Hellcat Ace**. And each of the three are distinctly different.

In **MiG Alley Ace**, you're the pilot of an F-86 Sabre Jet, in an aerial dogfight against the MiG 15s of the Red Chinese. The unique aspect of this game is its ability to let two players either fight against each other, or unite against the common enemy. This is accomplished through the clever use of a split-screen display. There are five scenarios in this game.



In **Hellcat Ace**, you again battle enemy airplanes, but this time in one of fourteen historical scenarios. Up to four players may take turns shooting down enemy aircraft. You can choose from four difficulty levels, the object being the achievement of five victories in a row, plus the attainment of the title, World's Greatest Fighter Pilot.

**Air Rescue** is the oddball of the three programs. In this game, you attempt a dar-

ing helicopter airlift rescue of a stranded archeological team. They're trapped in a vast gorge, which contains the remains of a long dead, but technologically advanced civilization. Numerous offensive and defensive systems thwart all your efforts to carry out this mission.

Control in each of these games is really quite good. Using the joystick, you dive and climb, turn and bank your aircraft—much like the real thing. Unfortunately, **MiG Alley** and **Hellcat** utilize both joysticks, which is very clumsy for the solo player (the second joystick's function may be performed with the keyboard in **MiG Alley**). All games pause with the SPACE BAR. I found each responsive to the controls, although their realistic simulation of flight makes them a bit hard to learn.

Let's move on to the screen displays, my main area of complaint. The graphics are very dated, resembling early 8-bit images (which is, of course, precisely what they are). But, although plain and very low-res, they do jam a lot of information onto the screens, and the action does move fast. **MiG Alley** and **Hellcat** have representations of the cockpit, complete with gauges and rearview mirrors. **Air Rescue** gives us a more traditional side view of the craft's movement.

The manual is superb, containing all of the information necessary to play the three games, with numerous charts, diagrams and maps. Scenarios are well explained, so that you know—at least, roughly—what you are expected to do. Additional flight information explains to you the difference between a loop, a split S and an Immelmann Turn, as well as how to accomplish these tricky aerial maneuvers and survive, without the benefit of a safety net.

So, while this package is most definitely a bargain, it might not be what you bargained for. If, however, you purchased or played one of these games in the past, enjoyed it and want more of the same, then, by all means, buy the **Top Gunner Collection**.

This ended up being another good month, with no games I really dreaded testing. Any one of these would be a nice addition to your collection. ☐

*The author wishes to thank The Magic One Computer Shop of Barberton, Ohio for their loyal support in the creation of this chronicle.*



# Keyboard Buffer

## Now your Atari can accept "type ahead" commands.

by Nancy A. Durgin

As a long-time user of various mainframe systems, I've found that one of the mainframe features I miss when using my Atari is a user keyboard buffer. A keyboard buffer allows the user to "type ahead" commands while the computer is processing the last request. It's a handy feature, especially for an experienced user or programmer who knows in advance what sequence of commands he wants to use.

For example, suppose you want to load a program and then list it to the printer. Instead of waiting for the computer to finish loading, you can type the LIST"P:" command ahead of time, sit back and watch the computer do the work.

### An overview.

The Atari operating system (or OS) provides a one-key buffer called CH, that's used on a First-In, First-Out (FIFO) basis. This "buffer" only remembers the last key pressed. The key code for the last key pressed is placed into CH (location 764 or \$02FC) by a keyboard interrupt routine (PIRQQ), located at 65470 (\$FFBE). Before processing a key-code, PIRQQ checks for keyboard bounce. It also sets various flags, such as the ATTRACT mode timer at location 77 (\$4D) and the CTRL-1 screen stop/start logic.

The PIRQQ function we're interested in is the transfer of the key code to CH. The OS routine simply moves the key code value to CH, overwriting the old contents. Once the key code is in CH, it can be accessed by the screen editor (E:) handlers, where further processing, including the actual echo of the typed character to the screen, is done.

We don't need to worry about what the screen editor will do with the key code, except we know that, when the editor accepts a key code from CH, it writes a flag value

of 255 (\$FF) into that location, to indicate that it's empty. This provides us with a means of communication between the editor and the keyboard interrupt routines not normally taken advantage of by the Atari OS.

The vector address that directs the Interrupt Request (IRQ) handler to PIRQQ is called VKEYBD, and is at locations 520 and 521 (\$0208 and \$0209) in RAM. The address in these locations can be changed, so control will pass to a user-written routine whenever a keyboard interrupt occurs.

### What the buffer does.

The new keyboard interrupt routine will perform all the same functions as the OS routine, except that, instead of moving the key code directly into location CH, it will check to see whether there are other key codes already waiting in the buffer to be processed. If there are, it will place the key code value into the buffer area until the previous keys have been processed.

Once the key code is in the buffer, we need a way to take it out when the editor is ready to process it. This is accomplished through the use of a Vertical Blank (VB) interrupt routine. During each VB interval, the routine will check to see whether CH contains the value 255, which would indicate that the editor has finished processing the last key code. If CH is 255, then the routine will move the next value out of the buffer into location CH, for the editor to process.

In order to implement a keyboard buffer on the Atari, then, we need three separate routines: a keyboard interrupt routine that moves the code for the last key pressed into the buffer; a VB interrupt routine that moves key codes out of the buffer into CH; and an initialization routine that sets up the proper system vectors to the other routines and initializes the buffer pointers.

The two interrupt routines make use of page 0 locations

to tell them where the buffer is located, and to keep track of the buffer pointers. The routines themselves are fully relocatable, since the only absolute addresses they must use are either OS locations, or page 0 locations. The initialization routine needs to use the absolute addresses of the other routines and of the buffer, so it cannot be relocatable, but it could easily be modified to reflect any change in the locations of the other routines.

Listing 3 shows a complete assembly listing of the **Keyboard Buffer** routines. This particular version uses a 60-character buffer and is set up to reside on page 6 of user RAM. It must be called once from BASIC, using `X=USR(1536)` to execute the initialization routine. A BASIC loader program to poke the routines into memory and then call the initialization routine is shown in Listing 1.

### Using the Keyboard Buffer.

Once the **Keyboard Buffer** interrupt routines are loaded into memory, they sit innocuously in the background, without affecting the normal operation of your computer. Anytime you hit a key before the editor is done processing the last key code (typically during I/O or program execution), the value of the key will be stored in the buffer until the editor is ready to process it.

If the buffer is full, the keyboard interrupt routine will ignore your keystrokes until there's room in the buffer, in order to avoid writing over any previous commands.

There are several things you should keep in mind when using the keyboard buffer. First, the auto-repeat feature is disabled whenever the buffer is not empty. You can't fill the buffer with `As` simply by holding the `A` key down.

Second, a `CTRL-0` key combination (which is normally ignored by the OS) can be used to clear out the buffer and location `CH`, and reset the buffer pointers. This can be especially useful if you realize you've typed an incorrect and potentially damaging key sequence into the buffer.

Last, remember that *all* of the keys you type will be interpreted by the OS just as they would be normally. Certain keys, such as the `BREAK` key and the special function keys (`OPTION`, `START`, etc.) do not cause keyboard interrupts, and they do not affect the buffer in any way.

### Using the Buffer with BASIC.

In order to use the **Keyboard Buffer** routines with Atari BASIC, simply type in the program shown in Listing 1. When run, it installs the buffer interrupt routines in page 6 and executes the initialization routine.

The routines will remain in memory until they're written over, or until you turn the computer off. Hitting `SYSTEM RESET` will disable the buffer routines, because the OS replaces the vectors to the keyboard interrupt and `VB` routines with the normal OS vectors. You can restart the keyboard buffer routines by typing `X=USR(1536)`.

After you've run the program in Listing 1, try the following to test out the buffer: in immediate mode, type `FOR X=1 TO 3000:NEXT X`, then hit `RETURN`. While the computer is running this loop, type something else, such as `HI THERE!!` Nothing will seem to happen, but, in reality, all the keystrokes are being recorded in the buffer. When the loop is completed and the computer returns to the

screen editor mode, your message will appear (complete with the accompanying "click" for each keystroke) as the buffer empties out.

### Moving the buffer off of page 6.

The advantage of placing the keyboard buffer routines on page 6 is that the keyboard buffer will work in immediate mode, as well as during program execution. You can load in new BASIC programs without affecting the keyboard buffer, as long as you don't try to use page 6 for anything else.

If you want to use page 6 for some other machine language subroutines, it's still possible to use the **Keyboard Buffer** within a specific applications program. This is because the buffer interrupt routines are fully relocatable. They can be anywhere in memory, including the memory reserved by a BASIC program for string variables.

Listing 2 shows how the **Keyboard Buffer** can be implemented within a BASIC program by storing the routines in strings. `KEYINT$` contains the keyboard interrupt routine, `KEYVB$` contains the `VB` routine, and `BUFFER$` contains the actual buffer area. In this program, the initialization is done directly from BASIC, instead of using the machine language `INIT` routine.

In Listing 2, Lines 30000-31240 contain the machine code data and a routine to place the routines in `KEYINT$` and `KEYVB$`, and initialize the buffer. Lines 10-999 contain a short driver program that can be used to demonstrate the **Keyboard Buffer**. The program accepts a user input and inserts a pause, during which the user can "type ahead" any message he wants to. The contents of the buffer (up to the next `RETURN` character, which terminates an input line), will then appear as the input to the next prompt, which will be accepted by the program.

Note that, when **Keyboard Buffer** routines are placed in program string variable memory, the routines will work normally within the program environment. But if the program is terminated, weird things can happen, since the routines are still active in memory, but the memory space where they're located isn't "safe," as page 6 is. Before you attempt any system commands (such as `LOAD` or `SAVE`), be sure to hit `SYSTEM RESET` to disable the **Keyboard Buffer**.

### Modifications to Keyboard Buffer routines.

The assembly program for the `INIT`, `KEYINT` and `KEYVB` routines is shown in Listing 3. The listing is from the Atari Macro Assembler, so some minor modifications are necessary to use it with the Assembler/Editor cartridge. As written, the **Keyboard Buffer** routines and the buffer itself just barely fit in one page (they take 253 bytes). The 60-byte buffer length was chosen rather arbitrarily, so that the whole modification would fit onto page 6. If you want to put the routines somewhere else, then the length of the buffer can be increased or decreased, as desired.

The initialization routine is written to be called as a subroutine from BASIC. If you want to load the buffer routines using the binary load (`L`) option in DOS, then the very first opcode in the `INIT` routine should be removed (or changed to `NOP`). This PLA command pulls the value for the number of arguments passed from BASIC off of the

stack, and discards it. This is unnecessary if the routine is not being called from BASIC.

The **Keyboard Buffer** can be a useful addition to any programming application that involves many user inputs of a predictable nature. One application which comes to mind immediately is in text-oriented adventure games. Once the player becomes familiar with the opening sequences of the game, it can be very annoying to have to sit and wait for the computer to process the last command before you can type in the next one.

The buffer is also useful for program development applications. The programmer can type commands to list and save a program to various devices all at once, instead of having to wait for the computer to finish processing the last command.

One of the nicest things about the **Keyboard Buffer** is that, once it's implemented, it is available if the user needs it. But if he doesn't want to "type ahead," it doesn't interfere with normal keyboard operations. ■

Nancy A. Durgin is a graduate student of physics at Columbia University, with degrees in Physics and Computer Science from Michigan State University. A computer enthusiast for many years, Nancy uses her personal computers for everything from playing *Star Raiders* to solving differential equations.

The two-letter checksum code preceding the line numbers here is *not* a part of the BASIC program. For further information, see the *BASIC Editor II*, in issue 47.

Listing 1.  
BASIC listing.

```

VZ 10 REM KEYBOARD BUFFER INITIALIZATION
PROGRAM
AZ 20 REM POKES MACHINE CODE INTO PAGE 6
AND CALLS INITIALIZATION ROUTINE TO IM
PLEMENT KEYBOARD BUFFER
YC 30 REM Written by Nancy A. Durgin
IZ 100 READ STARTLO,STARTHI,LASTLO,LASTHI
CB 110 START=STARTLO+256*STARTHI
FW 120 LAST=LASTLO+256*LASTHI
HX 140 FOR I=START TO LAST
BM 150 READ X
HY 160 POKE I,X
GF 170 NEXT I
AE 190 X=USR(START)
NR 200 END
XD 10010 DATA 0,6,193,6,104,169,0,133
WU 10020 DATA 205,133,206,169,194,133,203
,169,6,133
BB 10030 DATA 204,169,156,141,34,2,169,6,
141,35
WC 10040 DATA 2,169,36,141,8,2,169,6,141,
9
FB 10050 DATA 2,96,152,72,173,9,210,205,2
42,2
WR 10060 DATA 208,5,173,241,2,208,96,173,
9,210
PH 10070 DATA 201,159,208,10,173,255,2,73
,255,141
IX 10080 DATA 255,2,176,79,201,178,208,13
,169,0
UA 10090 DATA 133,205,133,206,169,255,141
,252,2,176
  
```

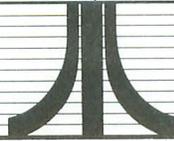
```

OW 10100 DATA 62,141,242,2,169,3,141,241,
2,169
QW 10110 DATA 0,133,77,165,205,197,206,24
0,12,164
MY 10120 DATA 205,200,152,197,206,240,36,
165,205,16
ZE 10130 DATA 15,173,252,2,201,255,208,8,
173,9
EC 10140 DATA 210,141,252,2,176,17,173,9,
210,164
NF 10150 DATA 205,145,203,200,152,201,60,
208,2,169
ZD 10160 DATA 0,133,205,169,48,141,43,2,1
04,168
EH 10170 DATA 104,64,165,205,197,206,240,
29,169,48
QY 10180 DATA 141,43,2,173,252,2,201,255,
208,17
KL 10190 DATA 164,206,177,203,141,252,2,2
00,152,201
IP 10200 DATA 60,208,2,169,0,133,206,76,9
5,228
  
```

Listing 2.  
BASIC listing.

```

UQ 10 REM DEMO PROGRAM - USES KEYBOARD BU
FFER
YB 20 REM Written by Nancy A. Durgin
QA 50 DIM MES$(60)
SW 100 GOSUB 30000
UE 130 PRINT CHR$(125)
TG 140 PRINT " KEYBOARD BUFFER DE
MO":PRINT :PRINT
OT 150 PRINT "Type something on the keybo
ard during this pause. Hit RETURN to t
erminate your input line."
ZA 160 PRINT "You can store as many separ
ate inputs in the buffer as you want."
:PRINT :PRINT "EXPERIMENT!!"
NC 170 FOR X=1 TO 5000:NEXT X
TC 210 PRINT :PRINT "INPUT ";:INPUT MES$
TG 220 PRINT :PRINT "YOU TYPED :";MES$:PR
INT :PRINT
WF 230 PRINT "(Type ahead during this pau
se)"
LR 240 FOR X=1 TO 3000:NEXT X
MM 250 GOTO 210
PR 999 END
UK 30000 REM ROUTINE TO SET UP KEYBOARD B
UFFER
DL 30001 DIM BUFFER$(60),KEYINT$(120),KEY
VB$(38)
OW 30005 REM POKE ROUTINES INTO MEMORY
TY 30010 RESTORE 31000:POS=0
RW 30020 READ BYTE:IF BYTE=-1 THEN 30100
NQ 30030 POS=POS+1:KEYINT$(POS,POS)=CHR$(
BYTE)
YA 30040 GOTO 30020
VF 30100 RESTORE 31200:POS=0
TE 30110 READ BYTE:IF BYTE=-1 THEN 30200
UV 30120 POS=POS+1:KEYVB$(POS,POS)=CHR$(B
YTE)
XY 30130 GOTO 30110
MS 30200 REM INITIALIZE THE KEYBOARD BUFF
ER
PS 30210 BUFIN=205:BUFOUT=206:BUF=203:VVB
LKI=546:VKEYBD=520
PR 30220 POKE BUFIN,0:POKE BUFOUT,0
TY 30230 HI=INT(ADR(BUFFER$)/256):LO=ADR(
BUFFER$)-256*HI
WI 30240 POKE BUF,LO:POKE BUF+1,HI
FE 30250 HI=INT(ADR(KEYINT$)/256):LO=ADR(
KEYINT$)-256*HI
  
```



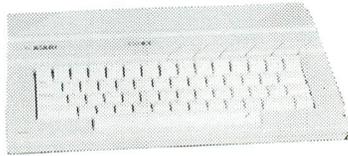
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# Keyboard Buffer *continued*

```

XJ 30260 POKE VKEYBD,LO:POKE VKEYBD+1,HI
TD 30270 HI=INT(ADR(KEYVBS)/256):LO=ADR(K
EYVBS)-256*HI
NG 30280 POKE VVBLKI,LO:POKE VVBLKI+1,HI
HD 30999 RETURN
QQ 31000 REM DATA FOR KEYBOARD INTERRUPT
ROUTINE
PQ 31050 DATA 152,72,173,9,210,205,242,2
WV 31060 DATA 208,5,173,241,2,208,96,173,
9,210
PL 31070 DATA 201,159,208,10,173,255,2,73
,255,141
JB 31080 DATA 255,2,176,79,201,178,208,13
,169,0
UE 31090 DATA 133,205,133,206,169,255,141
,252,2,176
PA 31100 DATA 62,141,242,2,169,3,141,241,
2,169
RA 31110 DATA 0,133,77,165,205,197,206,24
0,12,164
NC 31120 DATA 205,200,152,197,206,240,36,
165,205,16
ZI 31130 DATA 15,173,252,2,201,255,208,8,
173,9
EG 31140 DATA 210,141,252,2,176,17,173,9,
210,164
NJ 31150 DATA 205,145,203,200,152,201,60,
208,2,169
ZH 31160 DATA 0,133,205,169,48,141,43,2,1
04,168
XQ 31170 DATA 104,64
FV 31180 DATA -1
ZP 31190 REM DATA FOR VERTICAL BLANK ROUT
INE
MP 31200 DATA 165,205,197,206,240,29,169,
48
QD 31210 DATA 141,43,2,173,252,2,201,255,
208,17
JQ 31220 DATA 164,206,177,203,141,252,2,2
00,152,201
JF 31230 DATA 60,208,2,169,0,133,206,76,9
5,228
FI 31240 DATA -1

```

Listing 3.  
Assembly listing.

```

* Keyboard Buffer Routines
*
* Written by Nancy A. Durgin
*
* Loads into page 6
* Call from BASIC with X=USR(1536)
*
*****
* This program sets up a keyboard buffer and associated
* handler routines. The vector to the keyboard interrupt
* routine (VKEYBD) is changed to transfer control to a
* new routine, which stores characters that are 'typed
* ahead' into a 60 character buffer. A VBLANK routine
* checks to see if the current character (in CH - $02FC)
* has been processed, and if it has, moves the next
* character out of the buffer.
*
*****
* SYSTEM EQUATES
*
KBCODE = $D209 ;Code for the key just pressed
CHI = $02F2 ;Code for last key pressed
CH = $02FC ;Key waiting to be processed by E:
KEYDEL = $02F1 ;Keyboard "debounce" counter
ATRACT = $004B ;attract mode counter
SRTIMR = $022B ;Key Auto-repeat counter
VVBLKI = $0222 ;Vector to VBLANKI routines
VSVBVD = $E45F ;Vector to system VBLANK routines
VKEYBD = $0208 ;Vector to keybd intrrupt routine
V5FLAG = $02FF ;Screen STOP/START flag
*
* PROGRAM EQUATES
*
BUF = $CB ;Contains address of buffer
BUFIN = $CD ;IN pointer for buffer
;points to next free location
BUFOUT = $CE ;OUT pointer for buffer
;points to next data byte
BUFLN = $3C ;Buffer length = 60
CTRL1 = $9F ;Keycode for CTRL-1

```

```

CTRL0 = 5B2 ;Keycode for CTRL-0
*
* INITIALIZATION ROUTINE
*
* Initializes the routine by placing the correct values in
* the PAGE ZERO locations, and by substituting program
* vector addresses for the system keyboard interrupt and
* VBLANK handlers.
*
INIT ORG $0600 ;Remove argument count from stack
PLA
LDA #500 ;BUFIN=0
STA BUFIN ;BUFIN=0
STA BUFOUT ;BUFOUT=0
LDA #LOW BUFFER
STA BUF ;Store buffer address
LDA #HIGH BUFFER
STA BUFIN+1
LDA #LOW KEYVB ;LO byte of new VBLANK routine
LDA #HIGH KEYVB ;Store at vectr address
LDA #HIGH KEYVB ;HI byte
STA VVBLKI+1
LDA #LOW KEYINT ;LO byte of new handler
STA VKEYBD ;Store at vector address
LDA #HIGH KEYINT ;HI byte
STA VKEYBD+1
RTS ;RETURN
*
* KEYBOARD INTERRUPT HANDLER ROUTINE
*
* New handler for keyboard interrupts. This routine does
* everything the old 05 handler did, except that it stores
* new character values in the buffer, instead of directly
* into location CH.
* If this routine detects a CTRL-0, it resets the buffer by
* setting the IN and OUT pointers to 0, and putting an $FF
* in location CH.
*
KEYINT TYA ;Save Y register
PHA
LDA KBCODE ;Get internal code of key
CMP CHI ;Compare to last key pressed
BNE NOTSAME ;Skip debounce routine
LDA KEYDEL ;Load timer value
BNE EXIT ;Treat this code as a bounce
NOTSAME LDA KBCODE ;Get code again
CMP #CTRL1 ;See if it is a CTRL-1
BNE NCTRL1 ;Skip if not a CTRL-1
LDA V5FLAG ;Load STOP/START flag

```

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```

EOR    #5FF ;Reverse flag status
STA    55FLAG ;Store new flag value
BCS    EXIT ;Don't process key
NCTRL1 CMP    NCTRL0 ;See if it is a CTRL-0
BNE    NCTRL0 ;Skip if not
LDA    #500 ;Purge buffer ---
STA    BUFIN ;Reset IN pointer
STA    BUFOUT ;Reset OUT pointer
LDA    #5FF
STA    CH ;Reset CH
BCS    EXIT ;Don't Process key
NCTRL0 STA    CH1 ;Update last key pressed
LDA    #503
STA    KEYDEL ;Reset debounce timer
LDA    #500 ;Reset attract mode timer
STA    ATTRACT
LDA    BUFIN ;Load IN pointer
CMP    BUFOUT ;Subtract OUT pointer
BEQ    EMPTY ;IN=OUT --> Buffer is empty
LDY    BUFIN ;See if buffer is full
INY    ;Add 1 to IN and see if it = OUT
TYA
CMP    BUFOUT
BEQ    EXIT ;IN=OUT-1 --> Buffer is full
LDA    BUFIN ;Get IN pointer
BPL    PUTBUF ;Skip this next part
LDA    CH ;Get key code
CMP    #5FF ;See if last code has been used
BNE    PUTBUF ;Skip if CH has keycode in it
LDA    KBCODE ;Get key code
STA    CH ;Store at CH
BCS    EXIT ;Jump to exit
PUTBUF LDA    KBCODE ;Get key code
LDY    BUFIN ;Get IN pointer
STA    (BUF),Y ;Store in buffer
TYA ;Increment pointer
CMP    #BUFLEN ;See if pointer is at end
BNE    STORIN ;Skip if not at end
LDA    #500 ;Set to 0
STORIN STA    BUFIN
EXIT    SRTIMR ;Reset auto-repeat timer

