NUMBER 10

$2.50

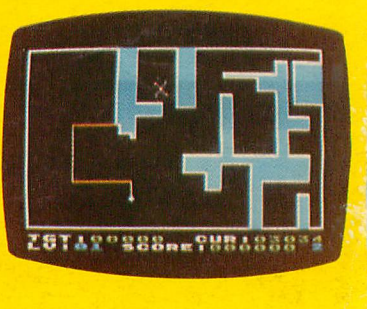
ANALOG COMPUTING™

THE MAGAZINE FOR ATARI® COMPUTER OWNERS

NEW!
THE ATARI 1200XL
HOME COMPUTER!
(see page 32)

SUPER ADVENTURE GAMES ISSUE!

Fill 'Er Up! page 100



MOSAIC 64K RAM SELECT™ FOR ATARI®

The Mosaic 64K RAM Select is the most advanced memory system made for the Atari computers. With a Mosaic Select series memory board you will own the most powerful, dependable, flexible and compatible bank select memory system available.

THE MOSAIC SELECT™ SERIES

A Mosaic Select™ Series board is used to expand your RAM memory beyond the normal address limit of your Atari computer. The Mosaic 64K RAM Bank Select was designed to take full advantage of the Atari computer's internal architecture. The Mosaic 64K RAM Select has 48K hard-wired RAM and then an additional four banks of 4K RAM addressed above the 48K limit, which gives you 52K RAM of continuous memory and 64K RAM total.

THE MOSAIC ADVANTAGE

In comparison with any other 48K or 64K RAM board the Mosaic 64K RAM Select will, for example, give you 30% more work space with the Atari Word Processor and 17% more work space with Visicalc... a true advantage for any disc based system. Plus program writers now have 16K more RAM to prevent page 6 overcrowding. Each board comes complete with step by step picture guided installation instructions — the best in the industry.

FEATURES:

- 4 year guarantee.
- Complete instructions.
- Complete compatibility with all Atari® products.
- Test cycled 24 hours for reliability.
- Gold edge connectors for better reliability.
- Designed to take advantage of Atari computer's superior architecture.
- Always the best components used for superior screen clarity and reliability.
- Low power design for safety and reliability.

CALL FOR YOUR NEAREST MOSAIC DEALER 1-800-547-2807.

THE ONLY CHOICE FOR SERIOUS ATARI® OWNERS!

MOSAIC™
ELECTRONICS, INC.

REMEMBER:

"NEVER FORGETS."

MORE THAN JUST ANOTHER PRETTY FACE.

Says who? Says ANSI.

Specifically, subcommittee X3B8 of the American National Standards Institute (ANSI) says so. The fact is all Elephant™ floppies meet or exceed the specs required to meet or exceed all their standards.

But just who is "subcommittee X3B8" to issue such pronouncements?

They're a group of people representing a large, well-balanced cross section of disciplines—from academia, government agencies, and the computer industry. People from places like IBM, Hewlett-Packard, 3M, Lawrence Livermore Labs, The U.S. Department of Defense, Honeywell and The Association of Computer Programmers and Analysts. In short, it's a bunch of high-caliber nitpickers whose mission, it seems, in order to make better disks for consumers, is also to make life miserable for everyone in the disk-making business.

How? By gathering together periodically (often, one suspects, under the full moon) to concoct more and more rules to increase the quality of flexible disks. Their most recent rule book runs over 20 single-spaced pages—listing, and insisting upon—hundreds upon hundreds of standards a disk must meet in order to be blessed by ANSI. (And thereby be taken seriously by people who take disks seriously.)

In fact, if you'd like a copy of this formidable document, for free, just let us know and we'll send you one. Because once you know what it takes to make an Elephant for ANSI . . .

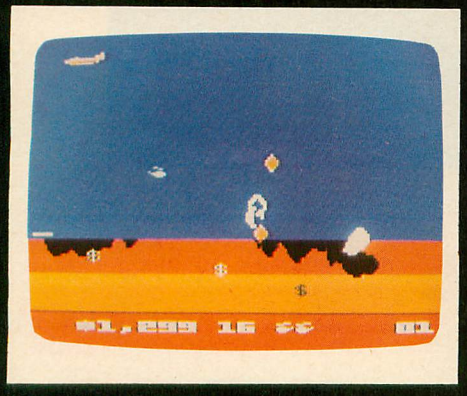
We think you'll want us to make some Elephants for you.

ELEPHANT.™ HEAVY DUTY DISKS.

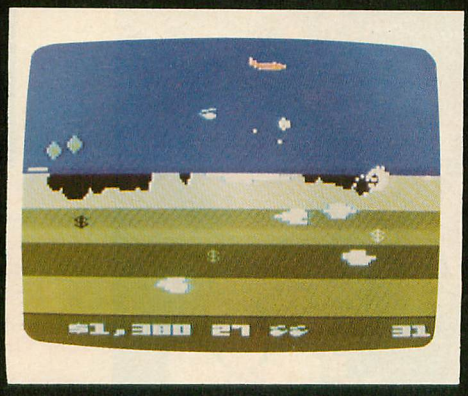
For a free poster-size portrait of our powerful pachyderm, please write us.
Distributed Exclusively by **Leading Edge Products, Inc.**, 225 Turnpike Street, Canton, Massachusetts 02021
Call: toll-free 1-800-343-6833; or in Massachusetts call collect (617) 828-8150. Telex 951-624.

IT'S DYNAMITE!

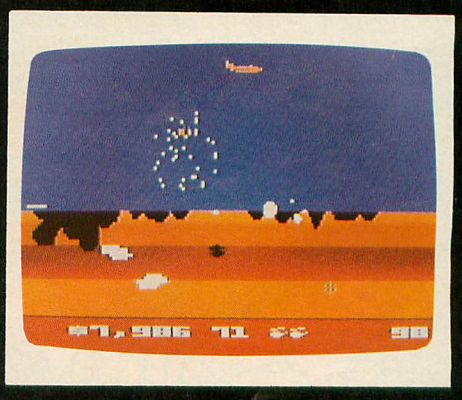
THE EXPLOSIVE NEW GAME FROM A.N.A.L.O.G. SOFTWARE



So you think you're good, huh?



Getting a little harder, isn't it?



OH NO! WIPEOUT!!!

BURIED BUCKS™

While flying your helicopter over a high mountain plateau in Tibet, your magnetic detector chatters wildly — you have discovered the treasure of a long-lost Sherpa kingdom!

Quickly equipping your 'copter with explosives, you fly over the plateau and attempt to blast the treasure out, intending to split the profits with the Sherpa natives.

But, flying over you in his World War II bomber, the evil Dr. Muta has other plans — he intends for the treasure to remain buried — along with you!

Buried Bucks is a fast action "dare devil" game written entirely in machine language for 1 or 2 players. 16K cassette or diskette.

Buried Bucks — the newest game for the ATARI, with **great** graphics, brilliant colors, dynamite sound effects — guaranteed fast action!! **99 levels** of play assure long lasting challenge. Will the evil Dr. Muta defeat you? Will the bucks remain buried forever? Don't go for broke — go for the bucks — **BURIED BUCKS!**

PLAYING NOW AT FINE COMPUTER STORES EVERYWHERE!

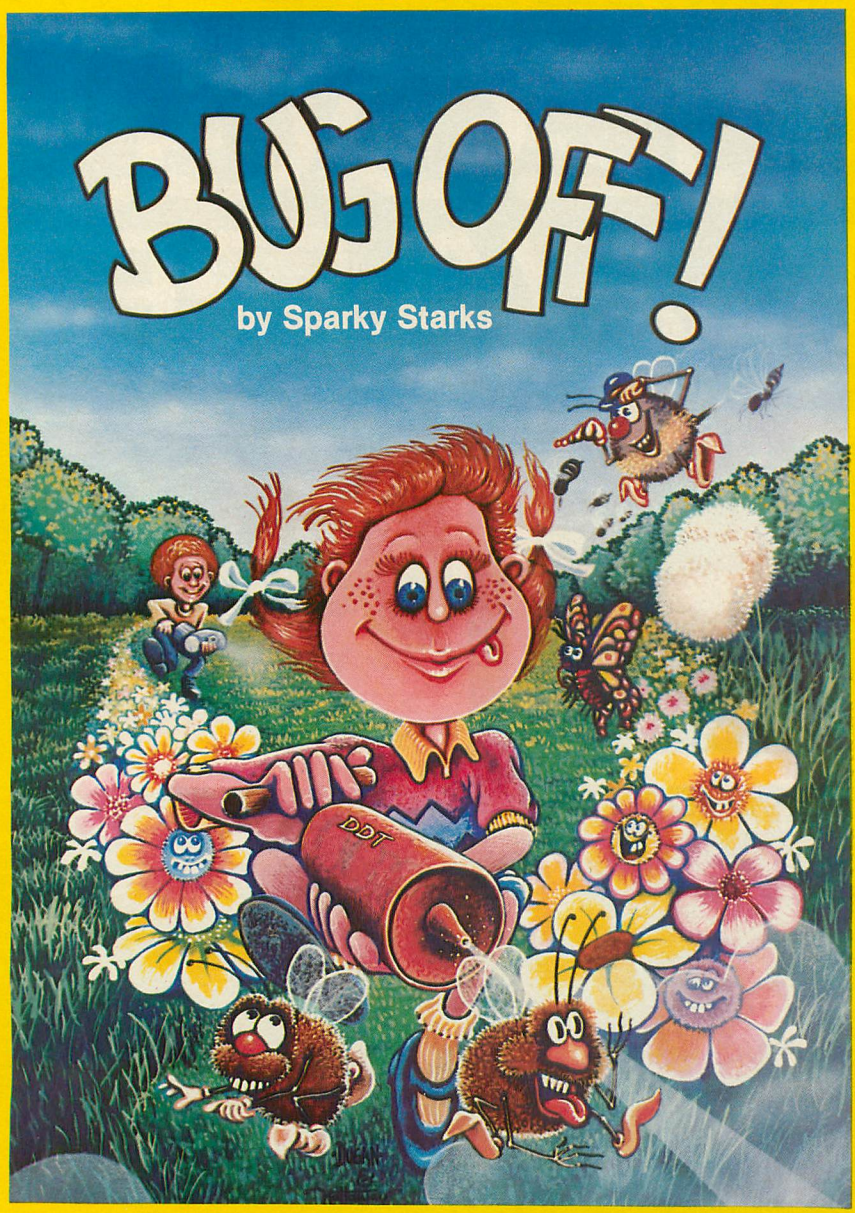
A.N.A.L.O.G. SOFTWARE

P.O. BOX 23
WORCESTER, MA 01603
(617) 892-3488

ATARI is a trademark of ATARI, Inc.