*
* Checks to see if CH=5FF, which would mean the current
* key has been processed. If it has been processed, then
* the next data byte is moved out of the buffer into CH.
* The appropriate pointers are updated.
* If the buffer is not empty, then the auto-repeat feature
* is disabled by putting a 530 in location SRTIMR.
*
KEYVB  LDA    BUFIN ;Get IN pointer
CMP    BUFOUT ;Subtract OUT pointer
BEQ    EXIT2 ;IN=OUT --> buffer is empty
LDA    #530
STA    SRTIMR ;Reset auto-repeat timer
LDA    CH ;Get value at CH
CMP    #5FF ;See if it is 255
BNE    EXIT2 ;Skip this if it isn't
LDY    BUFOUT ;Get OUT pointer
LDA    (BUF),Y ;Get character from buffer
STA    CH ;Store character at CH
INY    ;Increment OUT pointer
TYA
CMP    #BUFLEN ;See if pointer is at end
BNE    STOROUT ;Skip if not at end
LDA    #500 ;Set to 0
STOROUT STA    BUFOUT
EXIT2  JMP    555BVB ;Jump to system VBLANK vector
*
* RESERVE BUFFER SPACE
*
BUFFER D5    BUFLEN
*
* END
*
END
    
```

\* UBLANK ROUTINE

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# THE BBK Monitor

## A machine language monitor for your Atari.

by Bryan Schappel and Barry Kolbe

Many microcomputers have a built-in monitor which the user can call up to examine memory, disassemble memory, or even write simple machine code. This is available on the Atari only as a cartridge. So, one must switch back and forth between the BASIC cartridge and some assembler cartridge. Until now, that is. Enter the **BBK Monitor** (we'll call it **BBK**, for brevity). This is a 100 percent machine language monitor, residing "permanently" in memory (\$2000-\$30AE).

### Typing it in.

Listing 1 is the BASIC data to create your copy of the **BBK Monitor**. Please refer to **M/L Editor** on page 90 for typing instructions. You should create the program file under the name **BBKMON.COM**.

The assembly language source code for **BBK** is available on this month's disk version, or on the **ANALOG Computing Atari Users' Group** on Delphi.

To load **BBK** from Atari DOS 2.0s, go to DOS and type:

```
L [RETURN]
BBKMON.COM [RETURN]
```

**BBK** will load and run automatically.

To load **BBK** with OS/A+, go to the command processor and type:

```
BBKMON [RETURN]
```

Again, **BBK** will load and run automatically.

### Monitor functions.

**BBK** performs the following general functions: assembly, disassembly, disk management, number base conversions and memory dumping.

To get **BBK** up and running, you have two choices—to use it with or without a cartridge.

*Without a cartridge.*

Insert a disk with a copy of **BBKMON.COM** on it into

drive 1 and power up your computer. When you get to DOS, follow the loading instructions described above to load **BBK**. The message **BBK MONITOR** will appear on a green screen with a > for a prompt.

*With a cartridge.*

Boot up your computer and exit to DOS. When you get to DOS, load **BBK**. The program will load and initialize itself, then return control to the cartridge.

To enter the monitor, type **DOS** and hit **RETURN**. The **BBK MONITOR** message will appear on a green screen.

### Monitor commands.

(1) *Assemble.*

To enter this mode, type **A\$nnnn**, where **\$nnnn** is a hexadecimal address of one to four hexadecimal digits. All assembly must be done in hex. This is a mini-assembler. That means no labels. All assembly is done directly to memory.

Since the assembler actually stores opcodes and arguments in memory, this brings up the problem of finding free RAM. For example, the following program is "poked" into memory at \$4000:

```
A$4000 [RETURN]
$4000: PLA
$4001: LDA#$4
$4002: STA $600
$4003: RTS
$4004: [RETURN]
```

This results in memory locations \$4000-\$4006 being filled with these numbers (represented in hex):

```
$4000: 68 (PLA)
$4001: A9 (LDA#)
$4002: 04 ($04)
$4003: 8D (STA)
$4004: 00 Low byte of $0600
$4005: 06 High byte of $0600
$4006: 60 (RTS)
```

Obviously, a BASIC program residing from \$30AF to

\$5000 would be somewhat flawed after typing in the above program!

So where is there free memory? Well, we left you page 6 (\$600-\$6FF). We also left you free use of \$CB-\$CE, for indirect addressing. The monitor occupies \$2000-\$30AE. Without the BASIC cartridge, you have from \$30AF to the bottom of screen memory—see Figure 1, below.

ROM	\$FFFF
BASIC CARTRIDGE	\$C000
Screen Memory	\$A000
Free RAM	Varies, depending on graphics mode
Runtime stack	Varies (\$90,91 144,145 decimal)
BASIC program	Varies
BBK MONITOR	\$30AF
D O S	\$2000
Page 6	\$0700
Operating System Usage	\$0600
	\$0000

**Figure 1. — Memory map.**

With the BASIC language in operation, but no BASIC program in memory, you have from \$30AF to the bottom of screen memory. Be warned, though: BASIC will use \$30AF-\$31AF as a buffer for tokenizing lines! We would recommend starting at \$3200.

With a BASIC program in memory, the situation is more complicated. The bottom of the BASIC program will be at \$30AF, and the top can be found by determining the contents of MEMTOP, \$90,91 (144,145 in decimal). Use the memory dump to do this. For example, type: *M\$90* and RETURN. The result might look like this:

```
$0090: 30 54 A3 42 61 84
```

Then, \$5430 would be the current top of the BASIC program. Above the BASIC program is the runtime stack. This is where BASIC keeps track of line numbers for GOSUBs and FOR-NEXT loops. MEMTOP changes from program to program, and also changes while the program is running. Any place between MEMTOP and screen memory is suitable for assembling. We would stay 1 or 2K above MEMTOP, just to be safe.

You can also use the memory dump or disassembly functions to find a block of free memory. To leave the assembler mode, just hit RETURN.

Some error checking is performed. For example, typing *AND 3* results in an error; *AND \$3* would be accepted; *PHA \$3200* is taken as *PHA*, ignoring the \$3200; and *STA #23* is taken as *STA \$23*.

All branch instructions are checked for legal ranges.

(2) *Disassemble.*

Type *D\$nnnn[,P]* to disassemble memory at \$nnnn. For

example, *D\$A000,P* will disassemble the cartridge to the printer. Press any key to pause. Hit RETURN to exit at any time, even while paused. All disassembly is in hex. Disassembler format:

```
$A000: LDA $A023,Y    B9 23 A0
```

```
Addr  Mnemonics    Op Lo Hi bytes
```

(3) *Number base conversions.*

Type *?ddd* or *?\$nnn* to convert from decimal to hex or hex to decimal.

(4) *Change memory.*

Type *C\$nnnn<mm,mm,mm,...)* to change a range of memory addresses. The *mms* are hex numbers. A maximum of 40 bytes (including the End-Of-Line or EOL) are allowed for input. This allows about ten locations to be changed per input line.

(5) *Exit to cartridge.*

Type *Q* and RETURN. The monitor's still resident, however. Type *DOS* to re-enter the monitor; entering the monitor will not destroy your BASIC code.

(6) *Exit to DOS.*

Type *X* and RETURN. Doing this removes **BBK**, loads *DUP.SYS* and, most likely, will erase your BASIC code.

(7) *Disk functions.*

(a) *F,n*. Gives the directory for drive number *n*.

(b) *L>D:filespec*. Locks specified file. Wild cards are allowed.

(c) *U>D:filespec*. Unlocks file(s).

(d) *E>D:filespec*. Erases file. Be sure you want to do this; you're not asked if you're sure.

(e) *R>D:filespec1,filespec2*. Renames first file with the second name.

(f) *S>D:filespec,start,end*. Saves a single-stage binary file, from start to end. Note that *start* and *end* must be of the form \$nnnn.

(g) *B>D:filespec*. Loads any binary file into memory. If the file is not binary (\$FF headers) the message *Not a binary file* is displayed. If it is a binary file, then the message *Loading at \$nnnn* is displayed.

(8) *Memory dump.*

Type *M\$nnnn*. Each generated line has this format:

```
$nnnn: 00 00 00 00 00 00 .....
```

```
Addr    Hex bytes    ATASCII
```

First is the address of the line; next, the values of the contents in that memory (in hex); then the ATASCII characters for that memory. The only exception is \$9B (EOL). This is replaced by \$1B or ESCAPE. We use CIO to print all these characters, by placing a nonzero in location 766 before printing. After the print, store a 0 in 766 to let special control characters perform their normal functions.

Pressing any key will pause the screen. Press any key to resume screen scrolling. Hitting RETURN or BREAK will abort this function.

### Technical notes.

**BBK** resides in the low memory from \$2000-\$30AE. It is "protected" from erasure by the SYSTEM RESET process. We use a variable called WHICH? to determine if RESET was pressed while using BASIC or **BBK**. So, if you

press RESET in **BBK**, you're returned to **BBK**. Likewise, from BASIC you're returned to BASIC.

**BBK** takes up little more than 4K, leaving around 27K in which to program.

Originally, we designed **BBK** to reside just below RAMTOP, with screen memory below **BBK**. Even though we lowered RAMTOP 16 pages, SYSTEM RESET (depending upon screen size) wiped out up to 128 bytes of our program. We moved our program up 128 bytes (it wasn't 4K at that time; fine. . . right?) No. For some reason, SYSTEM RESET cleared out 960 bytes (one graphics 0 screen size) below old RAMTOP. At this point, we threw up our hands in despair!

The main reason for putting **BBK** in high memory was so we could go to DOS to perform binary saves and loads. Well, we tried. So we lengthened **BBK** by doing our own binary saves and loads, and adding a memory dump.

We hope you find this program useful at some time. It's coming in handy once in a while for us. Happy programming. **A**

---

*Barry Kolbe is a mathematics teacher in Madison, WI. He uses the Atari to demonstrate graphing in his classroom. His former student, Bryan Schappel, is studying Computer Science at the University of Wisconsin.*

---

Listing 1.

```

1000 DATA 255,255,0,32,172,48,32,255,2
55,32,254,32,169,0,133,12,5482
1010 DATA 169,32,133,13,169,103,133,10
,169,32,133,11,169,173,141,231,8034
1020 DATA 2,169,48,141,232,2,173,47,36
,240,6,32,238,32,76,119,4587
1030 DATA 32,96,165,12,141,1,32,165,13
,141,2,32,165,10,141,225,3985
1040 DATA 32,165,11,141,226,32,169,103
,133,10,169,32,133,11,169,0,3286
1050 DATA 133,12,169,32,133,13,169,173
,141,231,2,169,48,141,232,2,6891
1060 DATA 32,254,32,165,6,208,3,76,119
,32,108,250,191,216,162,127,9811
1070 DATA 181,128,157,0,5,202,16,248,1
69,1,141,47,36,32,254,32,4195
1080 DATA 169,228,141,198,2,169,0,133,
12,169,32,133,13,169,0,141,3545
1090 DATA 254,2,32,36,33,32,173,33,32,
75,33,32,106,33,162,13,9683
1100 DATA 173,148,5,221,205,35,240,5,2
02,16,248,48,20,138,10,170,5767
1110 DATA 189,219,35,141,185,32,189,22
0,35,141,186,32,160,1,76,255,8075
1120 DATA 255,136,32,195,33,76,135,32,
185,148,5,201,155,208,243,32,9041
1130 DATA 238,32,173,1,32,133,12,173,2
,32,133,13,173,225,32,133,4345
1140 DATA 10,173,226,32,133,11,76,255,
255,32,238,32,169,0,141,47,6286
1150 DATA 36,76,116,228,162,127,189,0,
5,149,128,202,16,248,169,148,9443
1160 DATA 141,198,2,96,162,0,169,12,14
1,66,3,32,86,228,162,0,3262
1170 DATA 169,247,141,68,3,169,35,141,
69,3,169,3,141,66,3,169,2982
1180 DATA 12,141,74,3,142,75,3,76,86,2
28,169,36,160,0,141,69,4141
1190 DATA 3,140,68,3,162,0,169,9,141,6
6,3,169,40,141,72,3,1366
1200 DATA 142,73,3,32,86,228,48,1,96,1
04,104,32,111,35,76,135,2432
1210 DATA 32,169,5,141,66,3,162,0,142,

```

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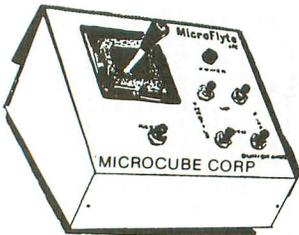
73,3,169,50,141,72,3,1462
1220 DATA 169,148,141,68,3,169,5,141,6
9,3,32,86,228,48,226,96,5169
1230 DATA 162,0,189,148,5,201,155,240,
3,232,16,246,224,0,240,46,9510
1240 DATA 134,133,162,0,189,148,5,201,
32,240,4,201,62,208,18,138,6942
1250 DATA 168,185,149,5,153,148,5,200,
196,133,208,245,198,133,76,126,1457
1260 DATA 33,232,228,133,208,222,173,1
48,5,201,155,240,1,96,104,104,8961
1270 DATA 76,135,32,169,36,160,35,32,4
0,33,32,36,33,169,62,76,444
1280 DATA 191,39,169,5,160,148,76,40,3
3,185,148,5,201,155,208,5,6434
1290 DATA 153,149,5,169,32,9,128,153,1
48,5,162,0,189,1,36,32,1453
1300 DATA 191,39,232,224,7,208,245,32,
188,33,169,100,141,0,210,169,9183
1310 DATA 170,141,1,210,169,0,133,20,1
65,20,201,3,208,250,162,0,7107
1320 DATA 142,1,210,96,160,1,185,148,5
,201,36,208,61,200,185,148,9446
1330 DATA 5,201,155,208,3,76,188,32,16
0,2,32,56,39,165,150,133,4756
1340 DATA 212,165,151,133,213,32,170,2
17,32,230,216,160,255,200,177,243,6592
1350 DATA 153,29,36,16,248,41,127,153,
29,36,200,169,155,153,29,36,5349
1360 DATA 169,36,160,28,32,40,33,76,13
5,32,169,1,133,242,169,148,6858
1370 DATA 133,243,169,5,133,244,32,0,2
16,32,210,217,32,163,35,160,7830
1380 DATA 1,169,36,141,29,36,185,191,3
,153,29,36,200,192,5,208,6574
1390 DATA 245,76,53,34,185,148,5,201,3
6,208,70,200,32,56,39,165,5537
1400 DATA 169,240,62,201,5,176,57,165,
150,133,142,165,151,133,143,169,735
1410 DATA 0,133,144,185,148,5,201,60,2
08,39,200,32,56,39,165,169,6804
1420 DATA 240,31,201,3,176,26,165,150,
132,137,164,144,145,142,230,144,1445
1430 DATA 164,137,185,148,5,201,155,24
0,4,201,44,240,221,76,135,32,9135
1440 DATA 136,76,188,32,185,148,5,201,
155,240,7,201,44,240,10,76,7458
1450 DATA 188,32,169,49,141,251,35,208
,15,200,185,148,5,201,49,144,8389
1460 DATA 238,201,53,176,234,141,251,3
5,32,101,35,162,32,169,3,157,5982
1470 DATA 66,3,169,250,157,68,3,169,35
,157,69,3,169,6,157,74,4115
1480 DATA 3,169,0,157,75,3,32,86,228,1
6,6,32,111,35,76,44,193
1490 DATA 35,162,32,169,5,157,66,3,169
,148,157,68,3,169,5,157,4610
1500 DATA 69,3,138,157,72,3,169,0,157,
73,3,162,32,32,86,228,4100
1510 DATA 16,6,32,101,35,76,135,32,32,
188,33,76,37,35,169,35,1379
1520 DATA 208,10,169,36,208,6,169,33,2
08,2,169,32,72,32,101,35,2516
1530 DATA 162,32,104,157,66,3,169,149,
157,68,3,169,5,157,69,3,2919
1540 DATA 32,86,228,16,3,32,111,35,76,
135,32,162,32,169,12,157,3560
1550 DATA 66,3,76,86,228,132,212,169,0
,133,213,32,170,217,32,230,427
1560 DATA 216,160,255,162,6,200,232,17
7,243,157,1,36,16,247,41,127,8292
1570 DATA 157,1,36,232,169,155,157,1,3
6,32,36,33,32,101,35,169,2142
1580 DATA 36,160,1,32,40,33,76,228,33,
160,0,162,1,134,146,169,5445
1590 DATA 240,53,212,74,74,74,170,1
89,12,36,153,192,3,200,166,7807
1600 DATA 146,169,15,53,212,170,189,12
,36,153,192,3,200,166,146,202,188

```

1610 DATA 16,219,96,63,70,88,67,76,85,  
69,82,68,81,65,83,66,1996  
1620 DATA 77,254,33,190,34,194,32,110,  
34,56,35,60,35,64,35,68,437  
1630 DATA 35,224,39,227,32,50,36,161,4  
2,207,43,175,44,69,58,155,5047  
1640 DATA 68,49,58,42,46,42,155,69,114  
,114,111,114,62,32,32,32,1268  
1650 DATA 32,155,48,49,50,51,52,53,54,  
55,56,57,65,66,67,68,9874  
1660 DATA 69,70,61,32,32,32,32,155,  
66,66,75,32,77,79,78,620  
1670 DATA 73,84,79,82,155,0,153,100,20  
0,32,56,39,165,169,240,5,6517  
1680 DATA 201,5,144,4,136,76,188,32,16  
5,150,133,170,165,151,133,171,525  
1690 DATA 32,134,39,32,75,33,32,106,33  
,160,0,185,148,5,201,155,5486  
1700 DATA 208,3,76,135,32,162,0,134,15  
6,160,0,185,148,5,221,108,7147  
1710 DATA 45,208,20,232,200,185,148,5,  
221,108,45,208,10,232,200,185,1743  
1720 DATA 148,5,221,108,45,240,20,160,  
0,230,156,165,156,201,56,208,1064  
1730 DATA 3,76,233,38,24,10,101,156,17  
0,208,208,166,156,189,23,46,8516  
1740 DATA 133,149,166,156,224,8,144,3,  
76,74,37,169,0,133,157,133,5697  
1750 DATA 158,133,150,133,151,160,3,18  
5,148,5,201,40,208,2,133,158,7700  
1760 DATA 201,35,208,4,169,2,133,157,1  
85,148,5,201,36,240,8,200,8475  
1770 DATA 192,32,208,244,76,233,38,200

,32,56,39,165,169,240,4,201,9360  
1780 DATA 5,144,3,76,233,38,165,157,24  
0,3,76,246,38,185,148,5,7552  
1790 DATA 201,155,208,16,165,151,208,5  
,230,157,76,246,38,169,3,133,8677  
1800 DATA 157,76,15,39,201,41,208,7,16  
9,4,133,157,76,246,38,201,8199  
1810 DATA 44,208,18,165,158,240,3,76,2  
46,38,165,151,208,10,169,5,7523  
1820 DATA 133,157,76,246,38,76,233,38,  
200,185,148,5,201,89,208,7,8489  
1830 DATA 169,6,133,157,76,15,39,201,8  
8,240,3,76,233,38,165,151,7978  
1840 DATA 208,7,169,5,133,157,76,246,3  
8,169,7,133,157,76,15,39,4355  
1850 DATA 166,156,224,33,176,3,76,45,3  
9,162,0,134,151,134,150,134,6734  
1860 DATA 157,166,156,224,48,144,10,22  
4,56,144,3,76,233,38,76,145,6589  
1870 DATA 38,138,56,233,33,133,156,185  
,149,5,201,65,208,18,165,156,9128  
1880 DATA 201,4,144,3,76,233,38,170,18  
9,95,46,133,149,76,45,39,4990  
1890 DATA 166,156,189,56,46,133,149,20  
0,185,148,5,201,35,208,4,200,9069  
1900 DATA 185,148,5,201,36,240,10,224,  
10,208,6,200,208,242,76,233,2278  
1910 DATA 38,200,32,56,39,165,169,240,  
4,201,5,144,3,76,233,38,5991  
1920 DATA 166,156,224,8,144,3,76,239,3  
7,185,148,5,201,155,208,14,8282  
1930 DATA 165,151,208,3,76,255,38,169,  
2,133,157,76,133,38,201,44,6528  
1940 DATA 240,3,76,233,38,165,151,208,  
5,230,157,76,121,38,169,3,6919  
1950 DATA 133,157,76,133,38,224,9,176,  
14,165,151,208,3,76,255,38,7631  
1960 DATA 169,44,133,149,76,24,39,224,  
9,240,249,224,10,208,13,173,9714  
1970 DATA 151,5,201,40,208,238,169,108  
,133,149,208,232,224,13,176,29,1366  
1980 DATA 173,151,5,201,35,208,3,76,25  
5,38,165,149,9,4,133,149,6156  
1990 DATA 165,151,240,243,165,149,9,8,  
133,149,76,24,39,173,151,5,5080  
2000 DATA 201,35,240,227,185,148,5,201  
,155,208,14,165,151,208,5,162,506  
2010 DATA 0,76,111,38,162,2,76,101,38,  
201,44,240,3,76,233,38,5731  
2020 DATA 165,151,208,5,162,1,76,111,3  
8,162,3,165,149,29,91,46,3786  
2030 DATA 133,149,76,24,39,165,149,29,  
91,46,133,149,76,255,38,166,7559  
2040 DATA 157,165,149,29,87,46,133,149  
,76,255,38,166,157,165,149,29,8618  
2050 DATA 87,46,133,149,76,24,39,162,0  
,134,151,134,154,134,150,200,9254  
2060 DATA 173,151,5,201,36,240,3,76,23  
3,38,200,32,56,39,165,169,7117  
2070 DATA 240,4,201,5,144,3,76,233,38,  
162,0,134,154,56,165,150,7306  
2080 DATA 229,170,133,150,165,151,229,  
171,133,151,176,2,230,154,56,165,1643  
2090 DATA 150,233,2,133,150,48,10,165,  
154,240,3,76,233,38,76,255,9184  
2100 DATA 38,165,150,201,254,144,2,230  
,154,165,154,208,241,240,236,32,5481  
2110 DATA 228,33,169,48,160,101,32,40,  
33,76,74,36,166,157,165,149,6571  
2120 DATA 29,79,46,133,149,165,149,160  
,0,145,170,165,150,200,145,170,1980  
2130 DATA 162,2,76,119,39,166,157,165,  
149,29,79,46,133,149,165,149,8336  
2140 DATA 160,0,145,170,200,165,150,14  
5,170,200,165,151,145,170,162,3,1515  
2150 DATA 76,119,39,165,149,160,0,145,  
170,162,1,76,119,39,162,0,4702  
2160 DATA 134,150,134,151,134,169,185,  
148,5,162,15,221,12,36,240,5,6585