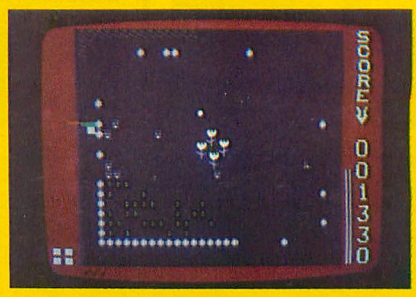
Buried Bucks is a trademark of A.N.A.L.O.G. Software

YOU'RE GOING TO HAVE FUN WITH YOUR ATARI!!



AND THE FUN GETS ROLLING WITH BUG OFF!

Yikes! The bugs are swarming here, there and everywhere and only a strong whiff of DDT can put 'em away. The object of the game is to control the seven different kinds of pests that are running helter-skelter over everything. The Army can airlift in more DDT to fill your bug sprayer . . . but will they make it in time?



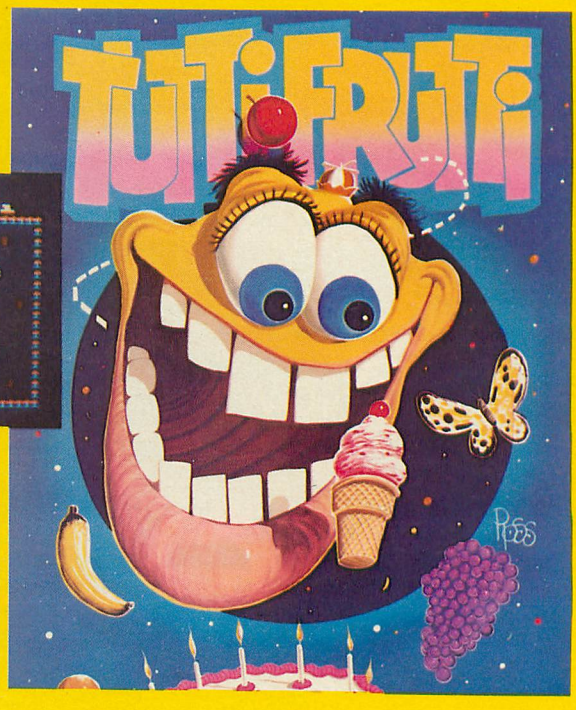
The action builds to a furious frenzy as an awesome assortment of insects attack anything and everything in sight. A definite case of "spray first and ask questions later." All this and hi-res graphics, too!

16K TAPE	050-0167	$29.95
32K DISK	052-0167	$29.95

TUTTI FRUTTI — by Alan Newman

"GRAPE FUN" FOR THE WHOLE FAMILY!

Somewhere between Never Never Land and next Thursday, there's a wild and wacky place where your joystick-controlled "Hungry" snacks on an orchard of goodies. But there are some nasty ol' bugs who'd just as soon snack on YOU, so look sharp and beware. **Fun**tastic action for all ages!



TUTTI FRUTTI . . . Wow! A crazy cast of characters in vivid hi-res color all performing in their natural habitat, otherwise known as TUTTI FRUTTI Land. Grape fun for ages 6 and up!

16K TAPE	050-0160	$24.95
32K DISK	052-0160	$24.95

Adventure INTERNATIONAL

To order, see your local dealer. If he does not have the program, then call 1-800-327-7172 (orders only please) or write for our free catalog.

Published by ADVENTURE INTERNATIONAL
a subsidiary of Scott Adams, Inc.
BOX 3435 • LONGWOOD, FL 32750 • (305) 862-6917
PRICES SUBJECT TO CHANGE

ANALOG COMPUTING
THE MAGAZINE FOR ATARI COMPUTER OWNERS

1983
NUMBER 10

FEATURES/ARTICLES

REVIEWS/PROFILES

PROGRAM LISTINGS

COLUMNS

A.N.A.L.O.G. COMPUTING (ISSN 0744-9917) is published bi-monthly for $14 per year by A.N.A.L.O.G. Magazine Corp., 565 Main Street, Cherry Valley, MA 01611, Tel. (617) 892-3488. Second-class postage paid at Worcester, MA and additional mailing offices. POSTMASTER: Send address changes to A.N.A.L.O.G. COMPUTING, P.O. Box 615, Holmes, PA 19043. Program listings should be provided in printed form. Articles should be furnished as typed copy in upper and lower case with double spacing. By submitting articles to A.N.A.L.O.G. COMPUTING, authors acknowledge that such materials, upon acceptance for publication, become the exclusive property of A.N.A.L.O.G. If not accepted for publication, the articles and/or programs will remain the property of the author. If submissions are to be returned, please supply self addressed, stamped envelope.

EDITORIAL

by Jon Bell

This issue's editorial deals with bits and pieces. A lot has occurred since **A.N.A.L.O.G. No. 9**, so I want to mention a number of things concerning this issue, as well as what you're likely to see in our pages in the near future.

Whither ATARI Follow-up

The response to the editorial in the last issue has been overwhelming. "Whither ATARI?" seemed to have touched a nerve among many ATARI owners, as well as from companies manufacturing ATARI software (see Reader Comment, page eight). Not surprisingly (to us), there was no response from anyone at ATARI, even though dozens of people at ATARI receive **A.N.A.L.O.G.** If we receive any word from the creators of our favorite home computers, we'll be sure to let you know.

There is a point that I'd like to clear up concerning the origins of "Whither ATARI?" The gentleman who wrote the editorial wrote it in conjunction with the editors of the Portland ATARI Club newsletter of Portland, Oregon. The editorial originally appeared in the October, 1982 edition of the P.A.C. newsletter. Due to a mutual misunderstanding, the credit for the article reprint was not given. For this I would like to apologize. The author's name was withheld at his request. I hope that the increased exposure of our thoughts, so well expressed in "Whither ATARI?", will in some manner influence the way ATARI sees its products — and the people who buy them.

The Reader's Poll

At the time of this writing, it's still too early to announce the winners of our free cassette and disk subscriptions, or the winner of the Favorite Program/Article Contest. By the time you read this, however, we will have picked the winners of both, and will have contacted them. The Reader's Poll cards have been pouring in at the rate of hundreds per week, and the preliminary results have been very interesting. The final results of all cards received will be given in the next issue, but I can mention the changes that we will be implementing in **A.N.A.L.O.G.**, starting in this issue. In other words, you asked for it, you got it! Generally, our readers would like to see:

...more reviews of both hardware and software, with plenty of pictures. Our readers have indicated that they want to read tough, no-holds-barred reviews of ATARI products before spending their money.

...more beginner's programs in both BASIC and Assembly language.

...an increased emphasis on educational and business software.

...how to access bulletin board systems.

...and, not surprisingly, at least two games per issue.

Well, if you scan this issue, you can see that we have a great deal of reviews with pictures, a beginner's player/missile graphics article, an article on how to access bulletin board systems, and three games, including a super Assembly-language game from Tom Hudson, author of "Graphic Violence!", **A.N.A.L.O.G. No. 8**. Fans of a certain coin-op arcade game should get plenty of kicks from it.

The A.N.A.L.O.G. Compendium

First, the bad news. We have a very limited number of back issues still available. The only issues available are no.'s 2, 7, and 8. When these are gone, that's it. No back issue of **A.N.A.L.O.G.** will be reprinted, so those of you who have all the back issues should consider them collector's items. Now, the good news. We are going to be publishing, sometime in spring, **The A.N.A.L.O.G. Compendium**, a large-format book which will contain the best articles and programs from the first 10 issues of **A.N.A.L.O.G. Computing**. **The Compendium** will contain utilities, games, tutorials and demo programs. It will be available in your local computer store, or you can order it direct from us. However, please do not call us until we have announced shipment in the magazine. We are not accepting advance orders now, so please be patient. I think you'll like it. □

The staff of A.N.A.L.O.G. would like to thank the staff of The Higgins Armory Museum for allowing us the use of their facilities for the production of this issue.

ADD A FLOPPY DISK TO YOUR ATARI* FOR LESS THAN $450

Now Atari* users can upgrade to 5″ or 8″ floppy disks at an affordable price with **MICRO MAINFRAME.**

Micro Mainframe, the premier manufacturer of low cost add on peripherals for the TRS-80 computer, is proud to announce our lineup of products for the Atari* computer. Micro Mainframe is not a newcomer to the computer marketplace, as we have been supplying quality disk drives for the TRS-80* for three years. We now bring our expertise to the Atari* market and pledge to provide the highest quality peripherals at the lowest price.

Our floppy disk drive is designed to sell for under $450, and check out the features:

- **Low initial cost includes one disk drive and controller**
- **Single and Double Density operation STANDARD**
- **Additional drives available for under $200**
- **Controller features a proprietary digital phase lock loop data separator for unparalleled reliability**
- **Operates 8″ disk drives with our MaxiDos A operating system (AVAILABLE MID-1983)**
- **Intermix 5″ and 8″ disk drives with MaxiDos A**
- **Includes a parallel printer port to allow the use of low cost printers**
- **Expandable to include hard disk operation (requires expansion chassis and host adapter)**
- **Includes a SWITCHING POWER SUPPLY that is capable of running two disk drives**
- **Can be used in conjunction with other Micro Mainframe peripherals**

The expensive Atari* 810 disk drive includes a costly disk controller and power supply for each drive. This is wasteful as one controller can easily control up to four disk drives. With a **MICRO MAINFRAME** drive, you pay only once for the disk controller. To add a second disk drive, you merely purchase a disk drive and case. The power supply in your first drive will power an additional disk drive. Other manufacturers use cheap linear power supplies which generate considerable heat that can shorten the life of your electronic equipment.

ADD A DISK DRIVE TO YOUR ATARI* FOR LESS THAN $90

If you already own a TRS-80 Model-III*, you can use your Model-III* as an intelligent disk controller with the addition of our **CONNECTION A™.** This peripheral connects between the 50 pin expansion bus on the Model-III* computer and the Atari* 400 or 800 computer. After loading the supplied software package, your Model-III* computer thinks that it is an Atari* disk drive and you can read and write Atari* diskettes on your Model-III* for less than $90.

Dealer Inquiries are Solicited

MICRO MAINFRAME

11325 Sunrise Gold Circle
Building E
Rancho Cordova, CA 95670
(916) 635-3997

*Atari is a trademark of Atari, Inc., TRS80 is a trademark of the Tandy Corp.

READER COMMENT

Due to the response from "Whither ATARI?" this issue's Reader Comment section has been considerably expanded, so our readers can voice their opinions unedited.

Dear Editor:

In response to your request for comment the following is submitted. I happen to be one of the many who bought an ATARI during the July-August 1981 crest. Your comments are right on the button. It has amazed me at the apparent lack of marketing for what I think is the most versatile system available to the home market. Having been in the computer field since 1963, using the ATARI 800 is a real pleasure even after coming home from working on Univacs, DEC's, Harris and Honeywell systems.

When telling someone you have a computer at home the first problem you experience as you say "ATARI" is the game syndrome. ATARI's image as a game machine is fixed in most peoples' minds because this is all they see advertised.