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2170 DATA 202,16,248,48,37,134,154,6,1  
50,38,151,6,150,38,151,6,3761  
2180 DATA 150,38,151,6,150,38,151,24,1  
65,150,101,154,133,150,165,151,9774  
2190 DATA 105,0,133,151,200,230,169,76  
,64,39,132,153,96,24,138,101,6993  
2200 DATA 170,133,170,165,171,105,0,13  
3,171,76,74,36,169,36,32,191,6137  
2210 DATA 39,165,171,74,74,74,74,32,18  
2,39,165,171,41,15,32,182,5006  
2220 DATA 39,165,170,74,74,74,32,18  
2,39,165,170,41,15,32,182,5001  
2230 DATA 39,169,58,32,191,39,169,32,3  
2,191,39,96,9,48,201,58,4048  
2240 DATA 144,3,24,105,7,134,147,162,0  
,142,72,3,142,73,3,162,3799  
2250 DATA 11,142,66,3,162,0,32,86,228,  
48,3,166,147,96,104,104,5513  
2260 DATA 32,111,35,76,135,32,185,148,  
5,201,36,208,12,200,32,56,5548  
2270 DATA 39,165,169,240,5,201,5,144,4  
,136,76,188,32,165,150,133,8116  
2280 DATA 170,165,151,133,171,169,0,13  
3,168,32,101,35,164,153,185,148,9478  
2290 DATA 5,201,44,208,35,200,185,148,  
5,201,80,208,27,133,168,162,271  
2300 DATA 32,169,3,157,66,3,169,48,157  
,69,3,169,109,157,68,3,4069  
2310 DATA 169,8,157,74,3,32,86,228,160  
,32,185,70,48,153,148,5,5596  
2320 DATA 136,16,247,165,171,32,254,40  
,160,1,165,161,153,148,5,200,9567  
2330 DATA 165,160,153,148,5,165,170,32  
,254,40,200,165,161,153,148,5,9728  
2340 DATA 200,165,160,153,148,5,160,0,  
177,170,133,149,162,0,165,149,9361  
2350 DATA 221,99,46,240,16,232,224,151  
,208,244,169,13,133,159,162,151,3243  
2360 DATA 134,164,76,129,40,134,164,18  
9,146,47,170,160,7,189,108,45,7881  
2370 DATA 153,148,5,232,200,192,10,208  
,244,166,164,189,250,46,133,159,4009  
2380 DATA 32,53,41,165,149,32,254,40,1  
65,161,160,19,153,148,5,200,8755  
2390 DATA 165,160,153,148,5,165,159,10  
,170,189,42,48,141,192,40,189,8737  
2400 DATA 43,48,141,193,40,32,255,255,  
169,5,160,148,32,40,33,165,7169  
2410 DATA 168,240,38,169,32,141,176,5,  
141,177,5,162,32,169,9,157,6593  
2420 DATA 66,3,169,5,157,69,3,169,148,  
157,68,3,169,40,157,72,5541  
2430 DATA 3,169,0,157,73,3,32,86,228,3  
2,65,45,176,3,76,50,2591  
2440 DATA 40,76,135,32,72,41,15,170,18  
9,12,36,133,160,104,74,74,4879  
2450 DATA 74,74,170,189,12,36,133,161,  
96,132,162,160,0,177,170,32,7859  
2460 DATA 254,40,164,162,165,161,153,1  
48,5,160,22,153,148,5,164,162,8749  
2470 DATA 200,165,160,153,148,5,160,23  
,153,148,5,165,170,24,105,1,5195  
2480 DATA 133,170,165,171,105,0,133,17  
1,96,132,162,160,0,177,170,32,8382  
2490 DATA 254,40,164,162,165,161,153,1  
48,5,160,25,153,148,5,200,165,9400  
2500 DATA 160,153,148,5,164,162,200,15  
3,148,5,76,53,41,169,35,160,6684  
2510 DATA 10,153,148,5,200,169,36,153,  
148,5,200,32,19,41,96,169,5711  
2520 DATA 36,160,11,153,148,5,200,32,1  
9,41,96,32,121,41,169,44,3354  
2530 DATA 160,14,153,148,5,200,169,88,  
153,148,5,96,169,36,160,11,6222  
2540 DATA 153,148,5,160,14,32,19,41,16  
0,12,32,67,41,96,32,150,1840  
2550 DATA 41,169,44,160,16,153,148,5,2  
00,169,88,153,148,5,96,32,6015

2560 DATA 168,41,160,17,169,89,153,148  
,5,96,32,137,42,160,13,32,3486  
2570 DATA 19,41,160,15,169,44,153,148,  
5,169,88,200,153,148,5,169,8518  
2580 DATA 41,200,153,148,5,96,32,196,4  
1,160,15,169,41,153,148,5,5602  
2590 DATA 200,169,44,153,148,5,200,169  
,89,153,148,5,96,169,65,160,8562  
2600 DATA 11,153,148,5,96,169,27,141,1  
76,5,169,28,141,177,5,160,6967  
2610 DATA 0,177,170,133,167,160,22,32,  
19,41,165,170,133,207,165,171,485  
2620 DATA 133,208,165,167,48,58,24,101  
,207,133,207,165,208,105,0,133,9648  
2630 DATA 208,238,177,5,165,207,32,254  
,40,160,14,165,161,153,148,5,8817  
2640 DATA 200,165,160,153,148,5,165,20  
8,32,254,40,160,12,165,161,153,368  
2650 DATA 148,5,200,165,160,153,148,5,  
160,11,169,36,153,148,5,96,6375  
2660 DATA 169,255,229,167,24,105,2,133  
,167,165,207,56,229,167,133,207,3246  
2670 DATA 165,208,233,0,133,208,76,46,  
42,96,32,137,42,160,15,32,3620  
2680 DATA 19,41,160,13,32,67,41,160,17  
,169,41,153,148,5,96,160,5566  
2690 DATA 11,169,40,153,148,5,169,36,2  
00,153,148,5,96,32,133,41,5377  
2700 DATA 169,89,153,148,5,96,96,32,10  
1,35,160,1,185,148,5,201,6426  
2710 DATA 68,240,3,76,188,32,200,185,1  
48,5,201,58,208,245,200,185,3966  
2720 DATA 148,5,201,44,240,6,192,16,20  
8,244,240,22,132,168,200,185,3609

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3500 DATA 3,3,3,3,3,3,3,3,6,6,6,6,6,6,  
6,6,4208  
3510 DATA 9,9,9,9,9,9,9,9,12,12,12,12,  
12,12,12,12,5034  
3520 DATA 15,15,15,15,15,15,15,15,18,1  
8,18,18,18,18,18,5860  
3530 DATA 21,21,21,21,21,21,21,24,27,3  
0,33,36,39,42,45,48,8186  
3540 DATA 51,54,57,60,63,66,69,72,75,7  
8,81,84,87,90,93,96,4556  
3550 DATA 99,99,99,99,99,102,102,102,1  
02,102,105,105,105,105,105,108,7668  
3560 DATA 108,108,108,108,111,111,111,  
111,114,114,114,114,117,117,117,120,91  
48  
3570 DATA 120,120,123,123,126,129,129,  
132,132,132,135,135,135,138,138,138,17  
32  
3580 DATA 138,138,141,141,141,141,141,  
144,147,150,153,156,159,162,165,168,45  
47  
3590 DATA 103,41,121,41,133,41,150,41,  
168,41,185,41,196,41,224,41,8178  
3600 DATA 247,41,255,41,115,42,116,42,  
151,42,160,42,36,32,32,32,2784  
3610 DATA 32,58,32,32,32,32,32,32,32,3  
2,32,32,32,32,32,8014  
3620 DATA 32,32,32,32,32,32,32,32,32,3  
2,155,32,32,197,242,242,8145  
3630 DATA 239,242,155,80,58,155,255,25

5,0,0,0,0,76,111,97,100,5780  
3640 DATA 105,110,103,32,97,116,32,36,  
48,48,48,48,155,65,100,100,4136  
3650 DATA 114,101,115,115,32,114,97,11  
0,103,101,32,101,114,114,111,114,7242  
3660 DATA 155,78,111,116,32,97,32,98,1  
05,110,97,114,121,32,102,105,6229  
3670 DATA 108,101,155,226,2,227,2,44,3  
2,0,0,0,0,0,0,0,7375

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## The Great American Cross Country Road Race

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by David Plotkin

The Great American Cross Country Road Race (or GACCRR) combines fast action with smooth control, superior graphics and realistic conditions, to produce a playable simulation/arcade game.

The object of GACCRR is to race from one of several cities on the West Coast to one of a selection of East Coast cities. You have many routes to choose from, say San Francisco to Washington or Los Angeles to New York, as well as a U.S. grand tour. At the beginning of each game, you select the route and what time of day to start. You race against a field of competing drivers, who differ for each of the routes. If you complete the race ranking in the top ten, you may save the race results to disk.

Once you've charted your overall course, you select how you want to travel. A map of the U.S. appears at the beginning of the race and every time you enter a city. Use the joystick to choose the next city on your route. Weather conditions are also shown on this map, so you can try to avoid snow, fog and other poor weather. You must try to reach the next city before the time is up on your clock. When time runs out, the game is over. If you complete one segment with time left, however, your extra time is added to the clock for the following segments.

Your view of the road is from above and behind your car, which steers right and left using the joystick. You also shift gears, accelerate and slow down via joystick. Shifting gears can be little tricky: do it too soon and the car won't accelerate; do it too late and you'll overrev, which can cause your engine to blow up. Luckily, the sound of your engine and the dashboard's tachometer will help you get the hang of shifting gears. Also present on the dashboard are

a fuel gauge, speedometer, odometer (this actually measures miles to the next city) and a radar warning indicator. The radar warning will give you advance notice of speed traps, so you can either slow down or try to outrun the cops. Getting caught costs you a thirty-second penalty and cuts your speed to zero.

Your primary task in GACCRR is to maneuver your car down the animated road, speeding up and slowing down as necessary, steering as the road bends and avoiding other cars. While hitting another car doesn't destroy you, it does cause you to skid to the edge of the road and come to a halt. Considerable time is lost in getting back up to speed, so a more moderate rate with fewer crashes is a wiser strategy.

Periodically, you'll need to stop for gas. You receive warning of approaching gas pumps, and to fill up, you'll have to slow down, pull to the side of the road at the pump and wait while the tank is filled. Obviously, you'll lose a lot of ground while doing this, but that's preferable to running out of gas, which will cause you to pound the joystick button, to "push" the car to the next pump.

Weather conditions make a tremendous difference. Driving in fog keeps you from seeing approaching cars till they're almost upon you, while icy roads cause a marked loss of steering response.

Some excellent touches are included in GACCRR, which put it a cut above average. The first: a lot of attention is paid to realism. Roads become more crowded as you approach the East Coast and as you enter each city. It's a good idea to try to make your best time across the long open stretches of the Midwest. The number of cars goes down during the night sequences and during foggy conditions, as the more prudent drivers stay home.

The detailed graphics also lend a nice

touch. Smooth scrolling of the scenery in the distance, and well-done sunrises and sunsets, all contribute to realism. The best effect, however, occurs as a city rises from the horizon upon your approach. Not only does the look of the city depend on weather conditions, but the cities themselves are different: the Statue of Liberty is clearly visible in New York; the Capitol buildings can be seen on your approach to Washington; St. Louis even has its arch!

My complaints with GACCRR are minor. Its instructions are fairly sketchy, especially those concerning exactly what's saved when you save a field of race results. Waiting for thirty seconds with the siren wailing, when you're caught in a speed trap, is annoying. It might have been better to simply subtract the time penalty from the clock. Also, the long introduction means waiting quite a few minutes before you can get down to business and play the game. And it would be nice to be able to bypass the Activision title screen and the game's opening screens. I do recommend a good quality joystick (I use a WICO); shifting and braking can be pretty tough on your stick in the heat of the race.

In all, the Great American Cross Country Road Race is a lot fun to play; I highly recommend it. Be prepared to spend fifteen minutes or so for each race. . . It is not a quickly played game. But then, most of us tired of this class of game long ago. So, if you're a road-racing buff, or just want to get the thrills without the risk, this is the game for you. **A**

*David Plotkin is a Chevron U. S. A. Project Engineer, with a Master's in Chemical Engineering. He got his Atari in April 1980, and is primarily interested in programming and game design, and in word processing. His work has been seen here and in Antic, COMPUTE! and Softside.*



# An introduction to the Vertical Blank Interrupt

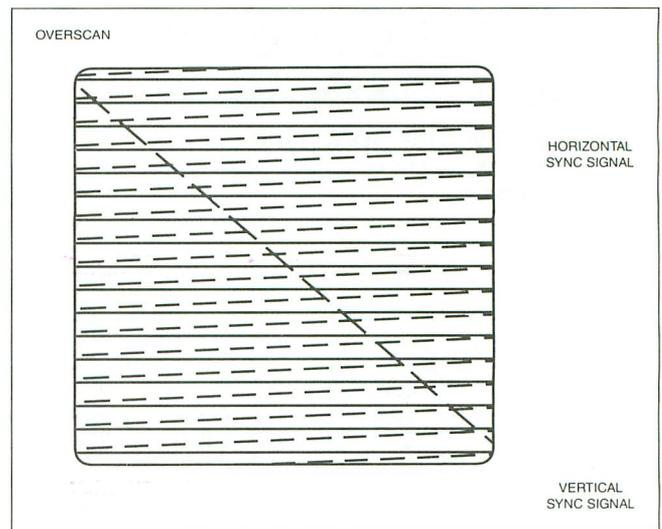
by Allan E. Moose and Marian J. Lorenz

Most of the sound and graphics features of the Atari personal computers are, to some degree, accessible from BASIC. Yet, often, the most satisfactory implementation of sound or graphics comes through the use of machine language routines. For example, you can use BASIC to play music. But if you want to play music and simultaneously have action on-screen, you'll need to use a machine language routine that runs during the vertical blank.

The vertical blank routines of the Atari operating system (the OS) are one of the most powerful and versatile features of these computers. However, taking advantage of this feature requires some knowledge of what goes on during the TV vertical blank and of machine language. In this series of articles, we'll discuss how to make use of the vertical blank for page flipping, scrolling and music. In the course of discussion, we'll present a number of useful machine language utilities you may want to incorporate into programs. This time, we'll focus on the vertical blank process and give an example of its use with a page-flipping program.

## Basic concepts.

*Picture Generation:* The TV's electron beam creates an image 60 times a second, by starting at the top left-hand corner of the TV and sweeping across the screen. When the beam reaches the right-hand side of the screen, it is turned off, returned to the left and concurrently moved down a line. This tracing is repeated 262 times, until the beam reaches the bottom of the screen. There, it is turned off and returned to the top left-hand corner.



**Figure 1.**  
A representation of TV scanning.

*Vertical Blank:* The period of time during which the electron beam is turned off and returned to the top left screen corner is known as the vertical blank (VB). The VB is so short—1400 microseconds—that it's imperceptible to the human eye. However, to the CPU, the VB is a long time . . . time enough to carry out housekeeping chores and run a user's machine language program.

*Non-Maskable Interrupts (NMIs):* The computer hardware responsible for creating a picture on the screen also produces a vertical blank synchronization pulse, used to



## An Introduction to the VB Interrupt *continued*

generate an interrupt signal to the CPU. Non-maskable interrupts cannot be disabled by the 6502 processor. There are three NMIs in the Atari system: (1) display list interrupts (DLIs), (2) vertical blank interrupts (VBIs), and (3) resets. DLIs and VBIs can be disabled by ANTIC through the NMIEN (Non-Maskable Interrupt ENable) register at location 54286.

**Vector:** Machine language programs often perform jumps to subroutines. Just as a BASIC GOTO must have a target address specified, a machine language JSR (Jump to Sub-Routine) must either specify the address, or *where to find the address*, of the subroutine. When the address of the subroutine is stored in a particular memory location, that memory location is called a pointer or a vector. For example, memory locations 546 and 547 store the starting address of the OS's immediate VBI routine. Thus, 546 and 547 are called the Vector to Vertical BLank Immediate (VVBLKI).

### The process.

There are three ways in which a programmer can link a machine language routine into the OS vertical blank process. To find out what they are, let's look at what the OS does during the vertical blank.

When the CPU receives an interrupt signal, the OS tests

to see if the interrupt is a DLI, reset or VBI. Assuming it's a VBI, we see from the flowchart (see Figure 2) that the system jumps to the location pointed to by VVBLKI (546,547). Normally this is the vertical blank immediate routine at 58463 (Stage 1). This is the first place you can insert your own machine language routine by "stealing the vector."

What this means is that the starting address of an alternate routine can be placed in 546,547. Depending on the intent, the alternate routine should end with a JMP to 58463, or to XITVBL (eXIT Vertical BLank). During the immediate VB routine, the OS increments the real-time clock, decrements system timer one and performs color attracting.

Once this is done, memory location 66 (CRITIC) is checked. If a time critical code section is being executed, CRITIC will be a value other than 0, and the program jumps to XITVBL. If the code is not critical, then Stage 2 is processed. During Stage 2, the following tasks are carried out: (1) system timers are decremented; (2) color registers are updated; (3) graphics registers such as CHBASE, PRIOR, CHACTL and DMACTL are updated; (4) keyboard utilities are processed; and (5) game controller data is read from hardware to RAM.

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Following the processing of the Stage 2 routine, the OS jumps to the location specified in 548,549. Normally, this vector points to XITVBL. However, this is the second place from which you can steal the vector and make it point to an alternate routine.

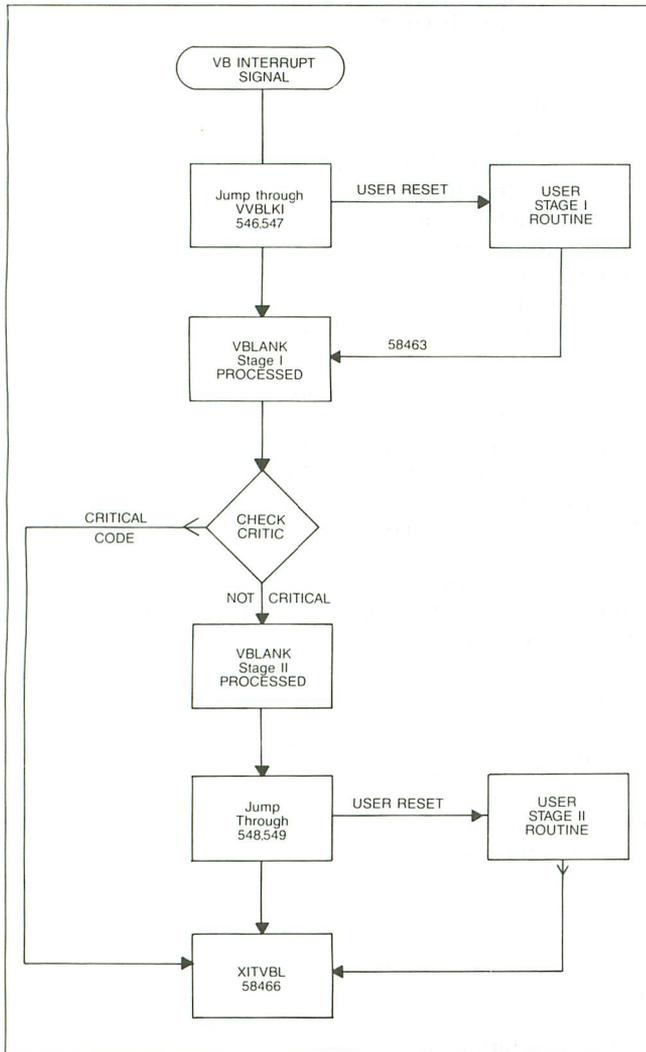


Figure 2. — Flowchart for VBI routine.

### VBI procedures.

Besides the vector stealing mentioned above, the other two ways to link a subroutine to the VB are to use system timer 2, or to use one of the software timers. The use of timers to link the VB with a subroutine will be discussed in the scrolling and music portions of this series. For now, let's turn our attention to vector stealing.

Step 1: Decide whether your routine is to be executed in Stage 1 or Stage 2. General considerations that should enter into your decision are: (a) if your routine must be mixed with time critical I/O, use Stage 1; (b) if your routine reads from or writes to OS shadow registers, use Stage 2; and (c) if your routine uses more than 3000 machine cycles, use Stage 2.

Step 2: Make sure your routine ends with a jump to: (a) 58463 for a Stage 1 routine (this allows the OS to continue its normal VB routines); or (b) 58466 for a Stage 2 routine. This allows the CPU to exit from the VBI.

Step 3: Place the routine in memory. It may be stored in page 6, but keep in mind that cassette I/O may use the first 128 bytes of page 6.

Step 4: Initialize any timers or memory locations necessary for the implementation of your routine.

Step 5: Link your routine to the proper stage by a short machine language program that stores the routine's starting address at: (a) 546,547 for a Stage 1 routine; or (b) 548,549 for a Stage 2 routine.

The last step requires a little additional explanation. The vectors listed are 2-byte addresses. If you were to use BASIC POKE statements to reset these vectors, there is the potential for an interrupt to occur before both locations are updated. This would crash the system. Consequently, linking a user routine to the OS involves a call to either of the two machine language routines listed in Figure 3. These two programs make use of an OS subroutine called SETVBV (SET Vertical Blank Vectors), which will safely install the addresses in the proper locations.

Routine to be linked to Stage 1		
PLA	104	
LDY ADDRLO	160,ADDRLO	Load Y with Lo-Byte of your routine's start address
LDX ADDRHI	162,ADDRHI	Load X with Hi-Byte of your routine's start address
LDA #6	169,6	Load accumulator with the number 6
JSR SETVBV	32,92,228	Jump to OS SETVBV routine
RTS	96	Return from subroutine
Routine to be linked to Stage 2		
PLA	104	
LDY ADDRLO	160,ADDRLO	Load Y with Lo-Byte of your routine's start address
LDX ADDRHI	162,ADDRHI	Load X with Hi-Byte of your routine's start address
LDA #7	169,7	Load accumulator with the number 7
JSR SETVBV	32,92,228	Jump to OS SETVBV routine
RTS	96	Return from subroutine

Figure 3. — VB linking routines.

### Using the VBI.

Most home computers set aside a limited number of static blocks of RAM for screen memory. This is not the case with the Atari, where you can use any available section of RAM for screen memory. Flexibility of this nature allows for creative programming. It's this type of flexibility that permits page flipping.

The basis of page flipping is to reserve two or more sections of RAM for screen memory, and flip from one section to another by changing screen memory addresses in ANTIC's LMS instruction. The result is that, to the viewer, the screen display will appear to change instantaneously. You can flip whole screens or parts of screens, depending on where the LMS instruction is placed in the display list.



## An Introduction to the VB Interrupt *continued*

There are a few things to consider concerning page flipping:

(1) Every screen you draw uses memory, even when it's not being displayed.

(2) You probably won't use it with the map modes. For example, in graphics 8 with nearly 8K of RAM per screen, you can use up memory in a hurry! Consequently, page flipping is most often used with the more memory-efficient character modes. However, on the 130XE, this shouldn't be too much of a concern—there being an additional 64K allotted for the screen memory.

(3) Although page flipping is accessible through BASIC, the results are not too satisfactory. Because BASIC is not fast enough, unsightly flickering results. Therefore, transitions between screens occur more smoothly if the LMS address bytes are changed during the vertical blank.

The BASIC program (Listing 1) uses a vertical blank routine to flip the display back and forth between two different areas of screen memory every thirtieth vertical blank (every one-half second). This flipping back and forth between screens gives the appearance of a bunny popping out of a magician's hat. To accomplish this, you need to: (1) set up a reserved space; (2) clear out screen memory; (3) move and redefine the character set; (4) set up screen 1 (hat); (5) set up screen 2 (bunny); and (6) flip back and forth between screens.

### Program variables.

EMPTY\$ — routine that clears out the area allocated for screen memory.

TRAN\$ — routine that moves the character set from ROM to RAM.

CHANGE\$ — routine that changes standard character set into a hat and a bunny.

HAT\$ — new characters.

VB\$ — this links the page flipping routine to the Stage 1 VB.

Clearing out screen memory, moving the character set and redefining the character set are all routine programming tasks that are most efficiently carried out with machine language subroutines. It is our preference to store these subroutines and the new character set as strings (see Lines 50-70), because this technique has several advantages. These are: (1) avoiding memory management problems—the problem is turned over to BASIC, which locates a safe place; and (2) the size of your routine is not limited, as it would be with page 6 storage.

### Memory usage and program organization.

By lowering RAMTOP 8 pages (Line 130), we reserve more than enough space for the redefined character set and screen memory 2. Space for screen memory 1 is provided by the OS with the GRAPHICS 18 instruction (Line 140).

Lines 150 through 260 are devoted to using the machine language routines. In this section of the program, you'll see that page 0 locations 203 through 206 are utilized repeatedly to store addresses needed by the machine lan-

guage routines. Page 0 locations, which are used for various addressing modes, are at a premium in the Atari, because most of them are assigned to the OS or BASIC. However, locations 203 through 209 are free. If you hunt through a memory map, you'll find other locations (such as 251) that are used sparingly. Location 251 is the degree/radian flag, and if your program doesn't need trig functions, borrowing this location should not present any real problems.

The addresses for screen 1, screen 2 and ANTIC's display list must be available for the VB routine. These addresses are POKEd into memory locations 203 through 208 (Lines 280-360).

Finally, before reading the VB routine (shown in Figure 3) into page 6, it's necessary to put the displays into screen memory. There are two ways to do this. One is to POKE the character codes directly into memory. In general, this can be troublesome because it requires calculating the proper memory location for each character code.

The second way is to use OS procedures with PRINT #6; instructions. Note that when the redefined characters are printed into screen 2, memory locations 88 and 89 must be changed, so the OS will know where to store the character codes. Putting the displays in memory (Lines 410-770) before the page flipping routine is read into memory insures that there's something on the screen while BASIC reads in the machine language routines. Once this is completed, Line 910 links in the page flipping routine, which goes into action shortly thereafter.

Next month, we'll learn how to perform vertical and horizontal scrolling using VBIs.

*Allan Moose is an Associate Professor of Mathematics and Physics at Southampton College in New York. He's been using home computers for research and recreation for five years, and has co-authored a book on assembly programming for Atari computers with Marian Lorenz.*

*Marian Lorenz is in charge of the Central Islip Public School's preschool program for handicapped children. A twenty-six-year teacher, she's been interested in computers for about four years. She's also learning the ins and outs of the ST.*

The two-letter checksum code preceding the line numbers here is *not* a part of the BASIC program. For further information, see the *BASIC Editor II*, in issue 47.

Listing 1.  
BASIC listing.

```

NF 1 REM RABBIT-IN-A-HAT
FU 2 REM BY ALLAN MOOSE/MARIAN LORENZ
NF 3 REM 1985
KO 4 REM PAGE FLIPPING DURING THE
UK 10 REM ** VERTICAL BLANK **
VN 20 REM ** DIM STRINGS THAT STORE ML **
ZN 30 REM ** AND CHARACTER SET **
BO 40 DIM TRANS$(20),CHANGE$(14),EMPTY$(1
8),VB$(11),HAT$(160)
MY 45 REM READ VALUES INTO STRINGS
NS 50 RESTORE 1000:FOR X=1 TO 20:READ A:T
RAN$(X)=CHR$(A):NEXT X:FOR X=1 TO 13:

```

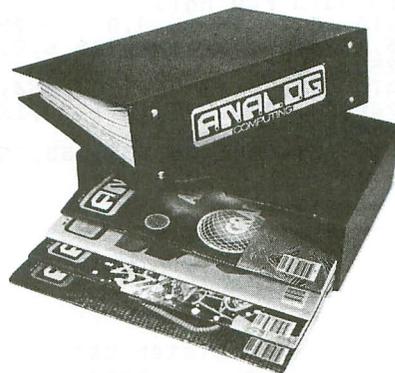
```

READ A:CHANGE$(X)=CHR$(A):NEXT X
TG 60 FOR X=1 TO 18:READ A:EMPTY$(X)=CHR$(A):NEXT X:FOR X=1 TO 11:READ A:VB$(X)=CHR$(A):NEXT X
UG 70 FOR X=1 TO 160:READ A:HAT$(X)=CHR$(A):NEXT X
XJ 125 REM SET UP RESERVED SPACE AND CLEAR
JC 130 POKE 106,PEEK(106)-8
PN 140 GRAPHICS 18:POKE 712,192:POKE 752,1
UQ 150 POKE 203,0:POKE 204,PEEK(106)
AK 160 EMPTY=USR(ADR(EMPTY$))
YB 170 REM MOVE CHARACTER SET/REDEFINE CHARACTER SET
RK 180 POKE 205,0:POKE 206,224
WL 185 POKE 203,0:POKE 204,PEEK(106)
WF 190 MOVE=USR(ADR(TRANS$))
NL 200 Q=ADR(HAT$)
XR 210 HIQ=INT(Q/256)
UB 220 LOQ=Q-HIQ*256
EN 230 POKE 205,LOQ:POKE 206,HIQ
RL 240 POKE 203,24:POKE 204,PEEK(106)
JD 250 CHANGE=USR(ADR(CHANGE$))
AH 260 POKE 756,PEEK(106)
HK 280 REM FIND AND STORE ADDRESS OF SCREEN 1
CI 285 Q=256*PEEK(561)+PEEK(560)
TB 290 POKE 203,PEEK(Q+4):POKE 204,PEEK(Q+5)
FZ 300 REM STORE ADDRESS OF SCREEN 2
UI 310 POKE 205,0:POKE 206,PEEK(106)+4
OS 320 REM STORE ADDRESS OF DISPLAY LIST
FP 350 POKE 207,PEEK(560):POKE 208,PEEK(561)
VF 400 REM PUT HAT IN MEMORY OF SCREEN 1
YE 410 POSITION 5,6:PRINT #6;"573"
AB 420 POSITION 6,7:PRINT #6;"03"
AT 430 POSITION 6,8:PRINT #6;"03"
BH 440 POSITION 4,10:PRINT #6;"ALACAZAM"
RB 710 REM PUT RABBIT IN MEMORY OF SCREEN 2
WX 715 POKE 88,0:POKE 89,PEEK(106)+4
UD 720 POSITION 7,2:PRINT #6;"+"
ZS 725 POSITION 7,3:PRINT #6;"-"
JN 730 POSITION 6,4:PRINT #6;"/01"
UT 735 POSITION 6,5:PRINT #6;"234"
PE 740 POSITION 5,6:PRINT #6;"576"
AK 750 POSITION 6,7:PRINT #6;"03"
BC 760 POSITION 6,8:PRINT #6;"03"
OF 770 POSITION 3,10:PRINT #6;"IT IS MAGI"
LF 800 REM LOAD IN THE VERTICAL BLANK PAGE FLIPPING ROUTINE
OQ 810 RESTORE 840:FOR I=0 TO 59:READ ML
ZS 820 POKE 1536+I,ML
GE 830 NEXT I
PE 839 REM DATA FOR VBI ROUTINE
AQ 840 DATA 166,209,202,240,5,134,209,76,98,228,162,30,134,209,166,251,224,1,240,18,169,1,133,251,160,4
AB 860 DATA 165,203,145,207,200,165,204,145,207,76,98,228,162,30,134,209,162,0,134,251,160,4,165
TB 870 DATA 205,145,207,200,165,206,145,207,76,98,228
WF 880 REM INITIALIZE COUNT
JX 890 POKE 209,2
KU 900 REM INVOKE FLIPPING BY LINKING IN THE ROUTINE
OE 910 VB$SRT=USR(ADR(VB$))
PQ 920 GOTO 920
WG 999 REM DATA FOR TRANS$
XY 1000 DATA 104,162,4,160,0,177,205,145,203,200,208,249,230,206,230,204,202,208,242,96
JF 1009 REM DATA FOR CHANGE$
UW 1010 DATA 104,160,0,177,205,145,203,20

```

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# An Introduction to the VB Interrupt *continued*

```

0,192,160,208,247,96
IR 1019 REM DATA FOR EMPTY$
GD 1020 DATA 104,169,0,162,8,160,0,145,20
3,200,208,251,230,204,202,208,246,96
CE 1029 REM DATA FOR VB$
OJ 1030 DATA 104,160,0,162,6,169,6,32,92,
228,96
IN 1039 REM DATA FOR HAT$
KE 1040 DATA 15,15,15,15,0,0,0,0,255,254,
254,255,127,127,127,127,255,0,0,255,25
5,255,255,255,255
ZS 1050 DATA 63,63,255,254,254,254,254,24
0,240,240,240,0,0,0,0,127,127,127,127,
127,127,127,127,255,255
JP 1060 DATA 255,255,255,255,255,255,254,

```

```

254,254,254,254,254,254,0,0,0,0,4,
4,4,4,0,0,0
LO 1070 DATA 0,64,64,64,64,4,12,12,12,13,
29,29,29,64,192,192,192,192,192,192,19
2,0,0,0,3
KQ 1080 DATA 7,15,15,15,63,63,255,255,255
,237,255,243,192,192,192,224,240,248,2
52,252,15,15,7,3,1
HV 1090 DATA 0,3,5,222,204,225,255,255,25
5,255,255,252,252,248,240,192,224,240,
240,255,255,255,255,127,127
CD 1100 DATA 127,127,255,255,255,255,254,
254,254,254

```

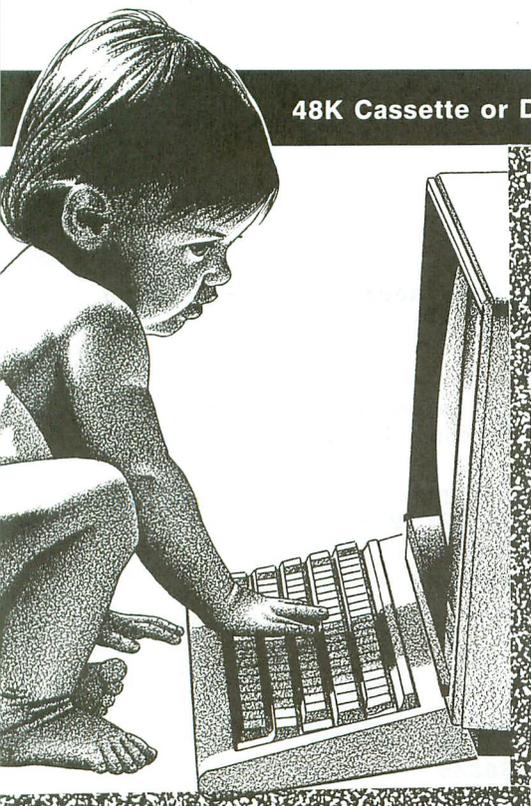
●

## Assembly Language Program Bunny-In-A-Hat

Register Use: Count: 209 - used to count off VB's as they occur  
Screen 1 address: 203(Lo-Byte), 204(Hi-Byte)  
Screen 2 address: 205(Lo-Byte), 206(Hi-Byte)  
Display list addr: 207(Lo-Byte), 208(Hi-Byte)  
Flag: 251 - keeps track of screens

MNEMONIC	DATA	COMMENT
LDX COUNT	166,209	Get count value
DEX	202	Subtract 1
BEQ	240,5	Test if zero. Yes then flip
STX COUNT	134,209	Not zero then store new count
JMP XITVBL	76,98,228	and exit vertical blank
LDX #30	162,30	Reset count
STX COUNT	134,209	
LDX FLAG	166,251	Load flag and test to see
CPX #1	224,1	which screen we're showing
BEQ OTHER	240,18	If flag = 1 then flip screen 1
		to screen 2
LDA #1	169,1	If flag was 0 reset it to 1
STA FLAG	133,251	
LDY #4	160,4	Load Y with offset we're on scr 2
LDA SCN1LO	165,203	so get scn 1 addr Lo-Byte and
STA (207),Y	145,207	store it in LMS instruction
INY	200	Increment offset
LDA SCN1HI	165,204	Get screen 1 address Hi-Byte
STA (207),Y	145,207	and store it in LMS instruction
JMP XITVBL	76,98,228	Exit the vertical blank
LDX #30	162,30	Reset count
STX COUNT	134,209	
LDX #0	162,0	Reset flag for next pass through
STX FLAG	134,251	
LDY #4	160,4	Load Y with offset
LDA SCN2LO	165,205	Get SCN2 address Lo-Byte and
STA (207),Y	145,207	store in LMS instruction
INY	200	Increment offset
LDA SCN2HI	165,206	Get SCN2 address Hi-Byte and
STA (207),Y	145,207	store in LMS instruction
JMP XITVBL	78,98,228	Exit the vertical blank

Table 1.



# The System Rerun Button

Childproof Atari programs—  
by turning RESET into RERUN.

by C.F. Fogarty III

Did you ever write a BASIC program for a small child, only to discover that he or she had a special knack for finding the SYSTEM RESET button? And all of your beautiful graphics and colorful sound effects came screeching to a halt? Did you ever wish for a simple routine to eliminate this problem? Well, here it is!

### Overriding System Reset.

There's no way to ignore the SYSTEM RESET key, short of disconnecting it from your keyboard. To compound the problem, most of the reset process takes place before you can even get at it. There is, however, a vector called DOSINI, which you can change to point to a new routine. That's where **The System Rerun Button** takes over.

**System Rerun** "steals" DOSINI and another vector called DOSVEC. DOSVEC is used when you issue the DOS command from BASIC, and is closely related to DOSINI.

By "stealing" these two vectors, it's possible to "trap" SYSTEM RESET and add a short machine language routine before returning to BASIC.

### How it works.

The program is started by the  $X=USR(A+256*B)$  from Line 9 of the BASIC program. When this statement is executed, **System Rerun** steals DOSINI and DOSVEC, and saves them for later reference. Then, it points DOSINI to the new entry point for **System Rerun** and sets up DOSVEC to handle a DOS call from BASIC.

**System Rerun** only steals these vectors once, during the initial USR call. It modifies its own code with these values,

using the same locations your own DOS uses. Therefore, it will work with a variety of system configurations and different brands of DOS. I've tested it with DOS 2.0S, DOS XL, Mach-DOS and DOS 3.0. It should work just as well with any DOS that follows these same steps during initialization.

**System Rerun** actually performs the entire SYSTEM RESET, then adds two changes before returning to BASIC. First, it prints *GOTO 10* on the TV screen, and, second, it starts the "dynamic cursor mode" by POKEing 842,13. Then, when BASIC takes control, it acts as if you typed in *GOTO 10* and pressed RETURN. Don't forget to POKE 842,12 on Line 10, to deactivate the "dynamic cursor," or you'll never regain control of your computer.

Those of you with OS B (or later) ROMs, can add *POKE 566,215:POKE 567,6* to Line 10, to disable the BREAK key. This points BRKKEY (the BREAK key interrupt vector) to a PLA, RTI sequence included in **System Rerun**, which will effectively disable its function.

Once **System Rerun** takes over, the only way to get out of a BASIC program is to call DOS under program control. Remember, once running, you can't stop the program to type in direct commands. Probably the best way to set up an exit to DOS is with a console-key/CTRL-key/regular-key keystroke combination. (i.e., *IF PEEK(53279)=6 AND KEYPRESS=4 THEN DOS*).

Thus, to exit to DOS, you would simultaneously press START, CTRL and the letter D. Sooner or later, little fingers will even find *that* combination, so, if you don't mind shutting off the computer, just omit any reference to DOS!

One note of caution: if you don't disable the BREAK key,

# System Rerun *continued*

don't type RUN more than once. SYSTEM RESET will "steal" its own location from DOSINI and lock up your computer. If you want to rerun the program, just press the **System Rerun Button!**

## Notes and conjecture.

It seems to me that **System Rerun** could easily be adapted for use with other programming languages. Most of the process is controlled by DOS, rather than by the language, so there are only two things to be changed.

First, alter the information in GOTO10 and the corresponding buffer length:

```
GOTO10 .BYTE "K↓↓GOTO 10↑↑"
BUFLEN=14
```

Change the GOTO 10 to the RUN or GOTO command for the language you're using, but don't delete the arrows (for positioning the cursor). Next, count the number of bytes (characters) and set BUFLEN to that number.

Second, change the address where you assemble **System Rerun**:

```
*=$0680
```

Assemble **System Rerun** in a safe area of RAM. Page 6 in BASIC is not affected by SYSTEM RESET. You'll need a similar area available to the language you're using. A good memory map will give you this information. 

*C.F. Fogarty is a full-time software programmer with Aetna Life & Casualty, EBD and Vice President of Concepts Consulting in East Hartford, Connecticut.*

The two-letter checksum code preceding the line numbers here is *not* a part of the BASIC program. For further information, see the *BASIC Editor II*, in issue 47.

Listing 1.  
BASIC listing.

```
DU 0 REM The SYSTEM RERUN Button.
HF 1 REM By : C.F.Fogarty III
ZO 2 REM For: ANALOG Magazine.
JK 4 DATA 128,6,230,6,104,165,10,141,213,
6,165,11,141,214,6,165,12,141,158,6,16
5,13,141,159,6,169,149,133,12,169,6
IF 5 DATA 133,13,32,64,21,169,202,133,10,
169,6,133,11,162,0,169,8,141,66,3,169,
217,141,68,3,169,6,141,69,3,169,14
DB 6 DATA 141,72,3,142,73,3,32,86,228,169
,13,141,74,3,96,173,158,6,133,12,173,1
59,6,133,13,76,159,23,104,64
UA 7 DATA 125,29,29,29,71,79,84,79,32,49,
48,28,28,28
JD 8 READ A,B,C,D:FOR X=A+256*B TO C+256*
D:READ C:POKE X,C:NEXT X
FR 9 X=USR(A+256*B)
KZ 10 POKE 842,12:POKE 566,215:POKE 567,6
:CLR
EZ 20 ? "K":LIST 0,3
US 30 ? :? :? :? "SYSTEM RESET and CBREAK
"
AG 40 ? :? "Are now Disabled."
AM 50 ? :? :? :? "Press [START]/CTRL/D fo
r DOS."
BO 60 OPEN #1,4,0,"K:"
NM 70 GET #1,IN:CHR$(IN);
NR 80 IF PEEK(53279)=6 AND IN=4 THEN CLOS
```

```
E #1:DOS
TS 90 GOTO 70
NG 100 REM You only need lines 4-10 in yo
ur own program(s).
```

Listing 2.  
Assembly listing.

```
0100 ; SYSTEM RERUN
0110 ;By: C.F.Fogarty III
0130 ;Version: 1.0
0150 ;
0420 ; * = $0680
0430 ;
0440 DOSVEC = $0A ;DOS Adr. from
0445 ; ;BASIC
0450 DOSINI = $0C ;Disk Boot Init.
0455 ; ;address
0460 ;
0470 ICCOM = $0342 ;IOCB0
0480 ICBAL = $0344
0490 ICBALH = $0345
0500 ICBLL = $0348
0510 ICBLLH = $0349
0520 POKE842 = $034A
0530 ;
0540 CIOV = $E456 ;Central I/O
0550 ;
0560 WRITE = $08 ;ICCOM Write Cmd
0570 BUFLEN = 14 ;Length of GOTO10
0580 ;
0590 PLA
0600 ;
0610 ;Steal DOSVEC and DOSINI then...
0620 ;
0630 LDA DOSVEC
0640 STA VECDO5
0650 LDA DOSVEC+1
0660 STA VECDO5+1
0670 ;
0680 LDA DOSINI
0690 STA DOS
0700 LDA DOSINI+1
0710 STA DOS+1
0720 ;
0730 ;Point them to this routine.
0740 ;
0750 ENTRY LDA #ENTRY&255
0760 STA DOSINI
0770 LDA #ENTRY/256
0780 STA DOSINI+1
0790 ;
0800 ;Continue initialization process
0805 ;and reload the "D:" device
0810 ;to the Handler Table.
0820 ;This is where the stolen DOSINI
0825 ;would normally go.
0830 ;
0840 .BYTE $20 ;JSR DOS
0850 DOS .WORD $1540
0860 ;
0870 ;Then reset the address to JMP
0875 ;to when DOS is called from
0880 ;BASIC. This allows you to exit
0885 ;BASIC to DOS.
0890 ;Otherwise, you would have to
0895 ;shut off the computer to
0900 ;get out of the BASIC program
0905 ;that is running.
0910 ;
0920 LDA #DVECTR&255
0930 STA DOSVEC
0940 LDA #DVECTR/256
0950 STA DOSVEC+1
0960 ;
```

```

0970 ;Now Clear the screen,
0980 ;Move the cursor down 3 lines,
0990 ;Write "GOTO 10" to the screen,
1000 ;Move the cursor up 3 lines...
1010 ;
1020 LDX #0
1030 LDA #WRITE
1040 STA ICCOM
1050 LDA #GOTO10&255
1060 STA ICBAL
1070 LDA #GOTO10/256
1080 STA ICBAN
1090 LDA #BUFLEN
1100 STA ICBL
1110 STX ICBLH
1120 JSR CIOV
1130 ;
1140 ;...start the dynamic cursor...
1150 ;
1160 LDA #13
1170 STA POKE842
1180 ;
1190 ;...and return control to BASIC.
1200 ;
1210 RTS
1220 ;
1230 ;Control goes here when DOS is
1235 ;called from BASIC.
1240 ;It resets the pointers to DOS
1250 ;and allows you to exit from
1255 ;BASIC.

```

```

1260 ;
1270 DVECTR LDA DOS
1280 STA DOSINI
1290 LDA DOS+1
1300 STA DOSINI+1
1310 ;
1320 ;Now JMP to where DOSVEC should
1325 ;have gone if it wasn't stolen.
1330 ;And DOS will take control.
1340 ;
1350 .BYTE $4C ;JMP DOSVEC
1360 VECDOS .WORD $179F
1370 ;
1380 ;POKE 566,BREAK&255 and POKE
1385 ;567,BREAK/256 then,
1390 ;Control goes here when [BREAK]
1395 ;is pressed.
1400 ;These 2 commands disable the
1405 ;[BREAK] key for OS 'B' ROMS.
1410 ;
1420 BREAK PLA
1430 RTI
1440 ;The information that you print
1445 ;to the screen follows:
1450 ;
1460 GOTO10 .BYTE "K++GOTO 10++"
1470 .END

```

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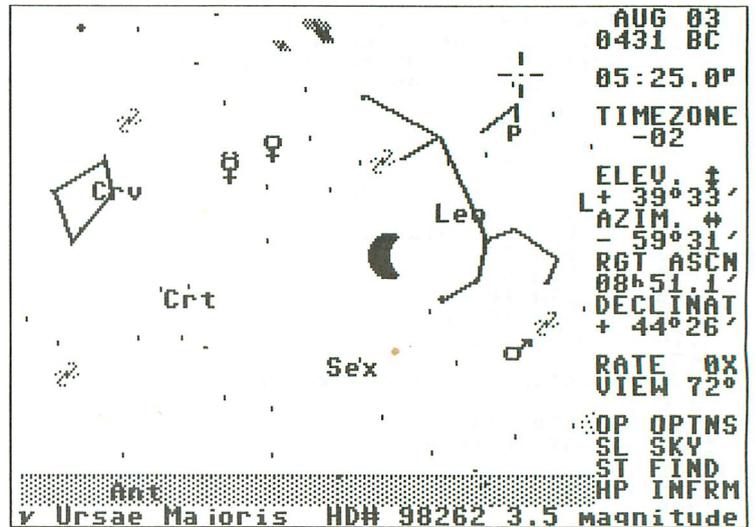
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# Atari Planetarium



**ATARI CORP.**  
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 \$24.95

by Bruce Frumker

Another magazine's recent review of **Atari Planetarium** stated that "**Planetarium**, though fun, has a somewhat limited appeal. It is probably most useful for amateur astronomers." From my experience with this program, I can emphatically say *that's not true!* In fact, I feel this wonderful new release from Atari will delight and inform *anyone* who has looked at the sky and wondered, "what am I looking at?" This program succeeds at both informing and stimulating a sense of wonder—a desire to experiment with the sky.

That's the power **Atari Planetarium** puts in your hands. On-screen, you're presented with a planetarium that can take you from 9999 B.C. to 9999 A.D. You may look at any part of the sky, from any place on Earth, at whatever time you choose. **Planetarium** depicts our solar system—planets, the Sun and our moon. It shows the location of over 1200 stars, in different sizes to suggest apparent brightness.

All 88 constellations are displayed, and 14 of the most important are portrayed with lines connecting the stars (if you so choose). More than 300 deep-sky objects (distant nebulae, galaxies and clusters outside our own galaxy) are also available. The

1985-86 appearance of Halley's Comet is also available.

The terms *available* and *if you so choose* are important here. **Atari Planetarium** lets you choose just what you want to see on the screen, and in what way. This is a most accommodating program.