One of the comments I have heard dealer's make who carried ATARI but were dropping the line is lack of support or slow delivery of orders. One dealer here in Charleston said he thought that if you carried several other competitive systems you did not get the support from ATARI. Again the image problem appears. ATARI is not an Apple nor a TRS-80. The personal computer market is now flooding with choices. I believe ATARI is missing the chance to grab the bull by the horns and become identified as the "Home Computer". Most of the current systems are really personal computers designed to be sold first as a aid to business with home applications being secondary. The new Commodore and the Zenith (among) others) are truly small business systems being sold as personal computers. Witness IBM PC, the "Cadillac," is not advertised as an entertainment system. The answer lies with ATARI. We as owner's can brag, show off our system and have the best of each world, but if the image problem is not reversed the rest of the industry will leave ATARI behind.

Thank goodness for the third party software. I have watched ATARI drop what I thought would have been a good product line not to mention the software which is really where profit comes from.

I believe ATARI needs to correct an image problem and then market the "Home Computer" as an answer to those out there who don't want a business system. Comparison of the cost alone for the true home user should sell ATARI if it were marketed properly.

Thanks for listening.

Sincerely,

Martin T. Foley

Moncks Corner,

South Carolina

Editor:

Your "Whither ATARI?" editorial in issue #9 was an act of courage. You risked advertising revenues and support from ATARI's parent, Warner Communications, by asking the important question: "Why is ATARI trying to sell and support their wonderful 400/800 home computers like throwaway toys?" That's a question troubling most all of us faithful ATARI computer users.

Early in December, Wall Street investors revolted against Warner's stock when news leaked that ATARI had lost its sales lead in the home computer market and was in danger of losing its near-total domination of the home video game market as well. While Warner pointed its finger to its errant ATARI Division as the culprit for a disappointing earnings statement, the true focus of both Warner's overall and ATARI's specific problems should have been aimed at the boardroom of Warner itself.

When Warner Communications purchased ATARI a few years ago, Warner had no real experience in marketing high technology products. Warner's holdings in the movie, TV and recording industries naturally make them entertainment specialists, and with ATARI producing the hottest new wave in entertainment, video games, it seemed a natural fit as another cog in their corporate wheel. But since the merger, ATARI has grown so fast and so large that it has become too complex for Warner's show-biz moguls to handle. Warner's control of ATARI is analogous to an old Douglas DC-3 pilot being given command of a Concorde.

Warner's installation of the Harvard Business School type of corporate political structure at ATARI marked the beginning of their problems with the division. Creative design and software engineers who were weaned on Nolan Bushnell's entrepreneurial spirit at the old ATARI chafed under the new Warner-installed regimen of MBA

executives, committee decisions and anything-for-the-bottom-line philosophy at the new ATARI. Many of them departed to form new companies or joined competitors. Some of the better engineer-businessmen from ATARI went on to form formidible competitors to their former employer such as Activision and Imagic.

Warner's answer to the burning question, "How do you market a home computer or video game to Mr. & Mrs. Average?", was in the form of mass marketing. And to implement this mass marketing program, ATARI replaced their key marketing executives with men from the toy and cosmetic industries rather than those who were experienced in selling consumer electronics. These "new brooms" quickly landed deals with major retailers like Sears, Toys-R-Us and K-Mart during the Summer. But to make these deals, ATARI had to give contract pricing to the big retailers that was well below the costs offered to ATARI's computer specialty dealers. Naturally, when Toys-R-Us can sell an ATARI 400 for less than XYZ Computer Center can buy it, XYZ would have to drop the ATARI line or go out of business. Thanks to ATARI's mass market programs, dealers from coast to coast dropped the ATARI line and began to bad-mouth it due to the bitterness of being cut out by ATARI. What ATARI's market managers didn't figure, however, was that while they were signing up the big retailers, so were their competitors, Commodore and Texas Instruments. Since Commodore and TI are both vertically integrated, they had no problem bombing the ATARI prices. ATARI, meanwhile had to sit back and attempt to sell the 400 home computer with a $50 handicap against their key competitors due to the video game groups' insistence that the too-late and over-priced 5200 Super Video Game System needed to occupy the $200 price slot. The fruits of this mass market effort have been bitter for ATARI. Before the Fall of 1982, ATARI led the home computer market, but today, (December 21, 1982), ELECTRONIC NEWS reported that ATARI had fallen into third place and even that position was in danger with Radio Shack coming up strong recently. For their efforts, the marketing executives and president of ATARI were recently terminated. The damage those executives did to ATARI's sales and support network still will require much effort to correct, however.

"Warner's control of ATARI is analogous to an old Douglas DC-3 pilot being given command of a Concorde."

For all of its faults, however, ATARI has the best supported home computer on the market. ATARI's APEX program is unique in that it allows the 400/800 users an opportunity to provide software support for their systems without having to go in business for themselves to do so. TI, Radio Shack and Commodore have no current program such as APEX. ATARI has done a good job of setting up service centers at most major cities, important support that the other companies are lagging in. ATARI has also cooperated with the third party suppliers of software, accessories and books for their computers in a manner similar to market-leader, Apple. Third party support is just in its infancy for ATARI's competitors, however.

On the marketing scene, ATARI will be dropping prices on all of their current home computer models and offering new models, such as the 1200XL, to boot. ATARI is also going to try to re-woo the specialty computer dealers with fairer margins and better support in 1983.

From appearances, ATARI and parent Warner have learned a hard lesson in the high-tech consumer electronics business: computers are not toys. Let us hope that they will return to being a technologically-driven, rather than a market-driven company in the future and that ATARI will graduate their excellent home computers from a stormy adolescence to a stable maturity. With over 750,000 users of the ATARI 400/800 among us and excellent magazines like **A.N.A.L.O.G.** to act as sounding boards, I'm certain that Warner and ATARI will get the message and give us the support and products we want and need in the future.

Sincerely,
J.T. Irby
Orlando, Florida

Dear Editor:

Your editorial in issue #9 was straight to the point and ironic in view of current events. The New York Times of 12/19 reported that ATARI is plagued by management turnover, disappointing game cartridge sales and an unprofitable computer division. It seems that ATARI really doesn't understand the home computers it is trying to create and is unprepared to compete now that they aren't the only GAME in town. The December issue of Datamation magazine related an interesting picture of R & D at ATARI with a budget between sixty and one-hundred million dollars, an innovative chief scientist, an educational research institute, a lab to work on LOGO research and even a consultant in AI. I don't know about you but I think that this kind of effort should pay off with something more than just game software. Something is wrong.

Your points were well taken especially about education, user support and marketing. I do some part-time work for a local computer sales company and we no longer carry ATARI. Why? Because of the discounting of local video stores and mail order, it is not profitable to sell ATARI and provide support. ATARI seems to think user groups are the total answer but they aren't. Unfortunately people go for the low price and then realize too late that they need support in the form of advice and information. Everyone I have talked to wants a computer for their children. They are interested in education for their children as a very high priority and not only in games.

A particularly annoying indication, at least to me, that ATARI does not take computer software seriously is the Macro-assembler. It costs almost $100 and yet there is no way to buy a backup diskette and it doesn't even come with a center hole reinforcement. Games costing $30 always have the reinforcements and sometimes the backup availability. It may sound like a small point until you accidentally spill milk or something on your disk and have to pay full price for a "backup" of expensive software.

ATARI's forte (for the VCS) has thus far been games but Activision, Mattel et al have produced game cartridges with much better graphics for the 2600 than ATARI has and as I have said ATARI is hurting because of it. It seems that cartridge sales account for the bulk of game machine profits. ATARI is heading for the same situation in serious computer software. Perhaps if **A.N.A.L.O.G.** surveyed its subscribers and made the results known to ATARI the problems would be brought to their attention and improvements would follow.

Sincerely,
Jordan Powell
Carmel, New York

Dear Sirs,

This article was long overdue. I agree with it 100%, but I'm not sure who's to blame. We, the user, guide ATARI by our buying habits. If we show that we will buy more games than Educational or Utility programs then that will be the direction ATARI will take.

When the first Home Computer hit the market the best way to show it off and get the public's attention was with a game, such as Star Raiders, and it did the trick. After Star Raiders came Space Invaders and so on, but soon after playing these games the hobbyist found the real purpose of the computer, and started to write his own programs.

"With ATARI putting out more games and limited types of utility programs, ATARI went from Home Computer to Game Computer."

The problem is ATARI saw the money in games and started to redirect their thinking and leave the utility programs to third parties. With ATARI putting out more games, and limited types of Utility programs, ATARI went from Home Computer to game Computer.

We now have to correct this error and your article "Whither ATARI" is the first step, but it can't stop there. We have to let ATARI know by writing to their Marketing Dept., telling them what we want to see from them. We, the buyer, have to guide them.

Now is the time to get our act together. Maybe you could get the correct name and address of ATARI for your readers to write to with their ideas. If we don't let them know then we have nobody to blame but ourselves.

Sincerely yours,
Philip Diedeman
Phoenix, Maryland

Dear Sir:

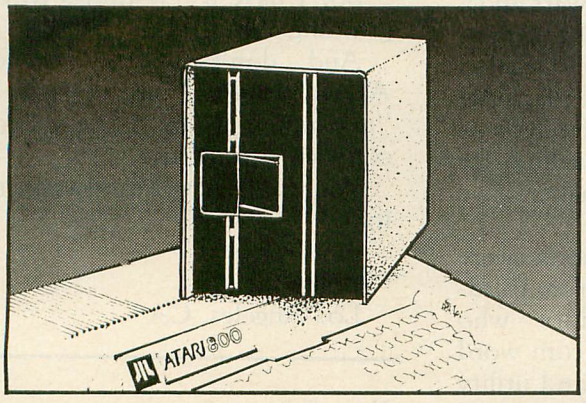
Your editorial in issue #9 expressed my long-felt opinions very well. After purchasing an ATARI 800 over a year ago for use in my home, I've agonized awaiting ATARI to release non-game software but was relieved when they finally released hardware information to third party developers. Now all ATARI users must wait for these firms to develop software that fills the gaps in Educational, Word Processing, Personal Finance, DB Management and Telecommunications. The efforts made by ATARI in these fields is less than first class and thus many users feel this reflects on ATARI hardware as well.

You question the marketing strategy and I'd like to share some questions and possible actions with you. ATARI has many resources, not the least of which is name recognition. We're seeing the retail price of hardware falling to under $600 for the ATARI 800. As ATARI struggles for market share, I wish they'd consider package enhancement instead of reduced prices.

As "Computers for People" enter more homes, I believe many will refrain from purchasing today as prices will be lower later. Many remember the calculator price shake out. Now that these households see little quality software outside of games, they have little motivation to buy today. Developers of non-game software also feel less urgency in positioning their products. The ATARI name recognition will keep the public very aware of these price changes.

Access Drives for the Atari®—Why settle for less!

GET THE MOST OUT OF YOUR ATARI® COMPUTER. GET AN ACCESS UNLIMITED MINI-DISK DRIVE.



Store twice as much information

With an Access Unlimited drive, you can store almost twice as much information on a diskette as you can with an Atari 810™

Our system has double-density storage. Which lets you store system and application programs on one diskette and still have room for data files.