One of the best things about **Planetarium** is its 115-page Owner's Manual. This is very helpful in telling you how to access and use all the features of the program. There's even a quick reference command-key table. Next, the manual gives a basic description of what's happening in the sky; it teaches what's moving where, and why. This "Guided Tour of the Universe" explains the sky and helps you learn by performing various experiments on the screen to let you see the results. This is a far better way to learn than by trying to visualize from a written description.

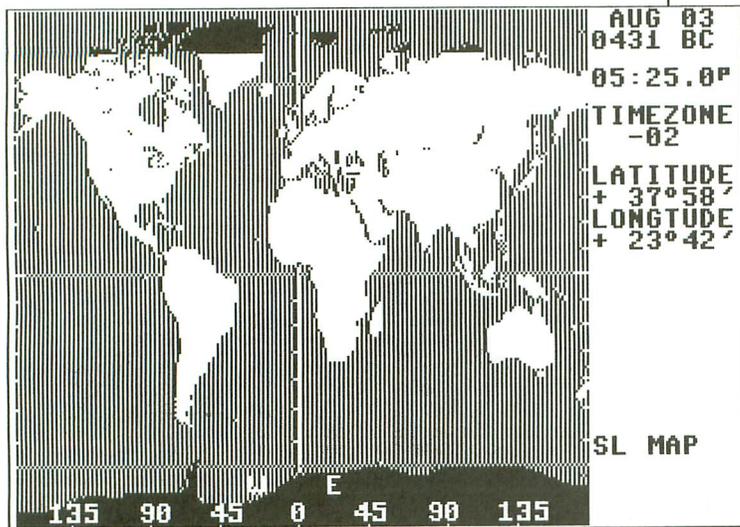
This on-screen experimental approach for new concepts is carried into the next section of the Owner's Manual, "Astronomy." Here, you get to view eclipses as they occur (not only do you see the Sun being covered, but the sky darkens, too). Learn about precession (our present North Star, Polaris, was not always the "North" Star), by actually going back in time and looking at an ancient sky.

My favorite part of the Owner's Manual

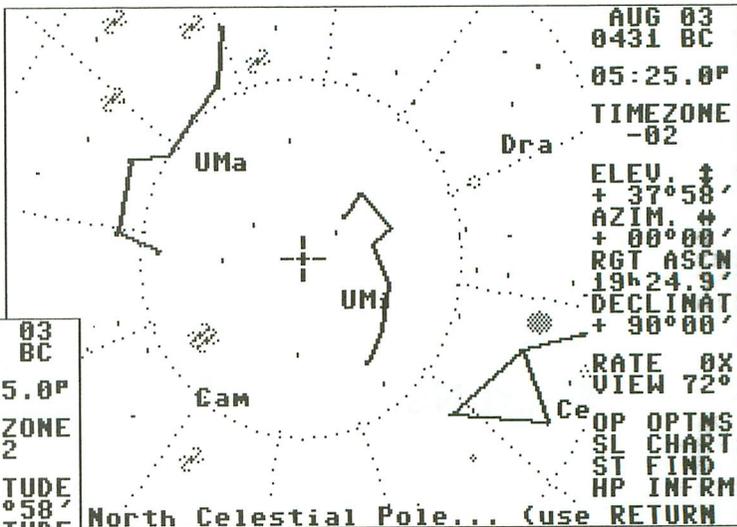
is this historic view. You can watch the solar eclipse reported by the Greek historian Thucydides, on August 3, 431 B.C., from Athens. You're able to look up a shaft in the Great Pyramid in 2700 B.C. and see the North Star. With a joystick, you can move over any object in the sky and get an on-screen description. You'll discover that the North Star seen through the shaft in the Great Pyramid was Thuban, not Polaris as it is today. This on-screen description can identify *all* displayed objects with names and astronomical catalog numbers. The description includes brief data on distance, size and object classification.

If you'd like a printout of your screen, Epson and Atari XMM801 printers are directly supported. I found my Gemini Star SG-10 worked perfectly with the XMM801 setting.

**Atari Planetarium** has many more capabilities. You can display the sky as your eyes see it, or, instead, show a conventional astronomical sky chart. The "slices" of sky you view can be changed from a viewing angle of 72° to 9°. Under the "higher magnification" of the 9° setting, more detail may be resolved (separation of double stars will show). You can look at the sky frozen in time, or moving. The speed of motion can be from 1x (as the sky appears in real time) to 64x faster or slower. You



AUG 03  
0431 BC  
05:25.0P  
TIMEZONE  
-02  
LATITUDE  
+ 37°58'  
LONGITUDE  
+ 23°42'



AUG 03  
0431 BC  
05:25.0P  
TIMEZONE  
-02  
ELEV. †  
+ 37°58'  
AZIM. †  
+ 00°00'  
RGT ASCN  
19h24.9'  
DECLINAT  
+ 90°00'  
RATE 0X  
VIEW 72°  
OP OPTNS  
SL CHART  
ST FIND  
HP INFRM

can use the 64x faster setting to speed up events you'd like to see quickly or study (run eclipses at this speed). You could have **Planetarium** running at the 1x speed near where you're watching the sky with either the naked eye, binoculars or a telescope. The sky on your screen will change at just about the same rate as the real sky, and you can keep track of what happens. The **Atari Planetarium** recalculates positions, then it jumps to the next one on-screen. That isn't as smooth as a real planetarium, but it *does* cost \$50,000 to \$5,000,000 less—and a real planetarium won't fit in your home.

You can have **Planetarium** find any object or constellation for you and place it in the center of the screen. You can have it track that object or constellation across the sky, through time. You can look directly north, south, east or west, or with the joystick, change your point of view to anywhere else. You can look overhead, down to the clearly shown horizon, then you can continue looking down through a transparent Earth.

The location on Earth from which you're stargazing can be changed in the "map mode." Here, you can set longitude and latitude from the manual's table, or move a cross hair over a map of the world. The "set mode" lets you set date and time of observation. **Atari Planetarium** automati-

cally makes the appropriate conversions for Julian and Gregorian calendar dates. However, you can override the conversion, if you desire.

The excellent manual concludes with technical notes for those users with a greater background in astronomy. Here, **Atari Planetarium** accuracy is discussed, along with screen updating intervals and the size exaggeration factor in the display.

The only problem with **Planetarium** is that it requires an Atari XL or XE computer and, also, a 1050 disk drive. If you've done any "funny" modifications to your drive or computer, you may not be able to run the **Planetarium**. Be aware of this before you buy.

Instead of going on, let me urge you to try out **Atari Planetarium**. If you notice a bright star in the sky and want to know what it is, just set up the date, time and location, and find out what you were seeing. Was it really a star (and if so, which one), or Jupiter, or what?

If you want to "play" with the sky, to see if you can visualize why planets go into retrograde motion now and then, just set up the **Atari Planetarium** and follow the planets. This is what's so wonderful about the program: it encourages you to explore and discover, to play and learn. Amateur astronomers will love **Atari Planetarium**

(so do several professionals I know), and they'll want to set it up next to their telescopes.

But I think **Atari Planetarium** offers a special joy to those who've looked up and wondered—with no way to really find out what they were seeing. Now, not only can they find out, but they can learn, as well. This is a truly splendid program. **A**

*Bruce Frumker, President of Atari Computer Enthusiasts of Cleveland, authored **Memory Match** for APX and has had programs published in COMPUTE! and Creative Computing, as well as book reviews in InfoWorld. Professionally, he works at the Cleveland Museum of Natural History, where he's been developing an interactive laser video disk exhibit, which is driven by an Atari 130XE.*




## MicroNet

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by **Matthew J.W. Ratcliff**

**MicroNet** is a hardware device from the Supra Corporation, which "networks up to eight Atari computers," allowing multiple computers to share a common set of peripherals.

To test **MicroNet**, I threw a computer party, asking several friends to come over with computers, monitors and serial I/O cables. I removed the I/O cable from my 130XE and connected it to the rear of **MicroNet**. Then we each took one of the other eight I/O ports for our computer and monitor. We took turns booting our machines with different programs and DOSs, with no problems—at first. The fun began when more than one person attempted to access a peripheral at the same time, as you'll see below.

**MicroNet** comes with a modified Atari DOS 2.5. It is designed to automatically retry I/O operations after a timeout error 138. The idea here is that a computer might have the serial bus tied up talking to a disk drive, for example, while another computer is "on hold," waiting for disk access. Under normal conditions, the second computer would get a timeout error.

This is misleading, however. Although not advertised or mentioned in the meager documentation, you immediately get the impression that **MicroNet** automatically handles "contention" problems for the

disk, printer and other peripherals. Wrong! **MicroNet** serves one very elementary purpose; it acts as a "bus splitter," isolating multiple computers from one another. This allows them to talk to the same set of peripherals.

**MicroNet's** most sophisticated networking "feature" is to deny serial bus access to a computer if another is using it. **MicroNet** does not keep track of open and closed files. This is where the real danger lies.

For example, say computer 1 opens file D1:DAN for writing a file to disk. A little later, computer 2 opens file D1:JIM for reading. During any file I/O, there's always a short pause between the record (sector) transfers (for disk head positioning and memory buffering). During this brief "dead time" between writing records for computer 1, computer 2 gains control of the drive and repositions the disk head to read its file. Just then, computer 1 comes along to write the next record, assuming the disk head to be where it left it. Then D1:DAN's write process clobbers D1:JIM. One—or both—computers may lock up (a BREAK sometimes recovers here), and a disk file may be wiped out, as well.

**MicroNet** functions as advertised, since it doesn't promise to do anything beyond allowing multiple computers to share the same peripherals, but handshaking must be used in the literal sense. Before using the disk or printer, you must be certain no one else is doing any I/O.

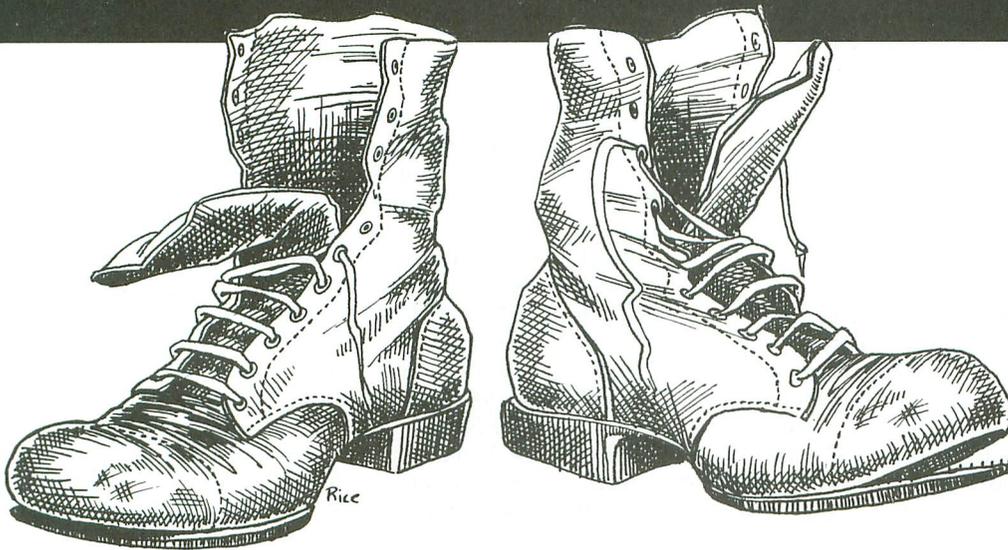
It seems that **MicroNet** was designed primarily for the 130XE. Each user boots his or her system in turn, moving all work files to the RAMdisk, where all subsequent work is done. Since this is completely internal to each computer, no serial bus contention problems will occur. At the end of a computing session, each user would take turns copying files from the RAMdisk to a floppy. A similar round-robin process would be needed for printer use. A printer buffer would minimize wait time here.

**MicroNet** would work nicely for a "game night" at the local user group meeting. It would also work well for the 130XE scenario mentioned above. However, this box does not truly network eight Ataris (as is stated in the documentation), but allows them to take turns using common peripherals. It is up to the human interface to make it work successfully. **A**

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*The author thanks Supra for the loan of **MicroNet** for review, and Dave, Jim, Dan, Terry and the rest of the gang for hardware and their assistance in the testing of this product.*

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# Boot Camp

by Karl E. Wieggers

We've spent three months on a sojourn into the realm of player/missile graphics, the heart of Atari animation. The crux of the matter was to overlay bit patterns in some section of memory (the players) on top of a background display of the usual screen graphics in some other part of memory (the playfield). By manipulating the player RAM independently of the playfield RAM, we could make objects move around the screen.

So far, **Boot Camp** has limited its playfield displays to the sort of things you can make by using the POSITION/PRINT and PLOT/DRAWTO commands in BASIC, or their assembly language equivalents. But the Atari has another graphics trick lurking up its silicon sleeve, the ability to redesign characters printed on the screen. You say you don't need a capital Q in your program, but you sure would like a little happy face? No problem. You may be familiar with the method in BASIC, and this month you'll learn how to do it in assembly language.

So, get ready to explore the powerful techniques of character set manipulations. Along the way, we'll add yet another item to your input/output toolbox. This is the ability to read data files from disk into whatever part of memory you want, using the sequential (as opposed to random, or direct) access method. Now, let's get started with our usual tutorial...

## Character set fundamentals.

You don't need a lot of computer expertise to recognize a character on the monitor screen when you see one. A character is basically anything you can put on-screen by pressing one or more keys on the keyboard. The Atari, like most computers, lets you create 256 unique characters. Since you spotted the magic computer number of 256, you

won't be surprised when I tell you that these characters are numbered from 0 through 255.

The folks who made computers in the first place realized that it would be nice if there were some standards for representing characters in all computers and computer peripherals, such as printers. Well, they didn't quite cover *all* computers (IBM mainframes are a notable exception), but all of the personal computers I know of adhere to the ASCII (American Standard Code for Information Interchange) standard.

There are really only 128 standard ASCII characters, numbered 0 through 127. Characters 0 through 31 are the control characters you get by holding down the CONTROL key while pressing a letter. Control characters usually don't print anything recognizable, but the Atari designers chose to make these the block graphics symbols. ASCII characters 32 through 127 are the usual upper- and lowercase letters, numbers, punctuation marks and the other special symbols.

Characters 128 through 255 can be anything the computer designer chooses. On the Atari, these are the inverse video representations of characters 0 through 127. The complete ASCII character set with the Atari modifications is called the ATASCII set.

So, what is a character, really? Nothing more than a pattern of dots in an 8x8 grid. That's 8 pixels horizontally by 8 television scan lines vertically. Recalling the Atari pixel resolution of 320 by 192 leads us to the inescapable conclusion that the Atari screen display can show 24 lines of 40 characters each. I imagine these numbers are familiar to you.

You may have read somewhere that graphics 0 (40x24 characters) is really the same mode as graphics 8 (320x192 pixels). The difference is that graphics 0 is a "character-mapped" mode, while graphics 8 is a "bit-mapped" mode.

This has important implications for memory usage. A full screen of graphics 0 requires  $40 \times 24 = 960$  bytes, since any one of the 256 available characters is referenced by a single byte value. However, a full screen of graphics 8 consumes eight times as much memory—almost 8K of RAM. If you could change the shapes of the characters in graphics 0, you could achieve all the same displays you can get in graphics 8. You gain both the advantage of much lower RAM consumption and much quicker displays (printing is faster than drawing). Besides, you could use these new characters in the color text modes, graphics 1 and 2, and even in the multicolor character modes known as ANTIC 4 and 5 (graphics 12 and 13 on the XL machines).

### Memory usage.

The dot pattern in each character forms the shape you see on the screen in graphics 0. To define the shape of a character you need 8 bytes of RAM, 1 for each scan line. The first byte corresponds to the top scan line in the character and the eighth byte to the bottom scan line. Within a byte, the bit pattern translates into the horizontal 8-pixel dot pattern that appears on the screen in a single scan line. Bits which are set (1) appear as dots, while bits which are cleared (0) show the background color.

Even though there are 256 ATASCII characters, there are only 128 unique dot patterns. This is because characters 128 through 255 are the inverse video incarnations of the characters 0 through 127. So we need to store dot patterns for 128 characters at 8 bytes per character. . .  $128 \times 8 = 1024$ , which just happens to equal 1K, which just happens to equal four pages (1 page = 256 bytes) of memory. Pretty convenient, eh? (You probably never thought you'd reach the point in your life where something like 1024 qualified as a "round number.")

The standard ATASCII character set resides in ROM, beginning at address \$E000 and continuing through address \$E3FF. Unfortunately, the 128 characters are not stored in contiguous ATASCII sequence. Table 1 shows the actual order of storage. The reason for this oddity: in graphics 1 and 2, you only have access to half of the character set at a time (64 characters). The peculiar grouping Atari engineers selected lets you use *either* the uppercase letters, numbers and punctuation marks, or the lowercase letters and control characters. (Not both. Unless we get tricky. Display list interrupts. Remember?)

ROM Address	ATASCII Values	Principal Contents
\$E000	32-63	numbers, punctuation marks
\$E100	64-95	capital letters
\$E200	0-31	control characters
\$E300	96-127	lowercase letters

**Table 1. — ROM character set storage sequence.**

But wait! I told you the standard character set was in ROM. That's Read-Only Memory, and we can't change anything in it. Whatever shall we do? No problem. We'll simply copy the standard character set from ROM into RAM, and then do anything we want to it.

We must set aside four pages of RAM for our new character set, starting on a page boundary that's evenly divisible by 2. Addresses like \$4000 are nice. Oh, and let's not

forget to tell the computer where to find our new characters. Location \$2F4 (756 decimal, known as CHBAS) must be loaded with the high byte of the starting location of our RAM character set, then all characters are taken from the byte patterns in the reserved block of RAM. You can have as many different character sets in RAM as you like, at 1K apiece. Just load CHBAS with the right value to use whichever set you want.

Incidentally, CHBAS is the shadow register for a hardware character set pointer at address \$D409, CHBASE. You can store your RAM character set address directly into CHBASE in a display list interrupt (or DLI) routine, to use multiple character sets on the screen at once. We'll discuss this more, later on.

In graphics 1 and 2, the contents of CHBAS tell the computer which half of the character set to use. Loading CHBAS with the high byte of the actual starting address of the whole set causes the computer to use the first half of the character set (uppercase letters, etc.) This is the default condition, with CHBAS containing \$E0 for the ROM set. To use the upper half of the set, store the high byte plus 2 into CHBAS (\$E2 for the ROM set).

Please turn now to the example program in Listing 1. In keeping with the philosophy of structured program design discussed last time, I've written several subroutines you can use in your own programs to perform specific tasks. Listing 1 includes a subroutine called MOVECHAR, which copies the entire ATASCII character set from ROM into RAM. The desired address for the new character set is specified in the equates list as RAMSET (\$4000 in Listing 1), while the original location is termed ROMSET (always \$E000).

Another subroutine in Listing 1 is called PRINT. This begins in Lines 1120-1130, by pointing to the RAM character set. Following this are the familiar instructions for performing a put record operation to IOCB #0, a procedure also referred to as printing a line of text on the screen. As written, you can print a line up to 512 characters long with subroutine PRINT. (Do you see why?) The line to be printed is called TEXT (Line 1300), and just shows five characters (ABCDE) we'll use to illustrate how a redefined character set works. Now, how about that third subroutine tantalizingly named REDEFINE?

### Redefining the character set.

You can create a custom character set in two ways. One is to copy the ROM set into RAM, then modify selected characters by actually changing the contents of RAM, byte by byte. This is the approach we're employing in Listing 1. The second method is to generate a complete new character set, with up to all of the 128 dot patterns changed. The latter technique is easiest when you use one of the many character set editor programs available commercially, and in magazines and books.

These editors usually let you change dot patterns using a joystick, and allow you to view characters in different graphics modes (sometimes in groups, handy when you're building large images that are mosaics of several redefined characters). Character set editors usually let you save the complete character set, with whatever changes you made,

in a disk file. These disk files are nine single-density sectors long—1024 bytes again. Once you have such a disk file (let's call it a "font" file), you can simply load it from disk into the block of RAM you reserved for your character set, and off you go. The simplest way to do this is to read the disk file sequentially, using our old friend CIO, the Central Input/Output system. The example in Listing 2 uses this method, and we'll get there shortly.

In Listing 1, we're simply modifying the alphabet's first five capital letters (A through E, in case you're fuzzy tonight) to be a little different from the standard Atari representation. I drew out some dot patterns I found pleasing on graph paper, using the 8x8 grid. Figure 1 shows what the A looks like. Going across each scan line, I drew the dot pattern as a binary number, with 1 representing a dot, and 0 a blank. The top line of the A came out as 00111100 in binary, which corresponds to \$3C hex or 60 decimal. Thus, the byte of my RAM character set that corresponds to the first byte of the capital letter A should be loaded with the value of decimal 60. I repeated this procedure for all eight scan lines of my five characters to get a group of forty numbers that must be stored in RAM in place of the standard byte contents for these characters. The values appear in decimal form in Listing 1, in the table named NEWCHAR (Lines 950-1040).

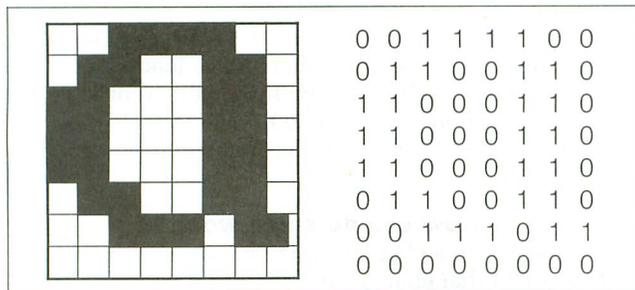


Figure 1.

So, where do I stuff these numbers? Your Atari BASIC manual tells you that the letter A is stored as character number 33 in ROM, even though its ATASCII number is 65. This means there are 264 bytes of character data between the start of the character set and the first byte of A. Remember that we start counting at 0, and you can compute that the 8 bytes defining the shape of an A are found at address RAMSET+264 through RAMSET+271. The data for the other four characters immediately follows the data for the A.

The purpose of subroutine REDEFINE in Listing 1 is now clear. It loads those forty data values into RAM, starting at address RAMSET+264. This substitutes my own dot patterns for the original letters A through E. (Yes, I know that Lines 830-880 really load the data beginning at RAMSET+264+39 and going backwards, but it's shorter to code that way.) Now, whenever we print one of those letters (after telling the Atari to use our RAM character set, rather than its own ROM set), we'll see my concepts of the letters. Assemble Listing 1 and run it, and you'll see what I mean. Notice that *all* capital letters A through E on the screen are modified, not just the ones printed after we

created the new character set. Press RESET when you wish to return to the normal display.

You can use this method to redefine any number of characters. It's most convenient when you want to use the majority of the hardware character set intact, but with a few alterations. It works fine, for example, if you just wish to generate some terrain shapes for a game's playing field. However, if you want to create a lot of new characters, it's easier to use a character set editor that creates a disk file, and read it into RAM. This is appropriate if you want a whole new font, like a computer-style alphabet, or a fancy Gothic font for a medieval adventure game. Now let's learn how to read disk files.

### Sequential disk access with CIO.

Think back to issue 43, if you were with us then. The theme for that month was performing floating-point arithmetic operations in assembly language. One of the operations discussed involved accepting keyboard input in the form of a string of characters typed by the user. The GETREC (GET a RECORD) operation of CIO came to our aid.

Sequential disk I/O involves the same kind of PUTREC (for writing) and GETREC (for reading) operations as does screen I/O. In fact, that's the whole point of having the CIO subsystem available: one sequential device behaves the same as another, be it a screen editor, keyboard, printer, or a cassette or disk file. (Of course, it's hard to read from the printer or write to the keyboard.)

Today we want to read an existing disk file of character font information, placing the 1024 bytes right into our reserved block of RAM for the redefined character set. I'm assuming that you have access to a character set editor and have a redefined font file. My example refers to a disk file called FANCY.FNT (as in "font"). However, you can actually read any disk file this way, substituting the name of the file where I have FANCY.FNT. Of course, anything besides genuine font data will give you relatively bizarre-looking characters.

The program in Listing 2 shows the necessary techniques. Again, notice the subroutine-oriented structure of the program. The "main" program is merely a few instructions in Lines 430-550. Listing 2 is identical to Listing 1 in Lines 10-360 and, also, Lines 1110-1260 (the PRINT subroutine again), so you need not type everything in all over again.

Listing 2 has three new subroutines to perform, in a general way: the three operations involved in reading a disk file. These may be familiar to you from BASIC. First, the subroutine OPENIOCB opens the IOCB (Input/Output Control Block) of your choice. Next, subroutine READFILE actually reads the file and transfers the contents to our desired location in RAM. Finally, subroutine CLOSEIOCB closes the IOCB we opened in the first place. Each of these subroutines is written in such a way that you must load the 6502's X-register with a number which equals 16 times the IOCB number you wish to use before the JSR instruction is executed. Notice that Lines 430, 500 and 520 all load X with 16, for IOCB #1.

The command bytes for the OPEN, GETREC and CLOSE operations are in the equates list (Lines 110-140). OPEN-

IOCB needs to specify the OPEN command (Lines 660-670), and point to the device name. The device name (at label *FNAME*, Line 1470) includes both a disk drive number and the complete filename, *D1:FANCY.FNT*, followed by the end-of-line (EOL) character. Finally, Lines 720-730 specify that we wish to open the file in read access mode by storing a 4 in auxiliary byte 1, *ICAX1*. A JSR to the CIOV entry point actually carries out our instructions (Line 740).

Other disk file opening options are 6 (read the disk directory), 8 (write a new file over the existing file), 9 (write by appending to the existing data in the file) and 12 (read and write, starting with the first byte in the file). Notice, please, that opening in access mode 8 destroys the existing file!

You might accidentally try to open a disk file that doesn't exist. This, and other illegal operations, would trigger an error condition from CIO. Upon returning from the JSR CIOV instruction, the error number is in the Y-register. Since error numbers are all negative numbers (bit 7 is set), this also sets the negative flag in the processor status register. To check for an error, then, we just need to test the negative flag.

Lines 450-480 in Listing 2 check for the negative flag being set. If not, control branches to label *NOERR1*, and

execution continues. Otherwise, subroutine *OPENERROR* is called. This routine, in Lines 1510-1660, simply prints an appropriate error message on-screen and returns. Then Lines 470-480 perform an unconditional branch to the infinite loop at label *END*, terminating execution of the program. In real life, you'd want to trap for all possible errors and take appropriate action. For now, this simple trap will hold us. We'll talk more about disk I/O and error messages in a future issue.

Now to fish some stuff out of the file. The *READFILE* subroutine issues a *GETREC* command. We need to tell the OS where to put data from the disk. Again, we want to store it at address *RAMSET* (\$4000), so that's our buffer address (Lines 850-880). Next, we tell CIO how many bytes of data to get. We know the file contains 1024 bytes, so we set the low byte of the buffer length to 0 and the high byte to 4 (Lines 890-920). The JSR through CIOV transfers the character set data from disk to RAM.

Unless you anticipate doing more I/O operations from the disk file, it is a good practice to close it. This frees up the IOCB for another use and also prevents you from inadvertently accessing the wrong file. Subroutine *CLOSEIOCB* (Lines 1000-1040) is a concise way to tidy up after ourselves.

And there you have it! The only other thing Listing 2 does is display most of the standard characters on-screen, using the long strings at the label *TEXT* (Lines 1340-1420). This is so you can examine what you've loaded from the disk. You can actually type anything you want in Lines 1350-1410, but don't omit the EOL character. I hope you were able to find a real font file. Again, press *RESET* to kill this display.

### Now you do some work.

Are you up for a challenge? Try modifying Listing 2 to include a DLI that changes the character set pointer (*CHBASE*) from the ROM set to your own RAM set partway down the screen. Print the same text lines above and below the DLI mode line. You may wish to refer to the **Boot Camp** columns in previous issues for help. Issue 41 showed how to print text at any position on the screen. Listing 1 in issue 46 described how to enable a DLI at a particular mode line in a graphics 0 screen. The issue 46 routine called *DLI2* in Listing 2 illustrated a character set change using a DLI.

This DLI technique is used in many character set editors, so you can simultaneously see the original ROM set, along with the RAM set you're editing. If you can write a program to these specifications, you've really tied together a lot of concepts. Treat yourself to an ice cream cone with sprinkles.

### Colored characters in graphics 0.

You may have heard about "color artifacting" in graphics 8. This refers to the phenomenon of seeing colored vertical lines in what is, nominally, a monochrome graphics mode. The colors are different, depending on whether the line is drawn on an odd- or even-numbered point.

Since graphics 0 is really the same as graphics 8, you can also see artifacting. You don't see it in the ROM char-

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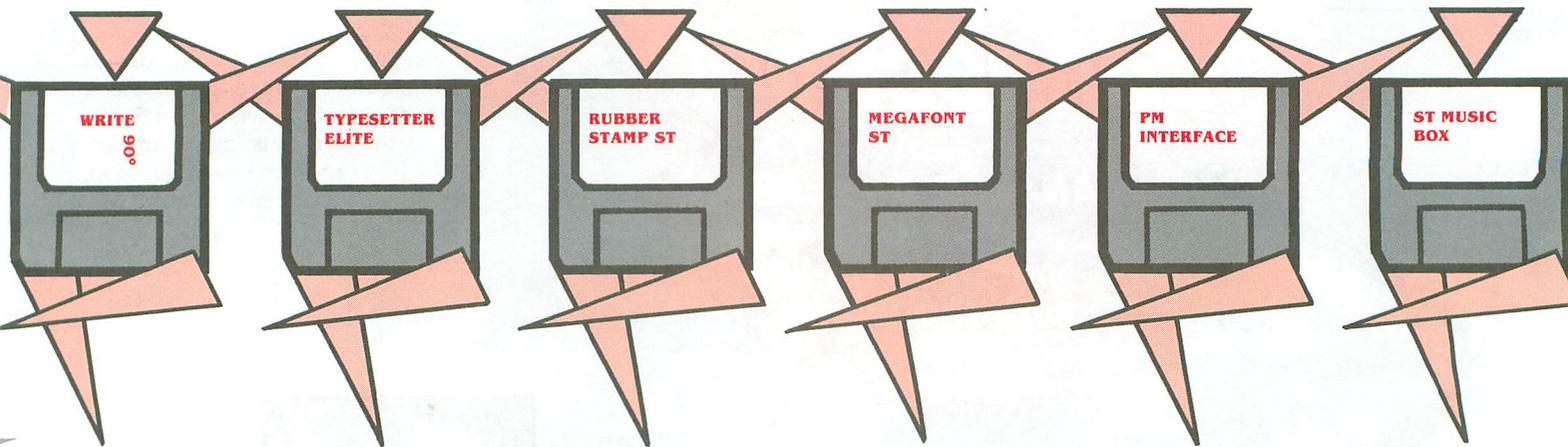
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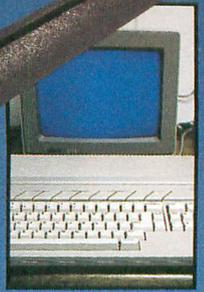
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acter set, because all those characters have at least two adjacent horizontal pixels lit in any vertical segment. This gives the pure foreground color you expect. However, if you redefine some characters to have vertical lines (as in an I) only 1 pixel wide, you'll see different colors. You can use this technique to produce colored characters in graphics 0, but at a loss in resolution. Try it.

### Aliens reprise.

You probably thought I had forgotten about "Attack of the Suicidal Road-Racing Aliens," but you're wrong. Another nice application of redefined character sets is in our graphics programs. We can transform a letter A into a tree shape, and print it in graphics 2 as dark green on a light green background. Or we can make some little figures, using the two multicolored text modes, and supplement our limited player supply for animation, or create highly detailed scenery. Virtually all the arcade-style games you've seen make heavy use of custom character sets, and there's no limit to the visual effects you can produce.

I suggest you get your hands on a character set editor and hack away. Just imagine the vivid screen displays you can create with a custom display list, a creatively modified character set, some animated players and some DLIs for additional seasoning. For extra flair, consider adding a vertical blank interrupt routine to create some pulsing color effects. You might try your hand at designing a playing screen for "... Aliens"—I haven't come up with a good one yet.

### Yet to come...

Your toolbox of Atari graphics techniques is getting pretty crowded, but there's more to come. We haven't even touched on horizontal and vertical scrolling techniques yet. And, sometime soon, I'll take a break from graphics and talk about the macro part of macro assemblers. If you have any preferences for topics or techniques covered in future issues, please drop me a line. ☐

Listing 1.  
Assembly listing.

```

10 ;Listing 1 for Character Set
20 ;Redefinition Examples
30 ;
40 ;by Karl E. Wieggers
50 ;
60 ; .OPT OBJ,NO LIST
70 ;
80 ;
90 ;Equates for IOCB operations
0100 ;
0110 OPEN = $03
0120 GETREC = $05
0130 PUTREC = $09
0140 CLOSE = $0C
0150 EOL = $9B
0160 ;
0170 ;pointer to character set
0180 ;
0190 CHBAS = $02F4
0200 ;
0210 ;equates for IOCB addresses
0220 ;
0230 ICCOM = $0342
0240 ICBAL = $0344
0250 ICBAH = $0345

```

```

0260 ICBLL = $0348
0270 ICBLH = $0349
0280 ICAX1 = $034A
0290 ICAX2 = $034B
0300 CIOV = $E456
0310 ;
0320 ;redefined character set will
0330 ;start at $4000 and go to $43FF
0340 ;
0350 RAMSET = $4000
0360 ;
0370 ;ROM character set starts at
0380 ;$E000 and goes to $E3FF
0390 ;
0400 ROMSET = $E000
0410 ;
0420 ;*****
0430 ; PROGRAM BEGINS HERE
0440 ;*****
0450 ;
0460 * = $5000
0470 ;
0480 JSR MOVECHAR
0490 JSR REDEFINE
0500 JSR PRINT
0510 END JMP END
0520 ;
0530 ;*****
0540 ; SUBROUTINES BEGIN HERE
0550 ;*****
0560 ;
0570 ;subroutine to copy entire ROM
0580 ;character set into RAM at your
0590 ;designated address (RAMSET)
0600 ;
0610 MOVECHAR
0620 LDX #0
0630 CHLP1
0640 LDA ROMSET,X
0650 STA RAMSET,X
0660 LDA ROMSET+$0100,X
0670 STA RAMSET+$0100,X
0680 LDA ROMSET+$0200,X
0690 STA RAMSET+$0200,X
0700 LDA ROMSET+$0300,X
0710 STA RAMSET+$0300,X
0720 INX
0730 BNE CHLP1
0740 RTS
0750 ;
0760 ;subroutine to redefine selected
0770 ;group of characters in the RAM
0780 ;set; in this case, 5 characters
0790 ;totalling 40 bytes; replaces
0800 ;characters 33-37 in RAM set
0810 ;
0820 REDEFINE
0830 LDX #39
0840 RDLP1
0850 LDA NEWCHAR,X
0860 STA RAMSET+264,X
0870 DEX
0880 BPL RDLP1
0890 RTS
0900 ;
0910 ;table of byte data for the new
0920 ;characters, 8 bytes per char.
0930 ;
0940 NEWCHAR
0950 .BYTE 60,102,198,198
0960 .BYTE 198,102,59,0
0970 .BYTE 62,99,99,99
0980 .BYTE 126,99,126,0
0990 .BYTE 60,99,96,96
1000 .BYTE 96,99,62,0
1010 .BYTE 60,99,99,99
1020 .BYTE 99,102,124,0
1030 .BYTE 60,98,96,124

```

```

1040      .BYTE 96,127,60,0
1050      ;
1060      ;subroutine to print a string of
1070      ;text on the screen (up to 512
1080      ;characters long), using the RAM
1090      ;character set
1100      ;
1110      PRINT
1120      LDA #RAMSET/256 ;point to
1130      STA CHBAS      ;RAM charset
1140      LDX #0          ;IOCB #1
1150      LDA #PUTREC    ;operation is
1160      STA ICCOM,X    ;PUT a RECOrd
1170      LDA #TEXT&255  ;point to the
1180      STA ICBAL,X    ;text string
1190      LDA #TEXT/256
1200      STA ICBAH,X
1210      LDA #0          ;print up to
1220      STA ICBLL,X    ;2*256=512
1230      LDA #2          ;bytes
1240      STA ICBLH,X
1250      JSR CIOV      ;go do it!
1260      RTS
1270      ;
1280      ;string being printed on screen
1290      ;
1300      TEXT .BYTE "ABCDE",EOL

```

Listing 2.  
Assembly listing.

```

10 ;Listing 2 for Character Set
20 ;Redefinition Examples
30 ;
40 ;by Karl E. Wieggers
50 ;
60      .OPT OBJ,NO LIST
70 ;
80 ;
90 ;equates for IOCB operatios
0100 ;
0110 OPEN = $03
0120 GETREC = $05
0130 PUTREC = $09
0140 CLOSE = $0C
0150 EOL = $9B
0160 ;
0170 ;pointer to character set
0180 ;
0190 CHBAS = $02F4
0200 ;
0210 ;equates for IOCB addresses
0220 ;
0230 ICCOM = $0342
0240 ICBAL = $0344
0250 ICBAH = $0345
0260 ICBLL = $0348
0270 ICBLH = $0349
0280 ICAX1 = $034A
0290 ICAX2 = $034B
0300 CIOV = $E456
0310 ;
0320 ;redefined character set will
0330 ;start at $4000 and go to $43FF
0340 ;
0350 RAMSET = $4000
0360 ;
0370 ;*****
0380 ;      PROGRAM BEGINS HERE
0390 ;*****
0400 ;
0410      *= $5000
0420 ;
0430      LDX #16
0440      JSR OPENIOCB

```

```

0450      BPL NOERR1
0460      JSR OPENERROR
0470      CLC
0480      BCC END
0490      NOERR1
0500      LDX #16
0510      JSR READFILE
0520      LDX #16
0530      JSR CLOSEIOCB
0540      JSR PRINT
0550      END JMP END
0560      ;
0570      ;*****
0580      ;      SUBROUTINES BEGIN HERE
0590      ;*****
0600      ;
0610      ;subroutine to open an IOCB for
0620      ;read access - need to load
0630      ;with IOCB# * 16 first
0640      ;
0650      OPENIOCB
0660      LDA #OPEN      ;operation is to
0670      STA ICCOM,X    ;OPEN an IOCB
0680      LDA #FNAME&255 ;point to
0690      STA ICBAL,X    ;name of disk
0700      LDA #FNAME/256 ;file to open
0710      STA ICBAH,X
0720      LDA #4          ;open for
0730      STA ICAX1,X    ;read access
0740      JSR CIOV      ;go do it!
0750      RTS
0760      ;
0770      ;subroutine to read 1024 bytes
0780      ;from open IOCB and put in RAM
0790      ;at address RAMSET. IOCB# * 16
0800      ;must be in X-register first.
0810      ;
0820      READFILE
0830      LDA #GETREC   ;operation is
0840      STA ICCOM,X    ;GET a RECOrd
0850      LDA #RAMSET&255 ;will store
0860      STA ICBAL,X    ;at address
0870      LDA #RAMSET/256 ;RAMSET
0880      STA ICBAH,X
0890      LDA #0          ;want to get
0900      STA ICBLL,X    ;4*256=1024
0910      LDA #4          ;bytes
0920      STA ICBLH,X
0930      JSR CIOV      ;go do it!
0940      RTS
0950      ;
0960      ;subroutine to close an IOCB.
0970      ;X-register must contain the
0980      ;IOCB# * 16 first.
0990      ;
1000      CLOSEIOCB
1010      LDA #CLOSE
1020      STA ICCOM,X
1030      JSR CIOV
1040      RTS
1050      ;
1060      ;
1070      ;
1080      ;same PRINT subroutine that we
1090      ;used in Listing 1
1100      ;
1110      PRINT
1120      LDA #RAMSET/256
1130      STA CHBAS
1140      LDX #0
1150      LDA #PUTREC
1160      STA ICCOM,X
1170      LDA #TEXT&255
1180      STA ICBAL,X
1190      LDA #TEXT/256
1200      STA ICBAH,X
1210      LDA #0
1220      STA ICBLL,X

```

```

1230 LDA #2
1240 STA ICBLH,X
1250 JSR CIOV
1260 RTS
1270 ;
1280 ;print this long text string so
1290 ;you can see what the characters
1300 ;you loaded from the disk file
1310 ;look like (actually, type any-
1320 ;thing you want in 1350-1410)
1330 ;
1340 TEXT
1350 .BYTE "ABCDEFGHIJKLM"
1360 .BYTE "NOPQRSTUVWXYZ"
1370 .BYTE "abcdefghijklm"
1380 .BYTE "nopqrstuvwxyz"
1390 .BYTE "1234567890"
1400 .BYTE "!#$%&'@()<>"
1410 .BYTE "-=+*_|~^,./[]?"
1420 .BYTE EOL
1430 ;
1440 ;complete name of the file with
1450 ;your character set data
1460 ;
1470 FNAME .BYTE "D1:FANCY.FNT",EOL
1480 ;
1490 ;subroutine to handle open error
1500 ;
1510 OPENERROR
1520 LDX #0 ;print message on
1530 LDA #PUTREC ;screen
1540 STA ICCOM,X

```

```

1550 LDA #OETEXT&255 ;error text
1560 STA ICBAL,X ;to print
1570 LDA #OETEXT/256
1580 STA ICBAH,X
1590 LDA #80 ;80 chars, or
1600 STA ICBLL,X ;EOL, whichever
1610 LDA #0 ;comes first
1620 STA ICBLH,X
1630 JSR CIOV
1640 RTS
1650 OETEXT
1660 .BYTE "Error on open",EOL

```

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Redding Atari Computer Enthusiasts (RACE)  
 8 bit: 20780 Oak St., Cottonwood, CA 96022  
 ST: P.O. Box 818,  
 1553 Main St., Cottonwood, CA 96022  
 Meetings; BBS; newsletter.  
 President 8-bit group: Timothy Winters.  
 President ST group: Michael Farrar.

Atari Federation  
 P.O. Box 5367, Vandenberg AFB, CA 93437  
 Meetings; SIGs; Public domain library; newsletters.  
 (805) 734-2451 President: Shirl A. Dellinger.

ST Information Group (STING)  
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 Washington, IL 61571  
 Meetings; newsletter. Serves the Peoria area.

ST-NERDS  
 c/o Dave's Computer World, The Wynkoop Bldg.,  
 107-109 West Third St., Brookston, IN 47923  
 (317) 563-3504 Meetings; BBS. Contact: Dave Alm.

Ol' Hackers Atari User Group  
 3376 Ocean Harbor Dr., Oceanside, NY 11572  
 Meetings; BBS; newsletter. President: Alex Pignato.

Atari Computer Enthusiasts of Syracuse  
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The Atari Peekers (TAP)  
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The Atari Computer Enthusiasts of Cleveland  
 1705 Lee Rd., Cleveland Hts., OH 44118  
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 President: Bruce Frumker.

Portland Atari Club (PAC)  
 P.O. Box 1692, Beaverton, OR 97005  
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Pittsburgh Atari Computer Enthusiasts (PACE)  
 P.O. Box 13435, Pittsburgh, PA 15243  
 Meetings; BBS; newsletter: *Keeping Pace*.  
 President: John Babson.

Randolph Area Atari Users Group (RAAUG)  
 P.O. Box 2611, Universal City, TX 78148  
 Meetings; BBS; newsletter. President: Dale Johnson.  
 Greater Richmond Atari Support Program (GRASP)  
 1420 Yale Ave., Richmond, VA 23224  
 Meetings; BBS; newsletter: *GRASP Gazette*.  
 President: Jack Richford.

Atari Users' of Fredericton (AUF)  
 Comp. 146, Site 22, SS#2,  
 Fredericton, N.B. Canada E3B 5W6  
 Meetings; BBS; newsletter.  
 President: David J.R. Courchesne.

Atari Bit Byter User Club E.V.  
 c/o Wolfgang Burger  
 Wieschenbeck 45, D-4352 Herten  
 West Germany  
 Newsletter published on diskette; the group wishes  
 contact with US-based Atari users.

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# The End User

## THIS MONTH:

**A farewell to the full coverage of *Infoworld*, and video games re-viewed.**

---

Arthur Leyenberger is a human factors psychologist and free-lance writer living in New Jersey. He's been writing about computers for four years and continues to be an Atari enthusiast. When not computing, he enjoys playing with robotic toys.

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## by Arthur Leyenberger

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Over the years, I've found that many (if not most) Atari users are interested in the general developments of the computer industry. Before its demise, I fervently read *Creative Computing* each month, to learn as much as I could about the state of computing. News about what Commodore, Apple—and, at the time, others like Tandy and Coleco—was as important as the news about Atari. *Creative Computing* was excellent, in that it gave us some machine-specific columns as well as more general or philosophical material.

Another publication read by many of us regularly was (is) *Infoworld*. This journal is published by CW Communications, the same folks who give us *MacWorld*, *AmigaWorld* and *Popular Computing*. Over the years, *InfoWorld* had a tabloid format, a slick magazine format and now it's once again in newspaper format. Until recently, it was called "The Newspaper of the Microcomputing Community." Now it's called simply "The PC News Weekly."

And it used to be excellent. Not only did it have outrageous columnists like John Dvorak, who saw through the haze clouding the computer industry, but it covered the entire realm of computers. In it, we read about Commodore's ups and downs. We read about the exciting saga of Coleco's Adam. And we often read about Atari, in good times and bad.

February 27, 1984's *Infoworld* featured as a headline the query "Is Atari Going Down the Tubes?" James Morgan (who?) was pictured on the cover. Another, published in August of the same year, showed CEO Jack

Tramiel on its cover and asked, "Tramiel Moves In: Can He Save Atari?" Still another, from January 28, 1985, proclaimed, "Atari Unveils its 'Jackintosh.'"

*Infoworld* was the microcomputer news weekly. It was usually well written, often contained insights into the companies and their leaders, and was always eagerly greeted at the mailbox. Occasionally, an article didn't quite get the facts straight—or didn't have the correct perspective when it came to Atari—but those were, basically, the exceptions.

It seems the *Infoworld* we all knew and read is changing. No longer is there any coverage of Atari. No longer do in-depth articles discuss the future of home, personal or microcomputers. In the words of Jonathan Sacks, *Infoworld* Editor-in-Chief, it is, essentially, "published for multiunit buyers of microcomputers and microcomputer-related products." Their readers are based "... primarily in large- and medium-size businesses, as well as in government and higher education."

*Infoworld*, unfortunately, has turned into just another IBM PC (and compatible) rag. They're no longer interested in the part of the industry that sells to the home market. They're now aimed at the boring, corporate side of the microcomputer business. So the Atari ST and the Commodore Amiga will not be covered in their pages.

That's too bad. I'll miss what used to be the best computer industry publication around. I'll miss coverage of new products, from whatever company. I'll miss coverage of ST developments. It looks like it's time to find another publication to fill the shoes *Infoworld* once wore.