You save $$

You save on the cost of diskettes—because you don't need as many.

You may also need fewer disk drives because our Access drives are double-density and, unlike the Atari 810, our controller can handle up to 4 drives.

Furthermore, our add-on drives do not require their own controllers. They're less complicated. They cost less. And they're more reliable.

Now Available!

Access single density drives. 102k storage but much cooler, quieter and more efficient than the 810!

Enjoy more flexibility

Our flexible drives let you cable your first-drive system directly into your computer. Or go through an 810 drive.

And our Access controllers automatically handle single- and double-density drives in the same system.

Order today. Satisfaction guaranteed.

ATAR88-1	first drive single density	**$488.00**
ATAR88-A1	Add on drive single density	**$379.95**
ATAR40-1	First drive double density	**$624.95**
ATAR40A1	Add on drive double density	**$399.95**
ATARISEP		**$24.95**

SPECIALS

Flip-N-File—holds 50 diskettes

5¼"	Reg. $34.95	**Now only $19.95**
8"	Reg. $49.95	**Now only $28.95**
Head Cleaning Kit	Reg. $29.95	**Now only $19.95**
Green Screen	Reg. $24.95	**Now only $12.95**
Drive Numbering Tabs	Reg. $4.50	**Now only $3.95**
Library Cases Holds 10 Diskettes		**Now only $2.95 ea**

We have just added approximately $250,000 worth of brand new business and game software.

New! 5¼" Soft Sector Diskettes W/Hub Ring

BASF	Lifetime Limited Warranty Discs. SSDD	**$24.90**	Box of 10
ATHANA	1 yr. Limited Warranty Discs. SSSD	**$19.90**	Box of 10

To order, call TOLL-FREE

1 (800) 527-3475 VISA master charge

Ordering Information

Order by phone or by mail. We accept Visa, MasterCard, cashier's checks, certified checks, and money orders. With personal checks, allow additional time for bank clearance. Your bankcard will not be charged until your order is shipped. On orders over $1,000, we pay freight (surface only) and insurance; please add $3.00 shipping and handling under 50 lbs. Over 50 lbs., add $5.00 for orders under $1,000.00. Texas residents add 5% sales tax. Allow 2 to 4 weeks for delivery.

LIMITED QUANTITIES • Prices subject to change without notice.

☐ Please send me a FREE catalog. I'm not ready to order at this time.
☐ YES, I'm taking advantage of your Sales prices.

Name _____
Company Name _____
Address _____
City _____ State _____ Zip _____
Phone Number (_____) _____

Quantity	Item	Unit Price	Subtotal
		Subtotal	
		State Sales Tax (Texas residents only)	
		handling charge	
		Total	

Check one:
☐ payment enclosed ☐ Visa ☐ MasterCard*

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

*If MasterCard, numbers above name: ☐☐☐☐

Expiration Date: ☐☐ — ☐☐

_____
Authorized signature, if charged

ACCESS UNLIMITED

Dept.G2/401 N. Central Expwy. #600/Richardson, Texas 75080
Tel 1-800/527-3475 214/340-5366
214/690-0207 Sat. and Evenings Only

What could be done? Prices are lowered due to decreased costs. Less resistance would occur had ATARI included more "optional" hardware with the ATARI 800 package. Suggested items would be: Pilot Home Package, Entertainer Kit, Educator Kit or 850 Interface. By adding any of these items to product would be enhanced and the selling price would not need to drop. The customer would not see successive price reductions and thus would purchase more readily based on desire to satisfy need.

What could be done to allow home users to upgrade? Why not give $75 credit toward the purchase of a 1200XL or 800 from a dealer with the trade-in of a 400? Then ATARI, via Warner, could place them in cable households in the vein of the Qube experiment in Columbus, Ohio. Or the trade-in units could be donated to schools at a break even expense to ATARI considering tax benefits and the "cost" of the trade-ins. This would place more units in front of more users and help enhance the "education" image for ATARI — not at the expense of the "game" image.

Regardless of the marketing strategy eventually chosen, I hope ATARI soon develops superior non-game software to compliment their machines and game software. Many households already have ATARI VCS game systems and more purchase them every day. Does ATARI really feel a household will pay $600 for a second game machine? Isn't there enough competition in the home arcade industry without ATARI competing with itself?

Robin Lynch
Mundelein, Illinois

Dear Sirs:

I couldn't help but grin when reading your editorial in **A.N.A.L.O.G. #9**.

Slightly over two years ago, I purchased a TRS-80 Color Computer from Radio Shack. I quickly learned BASIC, Extended BASIC, and updated the memory to 32K. I waited and waited for the software to come out, only to be rewarded with Dinowars and a whole list of second-rate games. Tandy's marketing policy targeted the computer as a game machine, but the users knew differently — they knew it was a machine far more capable than its makers gave it credit for.

Eventually, frustrations were eased by the products from third-party software vendors who developed everything from word processors, data bases and utility packages, to much-improved high-resolution action games. It was finally becoming a worthwhile investment, but no thanks to Tandy.

Although the machine improved in its capabilities, I never could resist the lure of the ATARI 800. In December, I plucked down a lot of money for the system with disk drive, and was thrilled that there was so much software to choose from. I gave the TRS-80 to my parents with their new-found interest in home computers.

The irony, of course, is that the **A.N.A.L.O.G.** editorial speaks of the same problem. Different computer, different corporation, same problem. The solution is simple: don't look to ATARI for the answers. The good software will result from two things, namely third-party software companies and *user demand*. Furthermore, the scenario is typical of many home computer products. We are not alone.

The fact is, any business application, peripheral device or expansion capability that can be conceived of will most likely be done, especially if there is a demand for it. I imagine there will be numeric keypads, Z-80's, CP/M systems and who-knows-what available for our favorite computer before too long.

As a matter of fact, I'm writing this letter on a system utilizing Bit 3's 80-column board, a green phosphor monitor and Letter Perfect word processor. It's enough to make many Apple users a little bit envious.

So, I have a few things to be grinning about.

And don't worry whether ATARI thinks they've got a "machine in a box." The serious software *is* out there.

You just have to know where to look.

Sincerely,
Bob Safir
Los Angeles, CA

Dear Editor:

We note the reference in your editorial in Issue 9 to the ATARI "Talk & Teach" system. Dorsett Educational Systems, Inc., developed this system in 1975, patented it, and in 1977 licensed ATARI to use it. We later developed 1024 half-hour tutorial program titles, contained in 64 courses of 16 audiovisual programs each, far in excess of the number for any other computer. It is perhaps more tutorial programs, (exclusive of drills, tests, games and simulations) than exist for all other computers, combined.

ATARI released only 256 of our titles, contained in 16 courses (Algebra, Spelling, Psychology, Sociology, Economics, Accounting, Electricity, U.S. History, World History, U.S. Government, Supervision, Writing, Physics, Counseling and Classics). We now sell these courses, plus Electronics (48 programs), First Aid and Safety, Spanish, Health Services, Office Careers, Philosophy, Auto Mechanics, Construction, Carpentry, Shop, Statistics, and hundreds of Reading Comprehension, Reading Development, Vocabulary Building, ESL, Phonics, and Math programs, each of which runs up to a half hour, and has full-time professional, high-quality recorded narration. We are unable to agree that for the ATARI computers, as you claim,

"quality educational software is in short supply."

ATARI apparently agreed with you that the "Talk and Teach" programs "didn't sell", since they sold the rights for them back to us nearly two years ago. But their royalty statement to me discloses that they had already sold more than 600,000 program copies packaged in 38,000 series. Not bad for something that "didn't sell" and which was returned at a time when 80% of the ATARI's now being used did not exist. We hope to supply courseware in increasing quantity.

But there are problems with "Talk and Teach" programs. They are first-generation, so graphics are simple, although often clever and colorful. Special visual efforts are infrequent, although all text is in upper and lower case. Particularly important is the fact that computer hobbyists will miss complex branching and string responses. Responses are all multiple-choice, and branching, when used, is simple. It is not easy to make illegal copies.

Most important, the tutorial mode actually attempts to teach, which means that after going through programs two or three times you are through with them, as compared to games or simulations, which can provide more extended interest to those who already know the subject. Many educators prefer to introduce information by non-computer means and use the computer as reinforcement. Tutorial programs may have more appeal for home self-study.

Sincerely,
Loyd G. Dorsett
President
Dorsett Educational
Systems Inc.
Norman, OK

Gentlemen:

Here I sit at the console of my ATARI 400, having just finished a productive and (through no choice of mine) lengthy programming session. I have decided to announce the big error.

This letter is being sent to four major magazines for personal computers in the hope that we can avoid any more BASIC cartridge-sized holes in the wall.

A "lock-up" is a painful experience, as it prevents any communication with the computer whatsoever. There are many ways to produce a lock-up, such as Print A = Not B. Try it. Then enter from tape or disk (after rebooting) a long BASIC program. Now the tricky part: type a line number near the beginning of your file. With your finger on BREAK, push RETURN immediately followed by depression of the BREAK Key. 4 out of 5 times, odds enhanced by long sessions of unsaved programming, the machine will allow entry of input but not respond.

Great fun, eh?

If this ever happens to you, don't get mad, just take it in stride (while sweeping cartridge pieces away). It's happened before, it will happen again and until 300,000 rude letters to Warner Communications cause them to correct the defect, will continue to happen throughout eternity.

Sean Puckett
Homestead, Florida

Dear **A.N.A.L.O.G.**,

Game programming can be rewarding, but moving the players up and down in BASIC is too slow. Since I do not know how to program in Assembly language, would you produce a machine language subroutine that I can call up from BASIC to move players up and down fast?

Thank you very much for your attention.

Yours truly,
Long Mai
Salt Lake City, UT

No problem. Check out "Moving Players in BASIC," page 73.

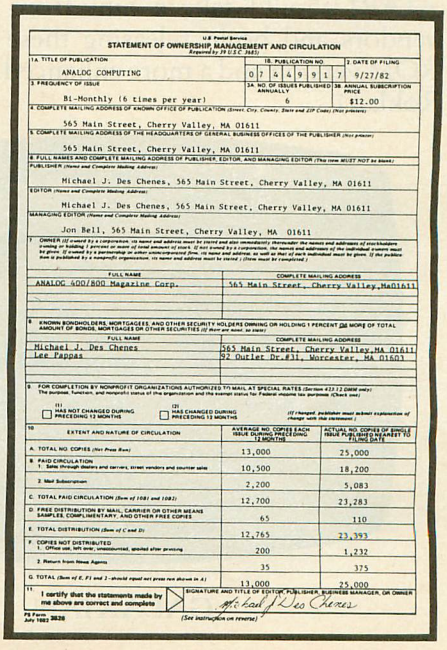
—Ed.

Sirs,

Is it possible to CLOAD or CSAVE a program, but not have that shrill beep?