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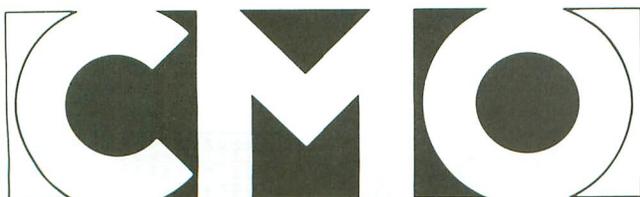
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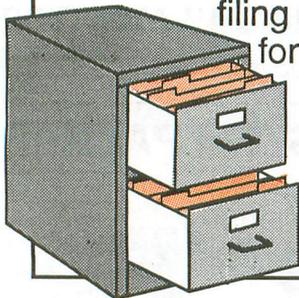
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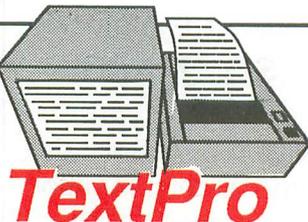
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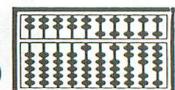
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## Return of the video games.

Video games are back! Although it may seem like something out of the "Twilight Zone," three companies have new home video game machines for sale. It's predicted that this holiday season will show the best video game sales in several years. But has the fun really returned?

Turn the wayback machine to 1982. Ray Kasser was President and CEO of Atari, a division of Warner Communications. At the start of the year, Atari had risen to \$2 billion in revenue. Toy companies, entrepreneurs and the like were rushing to produce games, in order to get a piece of the action. But, by the end of 1982, consumers had become bored—or perhaps discovered disco. The market simply dried up.

Retailers were left holding unwanted inventories of games; many companies went belly up; and Atari dumped truckloads of cartridges in a Southwestern landfill. No more "wacka-wacka" sounds in millions of American households. No more "teeeooooo, teeeooooo" noises as asteroids were disintegrated. And, fortunately, no more **Revenge of the Beefsteak Tomatoes**.

**ANALOG Computing** last reported on an Atari video game machine, the 7800 ProSystem, in August of 1984. Atari CEO James Morgan was attempting to turn his beleaguered company around with a new video game and such products as **Mind Link** (a "revolutionary" product that would let you play video games by moving your forehead muscles).

As the August **ANALOG** hit the newsstands, Jack Tramiel was buying Atari . . . That was the end of the 7800, its expansion interface for "future video game technologies," and the optional \$100.00 "full-stroke" keyboard that turned the machine into a 20K, \$250.00 8-bit computer. Yes, those were heady times.

It *does* seem like *déjà vu*. Here it is, 1987, and you can buy an Atari 65XE computer for about \$75.00. And you can get a Nintendo for about \$150.00, or a Sega video game machine for about \$130.00. You can also spend \$5.00 more than the 65XE to buy the "new" 7800.

According to Nintendo, the kids who are just now coming of age weren't around for the first game phenomenon. Sega thinks that video games will be an ongoing product category. Atari Corp. says that over a million 2600s were sold in 1985, convincing them that there's still a strong demand for video game entertainment. The slogan in their new advertisements: "the fun is back."

However, no one is predicting that the new video games will be the fad they were in 1981 and 1982. Manufacturers predict 2 million game machines and 10 million cartridges will be sold this time around—compared to the 8 million machines and whopping 75 million cartridges sold back in 1982. Still, the two Japanese companies

will battle it out with Atari for dominance in the market.

Video games aren't new to the Japanese. They've been leaders in the arcade market for several years. Games such as **Space Invaders**, **Donkey Kong** and **Pac-Man**, just to name a few, are familiar to almost all Atarians. On the other hand, home video games are one consumer electronics product the Japanese haven't yet dominated.

The video game leader in Japan is Nintendo. This company test-marketed a video game machine in the New York City area during Christmas of 1985. After selling over 100,000 in New York and later in Los Angeles, they've decided to compete nationally. At the most recent Consumer Electronics Show held in Chicago in June, Nintendo was proudly showing off their new products. Their basic machine costs \$100.00, plus another \$80.00 for the robot and gun.

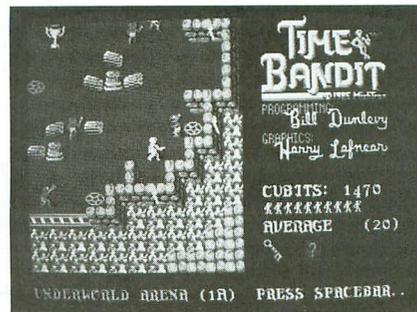
Sega, the other Japanese competitor, is also hoping to clean up in the new video game market. Their strategy seems to depend on cartridges which can contain as much as 125,000 bytes of ROM memory. Their games come in two flavors: a somewhat familiar-seeming cartridge, plus a credit-card size "game card." Sega's machine costs \$120.00 (\$150.00 with its gun). Both Nintendo's and Sega's machines come with more advanced accessories. Each of the companies offers a gun to shoot at the screen, and Nintendo has a robot which responds to what's on-screen.

Instead of offering new accessories or large-memory game cartridges, Atari is giving us a choice of two products. Their 2600 game machine is a smaller, lighter-weight version of the venerable 2600VCS that's been on sale for almost ten years. Its \$40.00 price tag includes one joystick.

The 7800 costs \$80.00 and is, essentially, the same machine the old Atari unveiled two years ago. The major difference is that the "new" 7800 comes with **Pole Position II** as a cartridge, rather than built in. The 7800 offers better sound and graphics than the 2600, but can use all of the 2600 game cartridges without an adapter.

How do all these video game machines compare with one another? The 2600 is definitely old technology, compared to the other three. Graphics, sound and game options just can't compete. As far as sound and graphics go, the Nintendo, Sega and 7800 are quite similar. The Nintendo and Sega have the advantage of gun controllers to use with shooting-type games. The Sega seems to have a slight edge on graphics, but lacks the robot accessory of the Nintendo. And, with the ten or so 7800 games plus the hundreds of 2600 games, the 7800 can play the most software.

A more important question for the Atari computer user is: how do these machines compare with existing 8-bit and ST computers? Clearly, there's no comparison with



*Time Bandit.*

the Atari's 16-bit computer. Rainbird's **The Pawn**, MichTron's **Time Bandit** and FTL's **Sundog** are examples of the superior sound and graphics possible on the ST. The 8-bit Atari computer games can be either better or worse. Some of the Lucasfilm games, from Epyx, have better graphics than I've seen on any of the three game players. On the other hand, a mediocre 8-bit game is not as good as say, Sega's **Hang On**, a sort of motorcycle **Pole Position**.

Your decision to buy one of these new game-playing machines will depend on individual taste. The best advice is to try all of them out before you buy. I favor either the Sega or the Nintendo, because of the guns that work with the screen. On the other hand, the amount of game cartridges for these is far less than that available for the Atari 2600 or 7800.

Although some say Atari is really not committed to selling video games, Atari CEO Jack Tramiel's philosophy has always been to sell whatever the customer wants. If the public wants video games, Atari will gladly sell them. And a healthy Atari is good for all of us. ☐



# M/L Editor

For use in machine language entry

by Clayton Walnum

**M/L Editor** provides an easy method to enter our machine language listings. It won't allow you to skip lines or enter bad data. For convenience, you may enter listings in multiple sittings. When you're through typing a listing with **M/L Editor**, you'll have a complete, runnable object file on your disk.

There is one hitch: it's for disk users only. My apologies to those with cassette systems.

Listing 1 is **M/L Editor's** BASIC listing. Type it in and, when it's free of typos, save a copy to disk, then run it.

On a first run, you'll be asked if you're starting a new listing or continuing from a previously saved point. Press S to start, or C to continue.

You'll then be asked for a filename. If you're starting a new listing, type in the filename you want to save the program under, then press RETURN. If there's already a file by that name on the disk, you'll be asked if you wish to delete it. Press Y to delete the file, or N to enter a new filename.

If you're continuing a file, type in the name you gave the file when you started it. If the program can't find the file, you'll get an error message and be prompted for another filename. Otherwise, **M/L Editor** will calculate where you left off, then go on to the data entry screen.

Each machine language program in **ANALOG Computing** is represented by a list of BASIC data statements. Every line contains 16 bytes, plus a checksum. Only the numbers following the word **DATA** need be considered.

**M/L Editor** will display, at the top of the screen, the number of the line you're currently working on. As you go through the line, you'll be prompted for each entry. Simply type the number and press RETURN. If you press RETURN without a number, the default is the last value entered.

This feature provides a quick way to type in lines with repetitions of the same number. As an added convenience, the editor will not respond to the letter keys (except Q, for "quit"). You must either enter a number or press RETURN.

When you finish a line, **M/L Editor** will compare the entries' checksum with the magazine's checksum. If they match, the screen will clear, and you may go on to the next line.

If the checksums *don't* match, you'll hear a buzzing sound. The screen will turn red, and the cursor will be placed back at the first byte of data. Compare the magazine listing byte by byte with your entries. If a number's correct, press RETURN.

If you find an error, make the correction. When all data's valid, the screen will return to grey, and you'll be allowed begin the next line.

Make sure you leave your disk in the drive while typing. The data is saved continuously.

You may stop at any time (except when you have a red screen) by entering the letter Q for byte #1. The file will be closed, and the program will return you to BASIC. When you've completed a file, exit **M/L Editor** in the same way.

When you've finished typing a program, the file you've created will be ready to run. In most cases, it should be loaded from DOS via the L option. Some programs may have special loading instructions; be sure to check the program's article.

If you want the program to run automatically when you boot the disk, simply name the file **AUTORUN.SYS** (make sure you have DOS on the disk).

That's **M/L Editor**. Use it in good health. ☐

The two-letter checksum code preceding the line numbers here is *not* a part of the BASIC program. For further information, see the **BASIC Editor II**, in issue 47.

Listing 1.  
BASIC listing.

```
AZ 10 DIM BF(16),M$(4),A$(1),B$(1),F$(15)
    ,F1$(15)
LF 11 DIM MOD$(4)
BN 20 LINE=1000:RETRN=155:BACKSP=126:CHK$
    =0:EDIT=0
G0 30 G0SUB 450:POSITION 10,6:? "Start or
    Continue?":G0SUB 500?:CHR$(A)
```

```
ZG 40 POSITION 10,8:? "FILENAME":INPUT F
    $:POKE 752,1:? " "
FE 50 IF LEN(F$)<3 THEN POSITION 20,10:?
    " ":GOTO 40
NF 60 IF F$(1,2)<>"D:" THEN F1$="D":F1$(
    3)=F$:GOTO 80
KL 70 F1$=F$
TN 80 IF CHR$(A)="S" THEN 120
FD 90 TRAP 430:OPEN #2,4,0,F1$:TRAP 110
HQ 100 FOR X=1 TO 16:GET #2,A:NEXT X:LINE
    =LINE+10:GOTO 100
MM 110 CLOSE #2:OPEN #2,9,0,F1$:GOTO 170
VT 120 TRAP 160:OPEN #2,4,0,F1$:G0SUB 440
    :POSITION 10,10:? "FILE ALREADY EXISTS
    !":POKE 752,0
ZU 130 POSITION 10,12:? "ERASE IT?":G0S
    UB 500:POKE 752,1:? CHR$(A)
VH 140 IF CHR$(A)="N" OR CHR$(A)="n" THEN
    CLOSE #2:GOTO 30
QG 150 IF CHR$(A)<>"Y" AND CHR$(A)<>"y" T
    HEN 130
BH 160 CLOSE #2:OPEN #2,0,0,F1$
IE 170 G0SUB 450:POSITION 10,1:? "NONMON
    MON?":LINE:CHKSUM=0
GH 180 L1=3:FOR M=1 TO 16:POSITION 13*(X
    (10)+12*(X)>9),M+2:POKE 752,0:? "BYTE #
    ";X":G0SUB 310
KH 190 IF EDIT AND L=0 THEN BYTE=BF(X):G0
    TO 210
FY 200 BYTE=VAL(M$)
OZ 201 MOD$(M)=M$
BU 210 POSITION 22,M+2?:BYTE;" "
YZ 220 BF(X)=BYTE:CHKSUM=CHKSUM+BYTE*X:IF
    CHKSUM>9999 THEN CHKSUM=CHKSUM-10000
M5 230 NEXT X:CHKSUM=CHKSUM+LINE:IF CHK$U
    M>9999 THEN CHKSUM=CHKSUM-10000
IG 240 POSITION 12,M+2:POKE 752,0:? "CHEC
    KSUM:":L1=4:G0SUB 310
EM 250 IF EDIT AND L=0 THEN 270
QM 260 C=VAL(M$)
SY 270 POSITION 22,M+2?:C;" "
IL 280 IF C=CHKSUM THEN 300
DI 290 G0SUB 440:EDIT=1:CHKSUM=0:GOTO 180
LM 300 FOR X=1 TO 16:PUT #2,BF(X):NEXT X:
    LINE=LINE+10:EDIT=0:GOTO 170
FU 310 L=0
LG 320 G0SUB 500:IF A=ASC("Q") AND X=1 AN
    D NOT EDIT THEN 420
PO 330 IF A<>RETRN AND A<>BACKSP AND (A<4
    0 OR A>57) THEN 320
DX 331 IF A=RETRN AND M$="" THEN M$=MOD$
    TD 335 IF A=RETRN AND L=0 AND X>1 THEN 35
    0
JR 340 IF ((A=RETRN AND NOT EDIT) OR A=B
    ACKSP) AND L=0 THEN 320
DM 350 IF A=RETRN THEN POKE 752,1:? "":R
    ETRN
GG 360 IF A<>BACKSP THEN 400
SA 370 IF L>1 THEN M$=M$(L,L-1):GOTO 390
A5 380 M$=""
RE 390 ? CHR$(BACKSP):L=L-1:GOTO 320
BB 400 L=L+1:IF L>11 THEN A=RETRN:GOTO 35
    0
WX 410 M$(L)=CHR$(A):? CHR$(A):GOTO 320
KN 420 GRAPHICS 0:END
YT 430 G0SUB 440:POSITION 10,10:? "NO SUC
    H FILE!":FOR X=1 TO 1000:NEXT X:CLOSE
    #2:GOTO 30
FD 440 POKE 710,48:SOUND 0,100,12,8:FOR X
    =1 TO 50:NEXT X:SOUND 0,0,0,0:RETRN
MY 450 GRAPHICS 23:POKE 160,112:POKE 53774
    ,112:POKE 559,0:POKE 710,4
XR 460 DL=PEEK(560)+256*PEEK(561)+4:POKE
    DL-1,70:POKE DL+2,6
HM 470 FOR X=3 TO 39 STEP 2:POKE DL+X,2:N
    EXT X:FOR X=4 TO 40 STEP 2:POKE DL+X,0
    :NEXT X
ZM 480 POKE DL+41,65:POKE DL+42,PEEK(560)
    :POKE DL+43,PEEK(561):POKE 87,0
AC 490 POSITION 2,0:? "analog ml editor":
    POKE 559,34:RETRN
MZ 500 OPEN #1,4,0,"K":GET #1,A:CLOSE #1
    :RETRN
```



## Family History

**DIRECT LINES SOFTWARE**  
**4755 Bamboo Way**  
**Fair Oaks, CA 95628**  
**48K Disk \$39.95 plus shipping**

by Jan A. Iverson

In 1983, a couple of magazines printed letters from Atari owners who pleaded to know if any genealogical software existed for the Atari 8-bit machines.

Genealogy is the study of an individual's or group's familial descent—and it's one of the most popular hobbies in the world. There have been attempts to create genealogical software for the Atari, mainly to arrange "pedigree" charts, but most of these have been somewhat limited. One of the complaints has been that Atari doesn't have an 80-column screen.

In 1984 and 1985, Direct Lines Software began marketing a genealogical software package for the Atari, which rivals those put out for the "big guys."

**Family History** can print "Pedigree" or "Family Group" charts to your screen, or to the printer. The lack of an 80-column screen doesn't hamper **Family History**, because you can toggle back and forth between three Input/Update screens.

The main menu has the following options: File Manager, Print/View, Pedigree Chart, Utility and Sortdex. Each of these options contains a copy of the main menu, so you return to it without reloading.

Your first step is to choose the Utility section, to format and initialize disks. You are then asked for the name of the data file, as well as the name of the index.

The real key to organization of the program is left to you. You can either choose to set up your own identification pattern, or let the computer generate one for you.

I highly recommend that you choose the former option.

An eight-character field is open to set up your identification number. Let's say you choose *A001* for yourself. For your father, you might select *B001*, and, for your mother, *C001*. You could continue this by assigning your grandfather on your father's side, *B002*, and his wife, *B003*. Your maternal chart could continue the "C" series. The program allows up to fifteen children per record, so you could use (for yourself) *A001A* as the first child, and so on. For your father, the children would be *B001A* and so on (be sure to include yourself in the right order as *A001*).

The input/update screens are easily accessed from the File Manager, and consist of three screens which you may flip back and forth, by pressing **OPTION** to go forward, or **SELECT** to go backward.

The first screen starts with the identification number you've selected for the individual you're working with. The => cursor is positioned at the top line, and when you press **RETURN**, all of your data is entered at the bottom of the screen: the complete name of the individual, birth information, and statistics covering marriage through death.

The next screen contains data you may enter for place buried, and the identification numbers for mother, father and up to three spouses. Also, the screen has room for the identification numbers of three children. The final screen contains the rest of the children (up to fifteen) and a comment line.

At any time, you may use the < key to

move the => cursor up a line or the > key move down a line, either to enter new or replace existing data. When you are satisfied that the information is correct, press **START**. The record is then ready to save. After this, you're prompted to input or update any other records.

A real savings in disk space is gained by using the "compress" feature of the Utility section. If you have deleted any records or have any blanks in your record, this part of the program selects by index only those records which are appropriate, and writes them to another disk.

Multiple disk drives are supported. I would recommend at least two, since a certain amount of disk swaps are needed if you only have the one drive.

The Print/View and Pedigree Chart options from the main menu work in this way . . . When one of the programs is loaded, you're prompted from its menu to enter the identification number of the individual you wish to print out—in the cases of the Family Group or the Pedigree Charts, the individual you wish to start with. The program accesses the Identification Index and buildd the charts from data you've typed in and saved to disk. If you have no information for that individual, the information line prints a question mark (?). Again, you have the choice of printing to the screen or printer.

The Sortdex option allows you to choose an alphabetical sort by last name, or a sort on the identification number. You can then print this out, to keep track of your identification number assignments.

I thought **Family History** easy to work



with, but found a couple of things annoying. When entering data, my fingers decided to do "their own thing," and I hit the BREAK key. The program trapped the mistake all right, but I lost all the new information and had to start over again. Also, the program only has a two-character field for state. That's okay for the United States, but when you get into other countries, it doesn't work well.

I called the author and learned that he's fixing the BREAK key problem. It will be alleviated in the next update. The state/country dilemma is a little more difficult, and the solution at hand is to produce an authorized two-character state code and country code in the appendix. The author has agreed to include those updates in the next user documentation.

The disk is unprotected. The author recommends you make a backup disk right off and put the original in a safe place, using the backup as your primary disk.

If you'd like to see how **Family History** works, there's a demo disk available for \$5.00. This takes you through the screen input/update and sorting of the index.

All in all, I think Direct Lines Software should be commended on producing such a professional—and sorely missed by some—work for the Atari computer. **A**

*Jan A. Iverson works for Chevron as a Computer Programmer, and has been programming for fifteen years. Having bought his first Atari in 1983, he now has a 130XE and a 520ST. He's president of the Delta Atari Computer Club in Antioch, California.*

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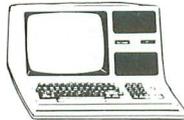
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# Phantasie

by Winston Douglas Wood  
SSI  
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Mountain View, CA 94043  
ST Disk \$39.95

by Steve Panak

When it comes to role-playing games, unless one has something special to offer, each tends to blur into the next. The attributes of the games—the battles, the riches and the quests—are so similar that it's often difficult to tell them apart. What SSI's newest derivative, **Phantasie**, offers us is enough originality to rise above the vast pool of similar games, and enough value to make it a required volume in any serious gamer's library.

The plot and action are familiar. You begin by creating characters with randomly generated attributes: strength, intelligence, dexterity, constitution and charisma. After naming each person in your band of up to six characters (strength in numbers), you find yourself in the town of Pelnor. Here, as is possible in each of the towns you enter, you can learn skills and spells, divide your treasures, rest, or consult the mystic. You could even delete, create and add new characters, should some of your warriors have fallen upon hard luck (or a knife) in that last encounter.

What is a role-playing game without battles? One might just as well ask, what is the computer without the monitor? Both are necessities, and **Phantasie**, again, does not let us down. As your alter-egos grow in power, so do your foes increase in number, strength and frequency of encounters with you.

The battles are graphic. An encounter

screen replaces the typical map. Your valiant band of warriors occupies the bottom of the display, while the top is filled with creatures of every description. In rotation (unless you—in a cowardly move—chose to flee), each person takes his turn wielding weapon or magic. And, as with all hits game's control operations, the mouse is the input device of choice.

This was my favorite part of **Phantasie**. Using the mouse was effortless, as pull-down menus contained each of the many (and varied) options, both in battle and in town. Need to know about a party member's health? Click on that option, then on the member's name. Need to orchestrate a battle? Click on the member's name, then on one of the fight options. If you click on *cast*, a submenu opens up with that character's available spells. To complete the incantation, simply click on the spell of your choice. Even moving about is mouse controlled: click on the compass, or ahead of your party in the direction you'd like to move. I have never played another adventure game so effortlessly.

One important aspect of this type of entertainment is the uncertainty of venturing into new territory. Going hand in hand with this is the creation and upkeep of the maps. **Phantasie** corrects the shortcomings of many computer fantasies in these areas. Most of its vast sixteen-screen area is hidden from view (blacked out) when you enter it. As you move along, the area around you becomes visible, and this visible territory remains in view even after you leave

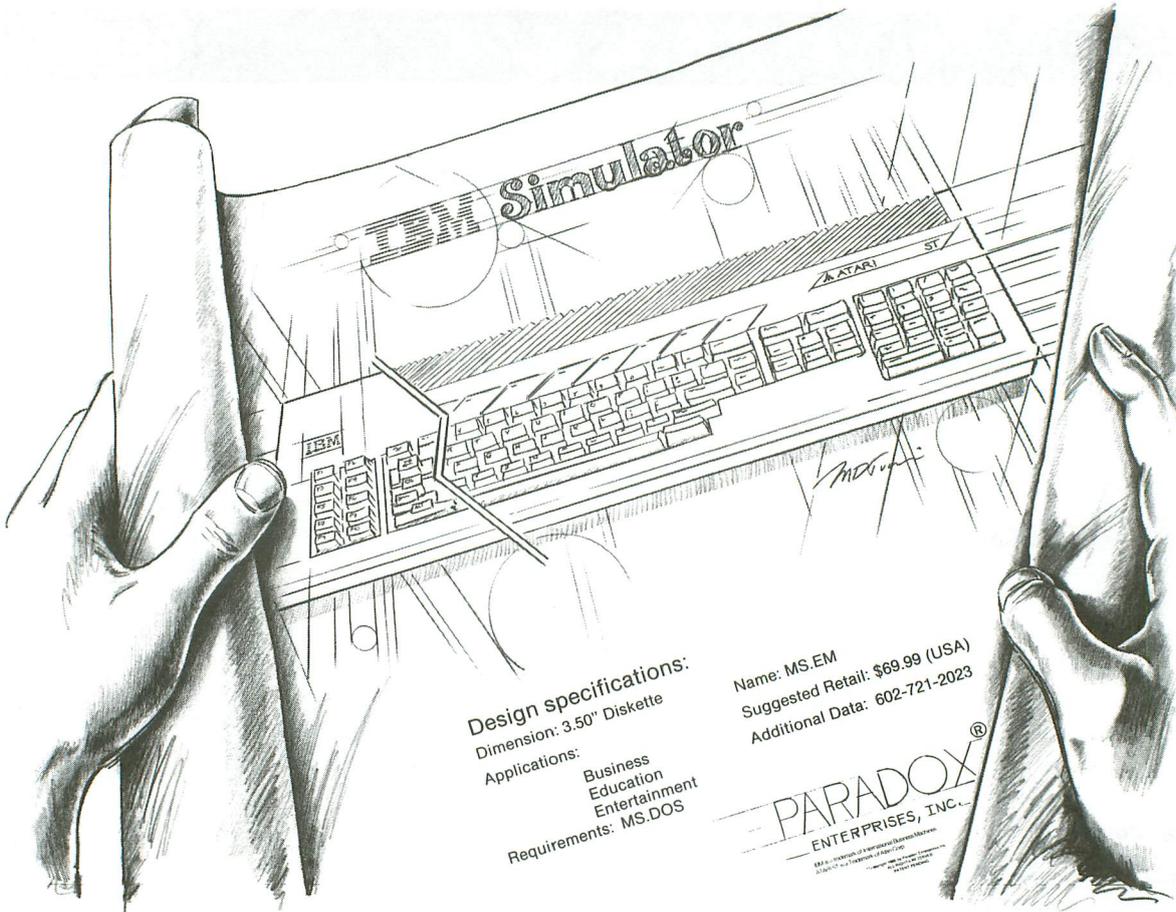
and return. The same thing occurs in the many dungeons of **Phantasie**, where secret doorways and passages abound.