The cassette (or disk) Input-output beeping can be turned on or off at any time. To turn the sounds off, use the command POKE 65,0. To turn them on again, POKE 65,3.

—TH



STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION

1a. TITLE OF PUBLICATION	1B. PUBLICATION NO.	2. DATE OF FILING
ANALOG COMPUTING	0 7 4 4 9 9 1 7	9/27/82
3. FREQUENCY OF ISSUE	3A. NO. OF ISSUES PUBLISHED ANNUALLY	3B. ANNUAL SUBSCRIPTION PRICE
Bi-Monthly (6 times per year)	6	$12.00

4. COMPLETE MAILING ADDRESS OF KNOWN OFFICE OF PUBLICATION (Street, City, County, State and ZIP Code) (Not printers)
565 Main Street, Cherry Valley, MA 01611

5. COMPLETE MAILING ADDRESS OF THE HEADQUARTERS OF GENERAL BUSINESS OFFICES OF THE PUBLISHER (Not printer)
565 Main Street, Cherry Valley, MA 01611

6. FULL NAMES AND COMPLETE MAILING ADDRESS OF PUBLISHER, EDITOR, AND MANAGING EDITOR (This item MUST NOT be blank)

PUBLISHER (Name and Complete Mailing Address)
Michael J. Des Chenes, 565 Main Street, Cherry Valley, MA 01611

EDITOR (Name and Complete Mailing Address)
Michael J. Des Chenes, 565 Main Street, Cherry Valley, MA 01611

MANAGING EDITOR (Name and Complete Mailing Address)
Jon Bell, 565 Main Street, Cherry Valley, MA 01611

7. OWNER (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual must be given. If the publication was published by a nonprofit organization, its name and address must be stated.) (Item must be completed.)

FULL NAME	COMPLETE MAILING ADDRESS
ANALOG 400/800 Magazine Corp.	565 Main Street, Cherry Valley,Ma01611

8. KNOWN BONDHOLDERS, MORTGAGEES, AND OTHER SECURITY HOLDERS OWNING OR HOLDING 1 PERCENT OR MORE OF TOTAL AMOUNT OF BONDS, MORTGAGES OR OTHER SECURITIES (If there are none, so state)

FULL NAME	COMPLETE MAILING ADDRESS
Michael J. Des Chenes	565 Main Street, Cherry Valley,MA 01611
Lee Pappas	92 Outlet Dr.#31, Worcester, MA 01603

9. FOR COMPLETION BY NONPROFIT ORGANIZATIONS AUTHORIZED TO MAIL AT SPECIAL RATES (Section 423.12 DMM only)
The purpose, function, and nonprofit status of the organization and the exempt status for Federal income tax purposes: (Check one)
(1) ☐ HAS NOT CHANGED DURING PRECEDING 12 MONTHS (2) ☐ HAS CHANGED DURING PRECEDING 12 MONTHS (If changed, publisher must submit explanation of change with this statement.)

10. EXTENT AND NATURE OF CIRCULATION	AVERAGE NO. COPIES EACH ISSUE DURING PRECEDING 12 MONTHS	ACTUAL NO. COPIES OF SINGLE ISSUE PUBLISHED NEAREST TO FILING DATE
A. TOTAL NO. COPIES (Net Press Run)	13,000	25,000
B. PAID CIRCULATION 1. Sales through dealers and carriers, street vendors and counter sales	10,500	18,200
2. Mail Subscription	2,200	5,083
C. TOTAL PAID CIRCULATION (Sum of 10B1 and 10B2)	12,700	23,283
D. FREE DISTRIBUTION BY MAIL, CARRIER OR OTHER MEANS SAMPLES, COMPLIMENTARY, AND OTHER FREE COPIES	65	110
E. TOTAL DISTRIBUTION (Sum of C and D)	12,765	23,393
F. COPIES NOT DISTRIBUTED 1. Office use, left over, unaccounted, spoiled after printing	200	1,232
2. Return from News Agents	35	375
G. TOTAL (Sum of E, F1 and 2 - should equal net press run shown in A)	13,000	25,000

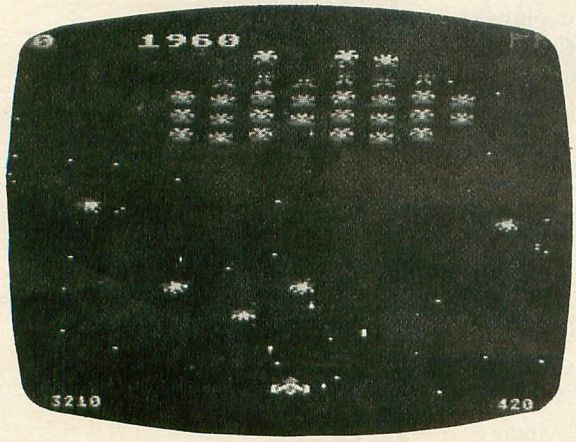
11. I certify that the statements made by me above are correct and complete. SIGNATURE AND TITLE OF EDITOR, PUBLISHER, BUSINESS MANAGER, OR OWNER: Michael J. Des Chenes

PS Form 3526 July 1982 (See instruction on reverse)

NEW PRODUCTS

by The Program Doctors

The ATARI home computer market continues its explosion as almost every "home" computer software company is now either converting or designing new software for the 400/800. With all the outside competition, ATARI is finally realizing that it must begin to meet the challenge head-on both in price decreases and an increase in the frequency of software releases. With the recent announcement of a $499 full retail 48K 800 (minus a BASIC cartridge), ATARI is clashing directly with the Commodore 64. Along with this our sources indicate that 810 drives will also be dropping in cost probably to combat the challenge from both Percom and Micro-Mainframe drives which retail for much less than the 810. ATARI rushed out DEFENDER and GALAXIAN for Christmas and neither match up to their arcade counterparts. DEFENDER (a true 16K cartridge) lacks the superb graphics of the original Williams classic. Although the game is a lot of fun to play it lacks that arcade "feel." GALAXIAN does not even come close to the Midway classic in either playability or screen display (and is really not that much fun to play.) The ATARI consumers are constantly upgrading their 400's; more and more people are also adding drives and playing such outstanding computer games as CHOPLIFTER, BANDITS and POOL 1.5. These people are not satisfied by "licensed arcade releases" in ROM packs. To satisfy the evergrowing "purist", ATARI should take a hint from the third party vendors and begin releasing these titles in both a ROM version and a more enhanced disk version (ala Roklan).

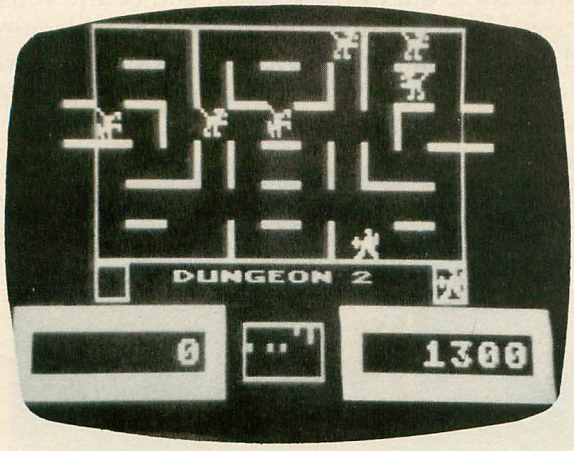


GALAXIAN

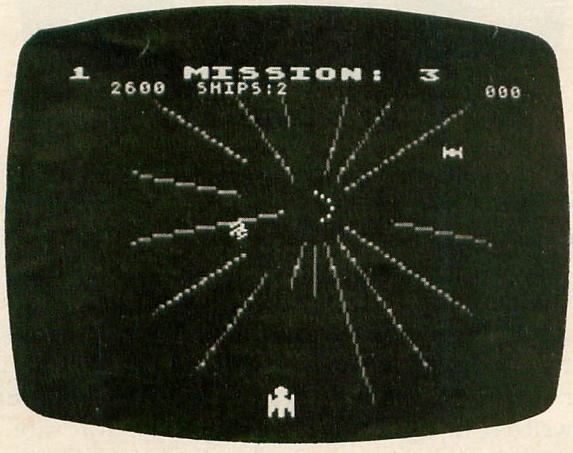
Back in the early days of **A.N.A.L.O.G.** there was an original program entitled "Maze Rider". Essentially this was a three-dimensional maze game and definitely an **A.N.A.L.O.G.** "classic." This idea was expounded upon by P.D.I. in *CAPTIVITY* and EPYX with MONSTER MAZE. The 3-D concept has been taken to the ultimate experience by Sirius in WAYOUT. This 48K game consists of 26 different mazes which provide hours of fun and frustration and demonstrates the superb graphics and animation which can be programmed into this marvelous machine. As you attempt to find the WAYOUT you see and feel the depth in the maze as you travel about with your compass and map maker. As in all games there is a villain and in WAYOUT it is "Cleptangle," a mischievous pirate that steals your exploration equipment and leads you astray. This game has a great scoring system which allows for many replays within the same maze, since it is based on the distance traveled through the maze. A floppy record is provided to maintain high or in this case low scores on the disk for each of the 26 mazes. On a lower note from Sirius is its release of all the VCS cartridges for the 400/800, FAST EDDIE, TURMOIL, DEADLY DUCKS, WORM WAR and BEANY BOPPER. To say that these are 4K cartridges should be enough to the average **A.N.A.L.O.G.** reader, but to be more specific, let your VCS buddies buy these cartridges.

Everybody likes to say that they own real arcade titles like FROGGER and MISSILE COMMAND, but sometimes these translations are not true to the originals. One company that is attempting to reproduce authenic arcade games is Roklan Software. Its first release was DELUXE INVADERS, an excellent translation from the Midway classic. Now comes WIZARD OF WOR and GORF, also licensed from Midway in both disk versions and ROM packs. WIZARD OF WOR, a personal favorite of the Program Doctors, is complete with hi-res graphics, arcade-like sounds, and interactive play. As you enter the "Dungeons of Wor", your mission is to rid the Dungeon of all the evil "Worlings", destroy the speedy "Worluk", and meet the mighty "Wizard" himself. Some of the "Wizard's Worlings" have the ability to disappear and therefore to aid in your search a radar screen is provided for tracking purposes. When you successfully survive a "dungeon" you are confronted with a better-protected one. Also, the time before the "Wizard's" cronies speed up their

defense of their "lair" is decreased and there are more enemies to destroy. In the interactive two-player version, both players compete at the same time either as partners or opponents. This really is the best feature of the game. WIZARD OF WOR is an arcader's delight and definitely a must for the game enthusiast. The disk version has more spruced-up sounds and a fine high-score save feature. GORF, the most popular of Midway's trio released by Roklan, does not excite as much as their previous two games. This could be due to the tremendous amount of quality arcade games on the computer market already. Although it was unique in its original issue as a multi-screen arcade game, GORF is not as well-received as it might have been had it been released a year ago.