The manual is in line with SSI's usual standards—superb. The 28-page booklet covers the rules quite nicely, though I was a bit confused by the section on machine-specific information. But, after just a few minutes in the kingdom, I became an expert. Other sections explain the adventurer characteristics, as well as adventures, encounters, magic and treasures. Those familiar with role-playing will easily adapt to this system, while those unfamiliar with the genre will quickly learn.

On the down side, there are a lot of disk accesses, which slow the game, but I'm used to that in adventures. Also, while I tested the ST software, an 8-bit version is promised, as well as a sequel, though neither is available yet. Still, if they're anything like this game, I can see we adventurers have a lot to look forward to.

**Phantasie** is fantastic. 

*The author wishes to thank The Magic One Computer Shop of Barberton, Ohio for their assistance.*



Design specifications:  
 Dimension: 3.50" Diskette  
 Applications:  
 Business  
 Education  
 Entertainment  
 Requirements: MS.DOS

Name: MS.EM  
 Suggested Retail: \$69.99 (USA)  
 Additional Data: 602-721-2023

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## Strip Poker



**ARTWORX**  
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by Steve Panak

Well, up till now, I thought I'd seen just about everything. I mean, shooting flying saucers against a phosphor star backdrop, devouring little multicolored ghosts with a flap-flap-trapping yellow mouth; somehow, I can accept these as "normal." But now... well, they've just gone too far.

**Strip Poker** needs practically no explanation. I've never run across a game which was so simple, so straightforward. In keeping with the spirit of the program (leaving nothing to the imagination), I'll describe it to you as well as possible, given the constraints of good taste (of which this game has not a whit).

If you know how to play poker, you know how to play the game. This is five-card stud, with three raises allowed. You can draw up to five cards. There's nothing wild—this is *not* a game for wimps.

Entries are entirely through the mouse. First, you select your opponent. The game disk comes with two female opponents, Suzi and Melissa. Suzi is a slightly inferior player. Should you require additional adversaries, more data disks can be obtained with both female and male strippers, at a modest cost. This game is completely nondiscriminatory.

The upper two-thirds of the screen is taken up by your reclining opponent; the bottom, by your cards. In the border between the two are seen your various options, such as raise, bet, draw, call or drop. Click on these to make your plays. Smart remarks also appear in this area, meant to

give each stripper his or her own, distinct personality. Usually, the remarks are merely stupid, but they fail to distract from the overall object of the game.

Ah yes... the graphics. By now, all of you should be pretty much excited, quite ready to hear about the graphics. Well, as compared to the girlie magazines available at your local convenience store, they're obviously inferior. However, they are—also obviously—nude individuals, anatomically correct (although slightly exaggerated) in every detail. The game is not for the prudish, although the HELP key should prevent embarrassment (press it, and the screen display blacks out until it's hit again). The unclothed opponents are billed as original works of art, not digitized images, as if to add a touch of class to an otherwise tasteless affair.

The manual is a slight sheet of paper, which explains the game fully. As for value, I can tell you that we had a great time playing it. Melissa was a formidable opponent—it took about a week to beat her. But, once both had been beaten, there was little left to do in the game—the conquest was complete.

It's still a nice little program to be able to bring out at a party. The whole game is rather lighthearted—the display reads *Click when done looking* after you've managed to deprive the girls of their last shred of clothing. **■**

*The author wishes to thank The Magic One Computer Shop of Barberton, Ohio for their assistance.*

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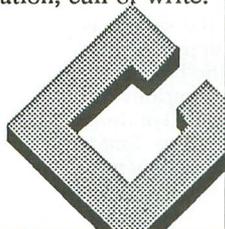
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Pascal and Modula-2 source code are nearly identical. Modula-2 should be thought of as an enhanced superset of Pascal. Professor Niklaus Wirth (the creator of Pascal) designed Modula-2 to replace Pascal.

### Added features of Modula-2 not found in Pascal

- CASE has an ELSE and may contain subranges
- Programs may be broken up into Modules for separate compilation
- Machine level interface
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  - Interrupt structure
- Dynamic strings that may be any size
- Multi-tasking is supported
- Procedure variables
- Module version control
- Programmer definable scope of objects
- Open array parameters (VAR r: ARRAY OF REALS;)
- Elegant type transfer functions

Ramdisk Benchmarks (secs)	Compile	Link	Execute	Optimized Size
Sieve of Eratosthenes:	6.2	4.3	3.5	2600 bytes
Float	6.4	4.8	8.3	4844 bytes
Calc	5.5	4.2	3.3	2878 bytes
Null program	5.1	3.2	—	2370 bytes

```

MODULE Sieve;
CONST Size = 8190;
TYPE FlagRange = [0..Size];
VAR x,y: REAL; i: CARDINAL;
    BEGIN (*$S-$R,$A+ *)
    FOR Iter:= 1 TO 10 DO
    Count:= 0;
    Flags:= FlagSet(); (* empty set *)
    FOR i:= 0 TO Size DO
    IF (i IN Flags) THEN
    Prime:= (i * 2) + 3; k:= i + Prime;
    WHILE k <= Size DO
    INCL (Flags, k);
    k:= k + Prime;
    END;
    Count:= Count + 1;
    END;
    END;
END Sieve.

MODULE Float;
FROM MathLib0 IMPORT sin, ln, exp,
    sqrt, arctan;
VAR x,y: REAL; i: CARDINAL;
    BEGIN (*$T-$A,$S-$*)
    x:= 1.0;
    FOR i:= 1 TO 1000 DO
    y:= sin (x); y:= ln (x); y:= exp (x);
    y:= sqrt (x); y:= arctan (x);
    x:= x + 0.01;
    END;
    END float.

MODULE calc;
VAR a,b,c: REAL; n, i: CARDINAL;
    BEGIN (*$T-$A,$S-$*)
    n:= 5000;
    a:= 2.71828; b:= 3.14159; c:= 1.0;
    FOR i:= 1 TO n DO
    c:= c*a; c:= c*b; c:= c/a; c:= c/b;
    END;
    END calc.
    
```

### Product History

The TDI Modula-2 compiler has been running on the Pinnacle supermicro (Aug. '84), Amiga (Jan. '86) and will soon appear on the Macintosh and UNIX in the 4th Qtr. '86.

**Regular Version \$79.95 Developer's Version \$149.95 Commercial Version \$299.95**

The regular version contains all the features listed above. The developer's version supplies an extra diskette containing a symbol file decoder - link and load file disassemblers - a source file cross referencer - symbolic debugger - high level Windows library Module - Ramdisk and Print Spooler source files - Resource Compiler. The commercial version contains all of the Atari module source files.

### Other Modula-2 Products

Kermit	- Contains full source plus \$15 connect time to Compuserve.	\$29.95
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CIRCLE #147 ON READER SERVICE CARD



# ST Color Tuner



by James Luczak

If you've used **NEO-Chrome** or have seen some of the animated pictures created with it, you may have wondered how picture files are animated. Or you may have wanted to learn how to change colors from within a program, instead of having to use the control panel desk accessory.

This article will show you how to change the ST's color palette and how to rotate colors to achieve interesting "animated" effects. It's very easy to do and takes only a few lines of code. This tutorial is accompanied by a program demonstrating color rotation from ST BASIC. It runs in low resolution only.

### Colors and the 520ST.

The 520ST can display sixteen colors in low resolution, four in medium, and two in high (black or white). The colors displayed are contained in a set of registers referred to as the "color palette." Each of the colors in the palette is selected from the ST's 512 total possible colors, and is made up of a combination of various intensities of the ST's three basic colors: Red, Green and Blue (RGB).

On the 520ST, each basic color can have one of eight intensities, ranging from 0 (low) to 7 (high). Since each basic color can have eight intensities and every color that can be displayed is made up of a combination of the three basics, the total number of different colors the 520ST can display is the product of the number of intensities of each of the three basics: that is, 8x8x8, or 512 colors in all.

### Tuning the color palette.

The color palette is a set of sixteen registers containing the values of the colors to be displayed. Each register is 16 bits long. Figure 1 shows the layout of a color register. Bits 0, 1 and 2 control the intensity of blue; bits 4, 5 and

6 control the green intensity, and bits 8, 9 and 10 control the intensity of red. Figure 2 shows how to derive a decimal from a binary number.

To construct a color, determine the intensity for each of the basic colors (a decimal number between 0 and 7 for red, green and blue) and use the following formula to derive the value to be placed in the register:

$$(\text{Red} \times 256) + (\text{GREEN} \times 16) + \text{Blue} = \text{Color Value}$$

Figure 1. — Color Register Layout.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
						RED			GREEN			BLUE			

Figure 2. — Binary to Decimal.

BINARY	DECIMAL
0 0 0	0
0 0 1	1
0 1 0	2
0 1 1	3
1 0 0	4
1 0 1	5
1 1 0	6
1 1 1	7

In ST BASIC, colors are referred to by the numbers 0 through 15, which are used with the COLOR command (refer to the ST BASIC Sourcebook). The ST BASIC color number *does not* match the color register that it controls. Figure 3 (default color settings) shows the relationship between the ST BASIC color number and the color register that it controls. If, for example, you want to change the color of



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# // ST Color Tuner *continued*

ST BASIC color number 6, you must change the value in color register number 3.

## Using a new color palette.

So far, we've learned how to construct new colors. But how do we get the ST to use the new color palette? This is the easiest part of the whole process.

During every VBI (Vertical Blank Interrupt), the ST checks memory location 1114 for the location of the color palette. If the value is 0, the ST uses the current palette. If it is nonzero, the ST will use this value as a pointer to the new color palette.

To make a new color palette, we must do the following: (1) dimension an integer array to 15; (2) install the new color values into the array; (3) find the address of the beginning of the array; and (4) poke this address into location 1114.

For example:

```
10 dim palette%(15)
20 a#=1114
30 for x=0 to 15:read palette(x):
next x
40 poke a#,varptr(palette%(0))
50 data 10,20,30,40,50,60,70,80,
90,22,44,33,55,66,45,69
```

Line 10 dimensions integer array PALETTE% to 15.

Line 20 puts the address 1114 into the double precision variable A.

Line 30 reads new color values into PALETTE%.

Line 40 puts the address of the beginning of the PALETTE% array into memory location 1114.

Line 50 contains the new color values.

Note 1: Elements 0 through 15 of the PALETTE% array correspond to color registers 0 through 15, not, as one might think, to the ST BASIC color numbers 0 through 15.

Note 2: Refer to the ST BASIC Sourcebook for more information about the VARPTR command.

Since memory location 1114 is checked at every VBI, you can change values in the new palette array (PALETTE% in the example) and load the address of the array into location 1114 as often as you like. This is how the color rotation is achieved in the demo program. By shifting values in the new palette array and poking the address of the array into location 1114, you can create a number of different effects.

## The figures.

Figure 3, which follows, Default Color Settings, shows the ST BASIC color number, the color register associated with the color number, default color, default color decimal value and the RGB values needed to create the color with the desk accessory control panel.

Figure 4, the final figure on this page, shows the Default Color Register Addresses. This table contains the addresses of the color registers used when the system is first booted. When memory location 1114 is poked with a pointer to your own color registers, these boot-up addresses are no longer used.

Figures 1 and 2 are explained in the text above (see the section "Tuning the color palette").

Figure 3. — Default Color Settings.

COLOR	COLOR REGISTER	DESCRIPTION	VALUE	R.G.B. SETTING R G B
0	0	White	1911	7 7 7
1	15	Black	0	0 0 0
2	1	Red	1792	7 0 0
3	2	Green	112	0 7 0
4	4	Blue	7	0 0 7
5	6	Dark Blue	5	0 0 5
6	3	Brown	1312	5 2 0
7	5	Dark Green	80	0 5 0
8	7	Grey	1365	5 5 5
9	8	Dark Grey	546	2 2 2
10	9	Cyan	119	0 7 7
11	10	Dark Cyan	85	0 5 5
12	12	Magenta	1799	7 0 7
13	14	Dark Magenta	1285	5 0 5
14	11	Yellow	1904	7 7 0
15	13	Dark Yellow	1360	5 5 0

Figure 4. — Default Color Register Addresses.

COLOR REGISTER	ST BASIC COLOR	HEX ADDRESS	DECIMAL ADDRESS
0	0	\$\$F8240	16745024
1	2	\$\$F8242	16745026
2	3	\$\$F8244	16745028
3	6	\$\$F8246	16745030
4	4	\$\$F8248	16745032
5	7	\$\$F824A	16745034
6	5	\$\$F824C	16745036
7	8	\$\$F824E	16745038
8	9	\$\$F8250	16745040
9	10	\$\$F8252	16745042
10	11	\$\$F8254	16745044
11	14	\$\$F8256	16745046
12	12	\$\$F8258	16745048
13	15	\$\$F825A	16745050
14	13	\$\$F825C	16745052
15	1	\$\$F825E	16745054

## The program listing.

This is the source code for the demo program. The demo simply draws a number of ellipses, each smaller than the previous one, then rotates their colors. You've seen similar demos before. This one shows how to rotate colors from BASIC on the ST. The program comments describe how the color rotation is accomplished. 

### Listing 1. ST BASIC listing.

```
100 '* COLOR ROTATION DEMO PROGRAM *
110 '* By James Luczak *
120 dim dp%(15),np%(15),c1(14):a#=1114
130 fullw 2:clearw 2
140 'LOAD DEFAULT COLOR SETTINGS
150 for x=0 to 15:read dp%(x):next x
160 'LOAD COLOR REGISTER ORDER
170 for x=1 to 14:read c1(x):next x
180 'DRAW ELLIPSES
190 x=151:y=83:x1=150:y1=82:c=1
```

# // ST Color Tuner *continued*

```

200 for i=1 to 30:color 1,c1(c),1:pell
ipse x,y,x1,y1
210 x1=x1-5:y1=y1-2.6:c=c+1:if c>14 th
en c=1
220 next i
230 'ROTATE COLOR REGISTERS FORWARD
240 for sht=0 to 3
250 for p=0 to 15:read np%(p):' Load C
olor Palette array
260 next p:inc=1
270 np1=np%(15)
280 ROTATEUP:
290 np2=np%(1)
300 for i=1 to 14
310 np%(i)=np%(i+1)
320 next i
330 np%(14)=np2
340 np2=np1
350 inc=inc+1
360 if inc>100 then goto ROTATEDN
370 poke a#,varptr(np%(0)):'Poke 1114
with address of New Palette array
380 for d=1 to inc:next d:'Delay
390 goto ROTATEUP
400 'ROTATE COLOR REGISTERS BACKWARD
410 ROTATEDN:
420 inc=0:np1=np%(1)
430 ROTATEDN1:
440 np2=np%(14)
450 for i=14 to 2 step -1
460 np%(i)=np%(i-1)
470 next i

```

```

480 np%(1)=np2
490 np2=np1
500 inc=inc+1
510 if inc>100 then goto ENDROTATE
520 poke a#,varptr(np%(0)):'Poke 1114
with address of New Palette array
530 for d=inc to 100:next d:'Delay
540 goto ROTATEDN1
550 'PROGRAM END
560 ENDROTATE:next sht
570 poke a#,varptr(dp%(0)):'Poke 1114
with address of DEFAULT PALETTE array
580 ?chr$(7);:end
590 'DEFAULT COLOR REGISTERS VALUES
600 data 1911,1792,112,1312,7,80,5,136
5,546,119,85,1904,1799,1360,1285,0
610 'COLOR REGISTER ORDER
620 data 2,3,6,4,7,5,8,9,10,11,14,12,1
5,13
630 'NEW COLOR PALETTE VALUES
640 data 0,1,2,3,4,5,6,7,119,7,6,5,4,3
,2,1
650 data 0,16,32,48,64,80,96,112,1792,
112,96,80,64,48,32,16
660 data 0,256,512,768,1024,1280,1536,
1792,1904
670 data 1792,1536,1280,1024,768,512,2
56
680 data 0,1793,1809,1825,1841,1857,18
73,1889
690 data 1905,1889,1873,1857,1841,1825
,1809,1793

```

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### ST CHECKSUM DATA.

(see issue 41)

```

100 data 615, 796, 97, 505, 369, 263
, 953, 305, 327, 716, 4946
200 data 345, 211, 271, 928, 38, 8,
60, 723, 741, 622, 3947
300 data 972, 98, 273, 722, 384, 654
, 188, 194, 228, 460, 4173
400 data 929, 671, 381, 833, 717, 84
5, 121, 290, 626, 401, 5814
500 data 643, 316, 183, 15, 458, 63,
2, 567, 75, 774, 3096
600 data 349, 305, 207, 969, 206, 44
, 894, 153, 730, 56, 3913

```

# ST notes

by D.F. Scott

## Newsworthy happenings in the ST world.

### Definite *Maybes* Dept.

Electronic Arts, a software publisher known to Atari enthusiasts by several other titles (some not mentionable here) was noted for its adamant support of the Amiga, as opposed to the ST. Still, having distributed such items as the Origin Systems **Ultima III**, EA kept a few sensors in the water, to see if the ST's buying public made waves.

Apparently, the ST tidal wave washed EA right into the middle of the third-party developers' aisle, in Atari's booth at the fall COMDEX.

Electronic Arts' Public Relations Manager Charlotte Taylor told us that **Skyfox** began shipping in November, with **Chessmaster 2000** following. Of EA's own product line, we should expect to see these ST titles for an approximate second-quarter 1987 release: **The Bard's Tale**, **Arctic Fox**, the widely-less-than-popular **Financial Cookbook** and a new item, the **New Technology Coloring Book**, described by Taylor as a "computerized color-by-number program," presumably compatible with **NEO-Chrome** and **DEGAS**.

The company is also planning to distribute the Origin Systems ST translations of **AutoDuel** and **Ogre**, both popular Steve Jackson board games. **Ogre** for the XE, by the way, operates in a manner somewhat akin to GEM.

Also on the distribution list is **Software Golden Oldies**, which should feature for the first time ST renditions of **Pong** and the artificial psychologist **Eliza**.

Some unanswered questions. . . First, how soon will we be seeing **Marble Madness** for the ST, if at all? Second, will EA produce a port-over of its "Deluxe" series of graphic arts software? **Deluxe Paint** and **Deluxe Video** have been two reasons for buyers to purchase an Amiga, but graphic arts software is so abundant for the ST that competition may just keep EA out of the market.

Does this surge in Electronic Arts support of the ST represent a reversal of

the company's original stance, thus jeopardizing its relationship with Commodore? Although Taylor admits the company has "definitely lagged" in producing ST material, she says EA feels the ST is "turning into a viable market." Concludes Taylor, though, "The trend will definitely show that we're supporting the Amiga over the ST. . . We're not supporting the ST up front in quantity, as much as in quality." She predicts the ratio in quantity of EA Amiga software to ST will be 5-to-1 throughout 1987. //

### GDO\$.

The furor began when independent ST software developers were told by someone at Atari Corp. that it would be charging them a \$500-per-year licensing fee for using the completed version of GDOS (the Graphics Device Operating System) in their programs. GDOS is a missing portion of the ST's TOS, presumably about 9K in length, which allows rudimentary shapes and lines to be stored into a shape table or "metafile," and lets these shapes be displayed on a CRT, or printed on a high-resolution dot-matrix printer.

The first to voice an opinion against the fee was Regent Software President Frank Cohen, who started by writing a diplomatic letter to Atari CEO Jack Tramiel—then published that letter on such databases as Delphi and CompuServe. Long-winded debates began on both networks, arguing whether or not Atari had the right to place a fee on development using what originally was to have been an integral part of the ST's internal OS.

Yet one Atari executive denies that the corporation has made a final decision on imposing the fee, and claims the issue has already been overstated and overexploited. Nonetheless, Regent's Cohen has told us his company is planning to develop an in-house substitute for GDOS, called RDOS, which will be integrated with future products,

or revisions, to provide high-resolution fonts for dot-matrix printers. Cohen says he will be happy to upload the basic RDOS routines to Delphi for public-domain distribution.

Cohen also stated that Regent is willing to support **Big Kiss**, a hardware expansion for the ST from QMS which includes 640K of temporary-allocation-only RAM (for RAMdisks, or for the 200K+ printer drivers GDOS or RDOS would require), as well as downloadable fonts for Epson-compatible dot-matrix printers.

"Right now," Cohen told us, "Regent would like to have a standard operating system. If we're forced to write our own standard, we will—but I'm sure almost nobody will support us. Regent is not in the business of creating standards."

"The AES and VDI modules of GEM," he continued, "are not complete unless they have GDOS included. GDOS is what pulls them all together and makes everything basically device-independent." Cohen claims it would be contrary to the original intent of the ST's developers for Atari "to turn around and say, 'We're going to ship an incomplete operating system,' and then, later on, charge a licensing fee to use the other part of the operating system."

In Cohen's letter to Tramiel, he writes, "We feel very strongly that the devotion of time and resources to learning the intricacies and nuances of the GDOS software would not be wise, compared to the same investment to develop a similar set of software on our own." Replying to such comments, an Atari spokesperson said he feels a fee might be necessary in order for the corporation to keep control of software developments, to make sure they are performed properly.

No word as to whether a fee would affect existing programs using GDOS, or whether Digital Research—GDOS originator—would uphold such a fee, or apply one themselves to their own GDOS releases. We'll keep you informed as the situation develops. //

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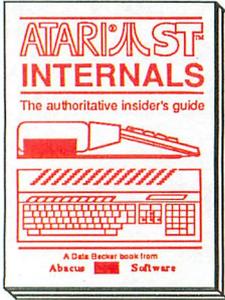


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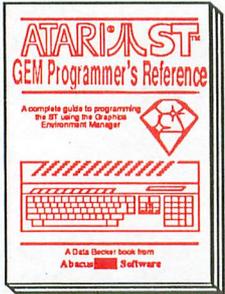


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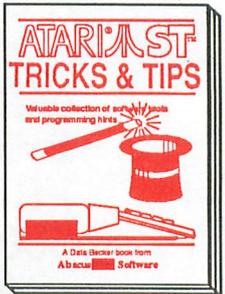
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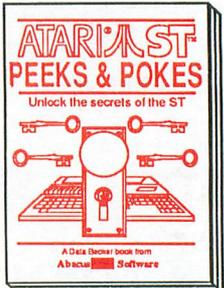
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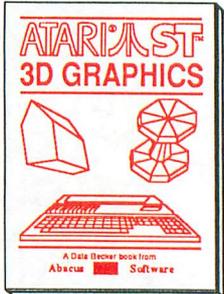


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