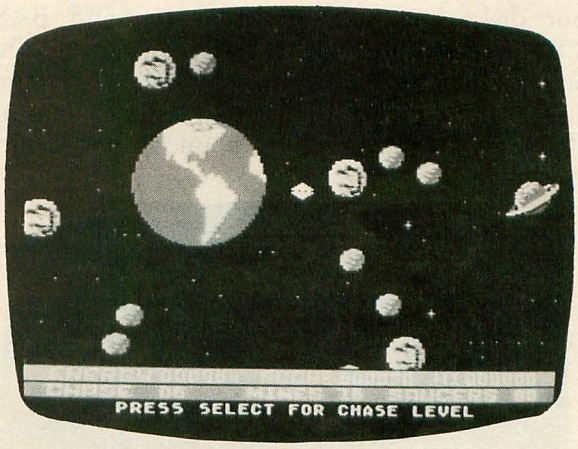


WIZARD OF WOR



GORF

Many software purchasers are influenced by full page 4-color advertisements in computer magazines. Often times the best thing about these programs is the cover art. A program that does live up to its 4 month media hype is First Star's ASTRO CHASE. From the time you see the title page and the one-voice opening theme (this was to preserve memory) you can tell this is something special. Currently available on 32K disk and tape, the scenario is a SYPFAD (for the new readers "SAVE YOUR PLANET FROM ABSOLUTE DESTRUCTION.") Graphically speaking this game has everything, and the periodic sideshows are well done and quite humorous. "THERE IS NO ESCAPE" to this game but it sure is a lot of fun trying.



ASTRO CHASE

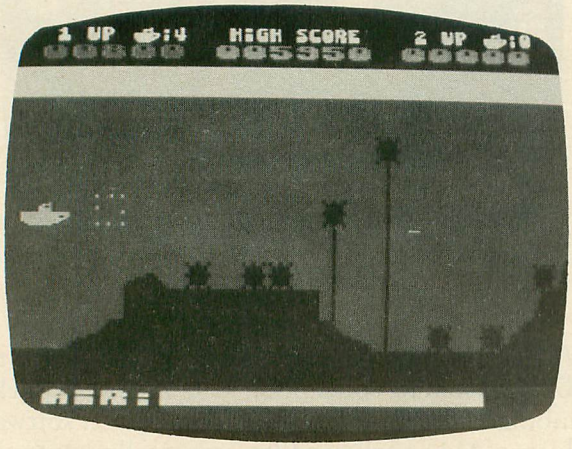
Adventure International has been writing for the 400/800 from its conception in 1979 and is quickly climbing to the top of the ATARI computer software industry. AI has followed its largest selling software program written for any computer, PREPPIE, with three new arcade titles. SEA DRAGON (written by Russ Wetmore, author of PREPPIE), is a multi-screened underwater game which not only requires skill but also patience as you navigate your submarine through a plethora of obstacles in an attempt to destroy the "Master Mine." This game receives the Program Doctors first "Seal of Approval" awarded only to computer games which contain everything a great arcade game should have:

1. Multi-level option
2. Great graphics, sounds, and game logic
3. Real-time playability
4. A save Hi-score to disk option (32K disk version only)
5. Multi-screens
6. An attainable ending (nobody says it has to be easy)
7. A repeatability factor (or lack of boredom factor)
8. An availability on both disk or cassette (16K in this case) so all of us can enjoy the game

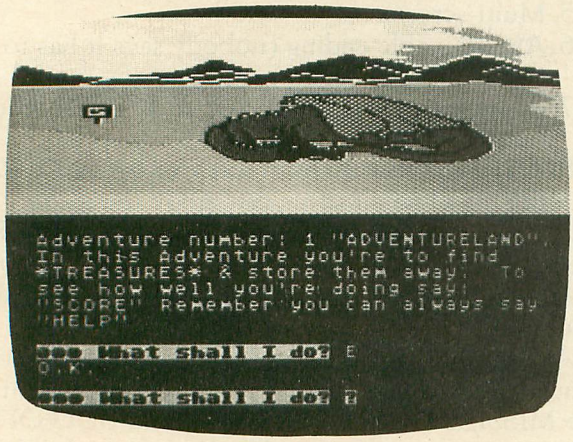
Obviously we like this game very much and highly recommend it, and suggest when you play it to try to use the joystick in as many ways as possible; you may find some hidden surprises.

AI has not stopped here. They have released two other arcade titles, STRATOS, a nice extension to the MISSILE COMMAND genre; and BUG OFF, a frantic game for you people who love to kill bugs instead of spaceships. For the adventurer both

ADVENTURELAND and PIRATE ADVENTURE are now available in 48K graphic versions and are unique both in animation and perspective, and the S.A.G.A. Series shows great promise. This company is not only offering support in these two areas but also in utility packages with DISKEY, a disk editor that allows you to do everything you wanted to do to your disks but were afraid to try, and BASIC ROUTINES FOR THE ATARI, by Jerry White, containing 24 basic programs to aid in programming in such areas as paddles, joysticks, timer, common subroutines, p/m graphics, sounds, disk utilities, etc..

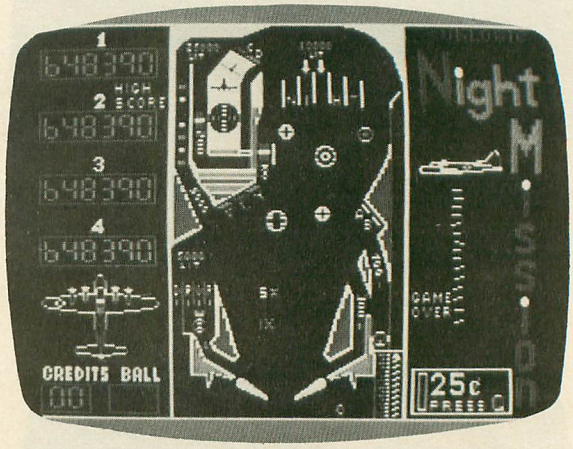


SEADRAGON



S.A.G.A. #1

Pinball simulations are big sellers for home computers and SubLogic has finally converted NIGHT MISSION for the ATARI. With its first ATARI arcade release SubLogic has attempted to recreate the actual feeling of playing pinball. From the time you insert your first quarter you begin to feel that this is different from other pinball simulations. NIGHT MISSION is user-adjustable, and therefore if you do not like the SubLogic version you can redesign it to suit your taste. Although you cannot modify the playfield itself you can adjust such things as ball speed, friction, inclination, bumper sensitivity, free game match probability, and free game score. These adjustable parameters allow you to customize NIGHT MISSION just the way you like it. The only drawback to this game is that the sounds come out of the speaker, and before you get annoyed, this was done for memory considerations and that old computer proverb "you don't mess with success", since the original was written for our good micro-buddy, the (burp) Apple.

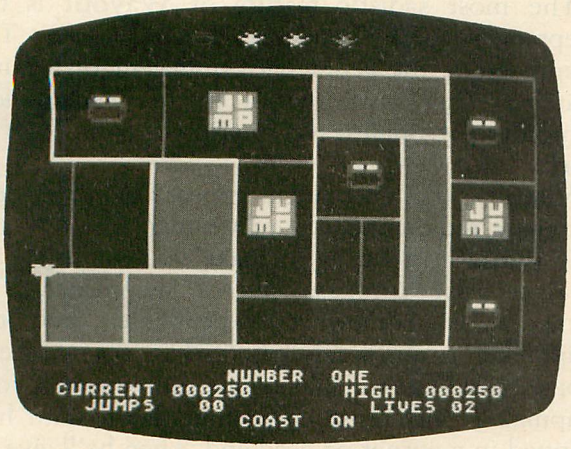


NIGHT MISSION

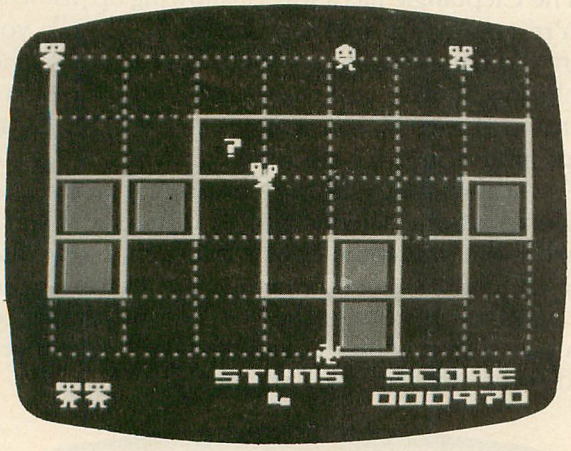
As the software companies pulled out all the stops for Christmas a multitude of new titles were released, including two games which will satisfy that QIX fix until the original is released by ATARI. KID GRID and JEEPERS CREEPERS are based on the "surround-the-box-before-they-get-you premise". Both are fun arcade games with addictive qualities. For all you "Forth Funatics", JEEPERS CREEPERS is written in QS FORTH by Quality Software on both disk and cassette. On the other hand Tronix (a new kid on the block) developed KID GRID, a real sleeper on both 16K tape and disk.

Just when we were about to write off Gebelli and give it the "Crystalware Award of the Year" prize, CANDY FACTORY, a 32K disk, comes to the rescue. Those of you who have been "burned" by this company in the past can be confident when you get this good climbing game. Unlike CANYON CLIMBER this game has "staying power". It has 10 different screens that will definitely bring out the Spiderman in you. Unfortunately we must warn you

to stay away from their two cartridges, the 4K FIREBIRD and EMBARGO; your software dollar can be much better spent.



JEEPERS CREEPERS



KID GRID

Before we close, the Program Doctors have one other new program to talk to you about. It is rather hard to do since a definite conflict of interest is apparent. We do not work in the offices of A.N.A.L.O.G. and have never even personally met one of our two editors, nor do we need the income derived from writing this bimonthly column. Our job is only to inform you, the software purchaser, of the products on the market. Therefore, hoping we have maintained our editorial integrity, we must tell you that A.N.A.L.O.G. Software has a definite winner with its latest release, BURIED BUCKS by Tom Hudson. Providing 99 levels of play, this original game requires speed and skill. The player uses a helicopter to dive-bomb holes into the earth and then delve inside these same deep caverns to pick up the money and run (or in this case fly) to safety. The nemesis in the action is a plane that keeps on coming to refill the earth channels your chopper has made. Available on both 16K tape and disk, for one or two players, this game is done rather well.

By next issue, we should have new, massive amounts of information for you, so until then, keep those cards and letters coming. □

Software Review:
Wayout by Paul Edelstein
SIRIUS SOFTWARE
Sacramento, CA 95827
48K Disk $39.95

by Brian Moriarty

A few weeks ago, I came strolling into the offices of **A.N.A.L.O.G.** to ask my favorite annoying question, "What's new?"

Editor Lee Pappas immediately began tearing his desk apart, looking for the latest marvel from Sirius Software. As his frantic search continued, his eyes began to redden, his breath heaving in quick, short jerks like a junkie going cold turkey. Just as I began to think it might be better to visit some other day, Charles Bachand had the bad luck to walk through the door. Lee grabbed Charlie by the throat *(not an easy task; Charlie stands 6'4")* and hissed, "Where's **Wayout**?"

"Out in my car," poor Charlie croaked helplessly.

"Get it — now!"

The precious pre-release copy of the disk was quickly booted, and I became another fan mesmerized by one of the best microcomputer games since **Star Raiders**. **Wayout** is really that good.

The idea of the game is simple. You've been dropped into the middle of a complicated maze which has exactly **one** exit. Armed only with a compass and a map-making tool, you must find your way out of the maze by the shortest possible route.

As you "walk" through the maze (using either the keyboard, a joystick or a paddle), you see a full-color image of the maze as experienced from the **inside**. The solid blue walls slip past with startling realism and perspective. Both Charlie and Tom Hudson (no strangers to assembly-language game programming) were astonished by this nifty example of real-time animation. The rest of us were dumbfounded.

26 ways to get hopelessly lost.

It wouldn't take very long to memorize the layout of a single maze, even a big one, so Sirius provides no less than 26 different mazes on the **Wayout** disk. You can save a game-in-progress, record your best score for each maze and even mark up to nine locations in a given maze and return to any one of them in a moment. This latter feature is essential to mastering the game — but more on that later.

While admiring the graphics, you may notice little dots of light flitting around the picture area. These "bugs" in the program are actually fireflies, moving around on the breeze that sometimes blows in from the exit. You're supposed to let the fireflies help you determine the location of the exit. After hours of play, I can't say they've been very helpful.

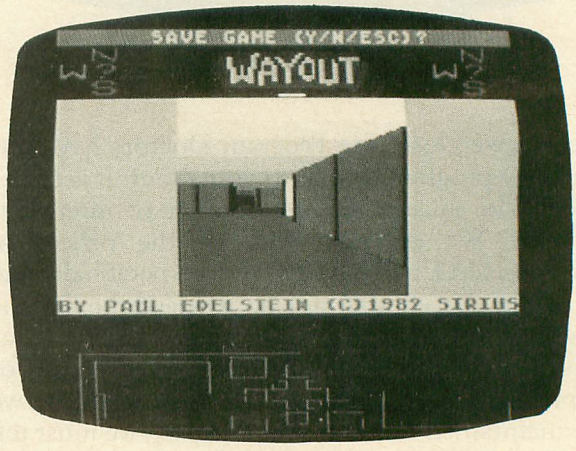
Introducing. . . the Cleptangle!

The most sadistic feature of **Wayout** is the Cleptangle (CLEPTomaniac RectANGLE). The Cleptangle is the geometric equivalent of a purse snatcher. He's also one of the most diabolical computer personalities to emerge since the Thief in **Zork**.

Visually, the Cleptangle appears as a spinning rectangle, red on one side and white on the other. His sole purpose in life is to make you miserable by stealing your compass and/or mapmaker. The compass is somewhat expendable, but the mapmaker is absolutely essential to your success. Consequently, if the Cleptangle runs off with your mapmaker you must chase him down until he's trapped in a corner or dead end. Then he'll give up his prizes and go away — for a while.

The Cleptangle has a way of showing up just when you're starting to make progress. He'll grab your stuff and head straight for the area you just finished exploring. Unless you use the save-position feature mentioned earlier, you will go mad re-tracing your steps after you catch up with the fiend.

A warbling tone indicates the presence (or blessed absence) of the Cleptangle. A different sound is heard when you come close to the exit, represented by a rapidly flashing hole in the maze. In some mazes, the wind coming out of the exit is so violent that you can't get near it without blowing away. You'll have to find some alternate path of approach.



Wayout is one of those rarities in ATARI games: a good-looking product that actually manages to hold your interest. Since I received my rare personal copy, I've made my way through about a dozen of the mazes. My scores have been pretty awful, but I'll be going back to improve them after I finish numbers 13-26. In the meantime, we can hope that Sirius will release additional **Wayout** mazes.

Paul Edelstein deserves stardom for his masterful programming effort. When I'm showing off my ATARI to friends, I don't automatically reach for **Star Raiders** any more. □

ComputAbility™ presents the Newest in ATARI Software Products for Atari

SUPER SPECIALS

CHOPLIFTER $22.95 DISK

GENETIC DRIFT $20.49 DISK/TAPE

SHOOTING ARCADE $20.49 DISK/TAPE

K-RAZY SHOOT OUT $31.95 CARTRIDGE

STRATOS $24.49 DISK/TAPE

BAJA BUGGIES $22.49 DISK/TAPE

Prices effective March 1 through March 31, 1983

FREE* SOFTWARE

FREE* SLIK STIK

ATARI
CONVERSATIONAL LANGUAGES - T 43.95
INVITATION TO PROGRAMMING 2 & 3 - T ... 21.95
MUSIC COMPOSER - C 32.95
MY FIRST ALPHABET - D ... 26.95
TOUCH TYPING - T 19.95
HOME FILING MANAGER - D 37.95
MAILING LIST - T 19.95
ASTEROIDS - C 26.95
CAVERNS OF MARS - D 28.95
COMPUTER CHESS - C 26.95
MISSILE COMMAND - C 26.95
SUPER BREAKOUT - C 26.95
STAR RAIDERS - C 32.95
ASSEMBLY EDITOR - C 44.95
BASIC - C 44.95
MACROASSEMBLER - D 65.95
MICROSOFT BASIC - D 65.95
PILOT (HOME PACKAGE) - C 58.95
INVITATION TO PROGRAMMING I - T 18.95
SPEED READING - T 55.95
BASKETBALL - C 26.95
GRAPH-IT - T 15.95
JUGGLE'S HOUSE - D/T 22.95
PILOT (EDUCATOR) - C 97.95
VIDEO EASEL - C 26.95
DEFENDER - C 32.95
GALAXIAN - C 32.95
QIX - C 32.95
DIG DUG - C 32.95
ET - C 38.95
TIME WISE - D 23.95
ATARI WRITER - C 61.95

ADVENTURE INTERNATIONAL
PREPPIE - D/T 23.95
S.A.G.A. ADVENTURES - D . 31.95
SEA DRAGON - D/T 27.95
STRATOS - D/T 27.95
BUG OFF - D/T 23.95

ANALOG
RACE IN SPACE - D/T 20.95
CARNIVAL - D/T 20.95
SUNDAY DRIVER - D/T 23.95
CRASH DIVE! - D/T 23.95

ON-LINE
JAWBREAKER - D/T 23.95
ULTIMA I - D 31.95
THRESHOLD - D 31.95
ULTIMA II - D 44.95
MOUSKATTACK - D 27.95
FROGGER - D/T 27.95

SIRIUS
BANDITS - D 27.95
WAY OUT - D 31.95
BEER RUN - D 23.95

THE DISCOUNT SOFTWARE COMPANY THAT PAYS YOU A DIVIDEND!!!

DATASOFT
SHOOTING ARCADE - D/T . 23.95
PACIFIC COAST HIGHWAY - D/T 23.95
MICROPAINTER - D 27.95
CANYON CLIMBER - D/T ... 23.95
FATHOMS FORTY - D 27.95
O'RILEY'S MINE - D/T 27.95
ROSEN'S BRIGADE - D/T ... 27.95
SANDS OF EGYPT - D 31.95

BIG FIVE
COAL MINER 2049'ER - Cart . 39.95

I.D.S.I.
POOL 1.5 - D 27.95
POOL 400 - Cart 31.95
SPEEDWAY BLAST - Cart ... 31.95
JUGGLER - D 23.95
SURVIVAL OF THE FITTEST - Cart 31.95

FIRST STAR
ASTRO CHASE - D/T 23.95

SENTIENT
CYBORG - D 27.95
GOLD RUSH - D/T 27.95

WE CARRY HUNDREDS OF ITEMS FOR ATARI 400/800, ASK FOR OUR FREE CATALOG.

*COUPON PROGRAM

The purchase of each program (with the exception of Super Specials, Atari, and APX) will earn you 1 COMPUTABILITY DIVIDEND COUPON. Save 3 coupons and redeem them for your choice of Slik Stik, a Lefty Adaptor, or an Extension Cable. OR save 10 coupons and redeem them for your choice of any program we sell for $24.00 or less (with the exception of Super Specials, Atari, and APX). You pay only a $2.50 shipping and handling charge.

BRODERBUND
APPLE PANIC - D/T 23.95
STELLAR SHUTTLE - D/T ... 23.95
DAVID'S MIDNIGHT MAGIC - D 27.95
STAR BLAZER - D 25.50
TRACK ATTACK - D 23.95
LABYRINTH - D/T 23.95
SERPENTINE - D 27.95
DUELING DIGITS - D 23.95
DEADLY SECRETS - D 27.95
CHOPLIFTER - D 27.95
GENETIC DRIFT - D/T 23.95

SPINNAKER
SNOOPER TROOPS #1 - D ... 35.95
SNOOPER TROOPS #2 - D ... 35.95
FACEMAKER - D 27.95
STORY MACHINE - D 27.95

EDU-FUN
CALL FOR ITEMS AND PRICES

THORN
CALL FOR ITEMS AND PRICES

NEW ITEMS
PIG PEN - D 23.95
BAJA BUGGIES - D/T 25.50
STARBOWL FOOTBALL - D/T 25.50
MASTER TYPE - D 31.95
ALI BABA - D 26.50
JEEPERS CREEPERS - D 23.95
PAINT - D 33.95
KID GRID - D/T 23.95
MOSAIC 32K 97.95

D - Disk T - Cassette
C - Cartridge

ATARI is a trademark of ATARI, Inc.

Starfighter
The Ultimate Joystick
- 2 Year Warranty
- More Accurate
- Easier to Hold

$16.95

LEFTY JOYSTICK ADAPTOR
Adapts to *any* Atari Joystick.
Moves fire button to top Right.
$9.95

SLIK STIK
- 90 Day Warranty
- Easy Ball Top Control

Suncom

$9.95

EXTENSION CABLE (5 ft.)
Adapts to *any* Atari controller.
$6.95

ALL JOYSTICKS WORK WITH Atari VCS, Sears Telegame, Commodore VIC 20, Atari 400/800 (All products have registered trademarks)

30 Day Money Back Guarantee on all Suncom Products - Dealers inquiries invited!!!

Mastercard/VISA Order Toll Free MasterCard **800-558-0003** No surcharge for credit cards VISA **In Wisc. Call 414/351-2007**

ORDERING INFORMATION
To order by mail send money order, certified check or personal check (allow 14 days to clear) to COMPUTABILITY. Include $2.00 shipping on software orders and $2.50 shipping on hardware orders (FREE OR PURCHASED). Mastercard & VISA please include card number and expiration date. WI residents please add 5% sales tax. Outside of continental U.S.A. please add 15% shipping (U.S. Funds only). Prices subject to change without notice.

Order Hours:
Mon. - Fri. 12 pm - 9 pm C.S.T.
Sat. 12 pm - 5 pm C.S.T.

ComputAbility
P.O. Box 17882
Milwaukee, WI 53217

HARDWARE REVIEW: B. KEY 400

INHOME SOFTWARE INC.
2485 Dunwin Drive, Unit 1
Mississauga, Ontario L5L 1T1
Telephone: (416) 828-0775

RETAIL: $119.95

by Richard A. Benson

What does someone who is 33 years old and still a kid at heart ask Santa Claus for Christmas? What else — a new keyboard for his computer! Of course I thought that my chances of actually getting one were slim to none, being that my wife hates the stupid thing that sits on the desk in the bedroom and occupies most of my waking hours. (When I am not playing with my IBM 3081 at work, that is). Well, Christmas morning I woke up to find shirts, ties, and last but not least, a B. KEY 400 keyboard for my ATARI 400. (Yes Virginia, there really is a Santa Claus).

I did my best to hold myself back from doing any more than just looking at it (or should I say drooling over it) until the kids had settled down after unwrapping their presents and totally destroying the house. After what seemed like years (actually an hour and a half), I grabbed my ATARI 400 and settled down at the kitchen table with a cup of coffee for what I expected would be at least an hour of tearing my hair (what little there is left) out while trying to install it. You see, I might be able to program, but when it comes to anything mechanical, forget it.

Inhome Software's advertisement read, "the B. Key 400 can be installed in 2 minutes." Well, I said to myself, here goes nothing. I opened up the instruction manual and read the first sentence. "TOOLS NEEDED: 1 PHILLIPS SCREWDRIVER." Hey, this isn't going to be as tough as I thought! I removed the 4 screws on the bottom of my computer, lifted off the top cover, and disconnected the factory installed keyboard. There were no additional screws to worry about and the ribbon cable simply pulled out to disconnect it from the computer. Next, I snapped in the B. KEY 400 and proceeded to plug the new ribbon cable into the computer. This was the only tricky part, as the new ribbon cable had no plastic reinforcement on the end to allow you to apply the even pressure needed to make the correct contacts. Back went the four screws and I was looking at my new keyboard after only 5 minutes installation. (Well, so the ad exaggerated slightly. Actually if it hadn't been for the ribbon cable, I could have easily done it in 2 minutes.)

Next came the tough chore of putting the keys on. I was actually going to have my 4 year old do it, but I knew if I wanted to have the key that I pressed be what it was supposed to be I had better do it myself. Another 5 minutes and the installation was complete. My coffee wasn't even cold yet.

For those of you who have done any serious editing on the ATARI 400, you will be pleased to know that I no longer had to wonder if I was actually pressing the CTRL key when moving the cursor around on the screen. The feel of the keyboard is great, as good as the 800, in fact. The only problem that I have found is that some of the special function keys have been moved around a little. This is because the size of the ATARI 400 keyboard is smaller than the ATARI 800 keyboard and in order to accomodate the larger size keys some adjustment had to be made. But I am happy to say that it took only a short time to make the adjustment and I find myself using the computer more than ever.

In short the B. KEY 400 is the ATARI 400 owner's dream come true. It is so good in fact that I just got a 48K memory board installed so that I could do everything that a 800 can do.

Congratulations to Inhome Software on a quality product with excellent installation instructions that even an amateur like myself could understand.

Let's see, what should I ask for next Christmas?... □

QUICKSOFT™

TOTAL SOFTWARE LIQUIDATION

SAVE up to 70% SALE!

OUR GOAL:
To LIQUIDATE OVER

$1,000,000.00

of SOFTWARE at SACRIFICE PRICES!

SAVE ON INSOFT • ON-LINE • DATAMOST
BRODERBUND • PENGUIN • AND MORE!

OFFER LIMITED TO STOCK ON HAND.

PUBLIC NOTICE
Never before have we offered our software at LIQUIDATION prices! This is YOUR chance to SAVE BIG on software while we are between warehouse arrangements. It will never happen again so BUY NOW!

GUARANTEED! This is all BRAND NEW merchandise and carries our regular guarantee!

PLUS NO SALES TAX!

	QUICKSOFT LIQUIDATION PRICE	RETAIL
LOST COLONY D	19.95	29.95
HOME FILING MG. D	39.95	49.95
CENTIPEDE C	35.95	44.95
PAC MAN C	35.95	44.95
TEMPLE OF APSHAI D/T	29.95	39.95
ATTACK at EP-CYG D/T	23.95	32.95
GENETIC DRIFT D/T	21.95	29.97
DAVID'S MIDNIGHT MAGIC D	24.95	34.95
CHOPLIFTER D	24.95	34.95
RASTER BLASTER D	21.95	29.95
BUG ATTACK D/T	21.95	29.95
POGOMAN D/T	30.95	39.95
TEXT WIZARD D	74.95	99.95
CANYON CLIMBER D/T	22.45	29.95
PACIFIC COAST HIGHWAY D/T	22.45	29.95
WORDRACE D	17.95	24.95
COMPU-READ D	21.95	29.95
MATCH RACERS D	21.95	29.95
PATHFINDER D	25.95	34.95

	SALE	RETAIL
CRYPTS of TERROR D	25.95	34.95
INTRUDER D	25.95	34.95
ALIEN NUMBERS D	24.95	34.95
POOL 400 C	31.95	39.95
SPEEDWAY BLAST D	30.95	39.95
ACTION QUEST D/T	21.95	29.95
GHOST ENCOUNTERS D/T	21.95	29.95
K-DOS D	69.95	89.95
CROSSWORD MAGIC D	35.95	49.95
MASTER TYPE D	31.95	39.95
LETTER PERFECT D	119.95	149.95
CROSSFIRE D/T	22.45	29.95
MOUSEATTACK D	22.45	34.95
FROGGER D/T	25.95	34.95
GALACTIC CHASE D	21.95	29.95

	SALE	RETAIL
ALI BABA D	23.95	32.95
GORF D	29.95	39.95
WIZARD of WOR D	29.95	39.95
SNEAKERS D	21.95	29.95
SNAKE BYTE D	19.95	29.95
BANDITS D	25.95	34.95
SNOOPER TROOPS #1 D	34.95	44.95
SNOOPER TROOPS #2 D	34.95	44.95
ADVENTURE on a BOAT D	17.95	24.95
BLACK FOREST D	17.95	24.95
DISK MANAGER D	21.95	29.95
PROTECTOR II D	24.95	34.95
SLIME D	25.95	34.95
SHAMUS D	25.95	34.95
WARLOCK'S REVENGE D	24.95	34.95
PROBE I D	24.95	34.95
KID GRID D/T	22.45	29.95
FIREBIRD C	29.95	39.95
DEADLINE D	37.95	49.95
ZORK I D	28.95	39.95
CYPHER BOWL T	37.95	49.95
CRUSH, CRUMBLE & CHOMP D	21.95	29.95
EMPIRE of the OVERMIND D	24.95	35.00

	SALE	RETAIL
MINER 2049er C	37.95	49.95
APPLE PANIC D	21.95	29.95
MICROPAINTER D	25.95	34.95
BASEBALL D	24.95	34.95
K-RAZY KRITTERS C	37.95	49.95
SAMMY the SEA SERPENT D	18.95	23.95
FACE MAKER D	25.95	34.95
THE SHATTERED ALLIANCE D	31.95	39.95

D—DISK T—CASSETTE C—CART

BUY NOW! Prices will never be this LOW again and quantities of items are limited!

CHARGE IT! use your VISA or MASTERCARD!

JUST A SAMPLE OF THE SAVINGS YOU'LL FIND!
CALL IF YOUR PRODUCT IS NOT LISTED!

FOR ORDERING ONLY CALL
1-800-547-8009

QUICKSOFT™
Department 97, P.O. Box 10854 Eugene, OR 97440

FOR INFORMATION OR ORDERING IN OREGON CALL
1-503-342-1298
No C.O.D. orders at sale prices.
FREE SHIPPING on orders of $100.00 or more.

Terms of this sale: Add 4% for Visa and Mastercard orders. All items subject to prior sale. Prices subject to change without notice.

THE AUSTIN EQUATION

400 + 150 = 800

MEMORY POWER FOR YOUR ATARI 400* COMPUTER

$149.95 Sugg. list.

48K AUSTIN BOARD™

AUSTIN BOARD™ FEATURES

- 64K RAM Technology for improved reliability & lowest power consumption.
- Superior CAD/CAM generated P.C. design.
- Complete bank and board de-coupling for cleanest signal possible.
- Gold edge connectors.
- Lifetime warranty.
- P.C. template provided for easy ATARI 400* installation.
- Full testing.
- ATARI 800* compatability with optional loop-back card (available for $5.00 additional).

32K AUSTIN BOARD $94.95 SUGG. LIST

AUSTIN FRANKLIN ASSOCIATES

617-772-0352

43 GROVE STREET, AYER, MA 01432

M/C, VISA & COD ACCEPTED DEALER INQUIRIES INVITED

*ATARI IS A REGISTERED TRADEMARK OF ATARI, INC.

UTILITY# 4: DISK DIRECTORY DUMP

16K disk

by Tony Messina

This issue's utility is rather simple in nature but can prove quite helpful when trying to remember what program is on which diskette. In order for this utility to work you need the following items. 1) A disk drive 2) a printer (40 or 80 column) 3) an ATARI computer with a least 16k of memory. The utility itself will give you a neat, formatted hardcopy of your disk directory (I told you it was simple!). The following article should also give you a general idea about IOCB's and the OPEN/CLOSE statements which are part of the BASIC repertoire.

IOCB's

Many programs appearing in **A.N.A.L.O.G.** use OPEN and CLOSE statements to perform a particular function. I'm sure such questions as (What is being opened/closed, How/Why is it being opened/closed and How can I open/close my own things?) has crossed your mind, so now would be a good time to find out what it's all about!!

One of the most difficult things to do on any computer is INPUT/OUTPUT or I/O for short. Would you like to write the program (commonly called a driver) to print to the printer or list to the disk or input a character from the keyboard?? It really isn't all that fun. Thanks to those great ATARI folks who designed our systems, (the operating system in particular), we don't have to worry too much about the above-mentioned items. We can control our I/O through an IOCB or Input Output Control Block. The operating system has eight IOCBs. Each IOCB contains information as to the nature of the device we want to communicate with, where the driver for the device is located, where the buffer for the device is located, length of the buffer, the command we are trying to execute on the device (OPEN, CLOSE, PUT CHARACTER, GET CHARACTER etc), Timeout values (i.e. how long do we try to execute a command before we decide to give up) etc. This information is used by the Central Input/Output (CIO) portion of the operating system when communicating with the device on the IOCB specified. Now that we know about IOCBs, lets look at how we set them up.

OPEN/CLOSE

The OPEN command allows us to communicate with a device using the CIO facility. We don't have to know maching language to access a device... we can use BASIC instead! OPEN just dedicates an IOCB to perform our command. We can think of it as opening a hotline to our device. The line will stay open until we hang up or CLOSE it. The form of the OPEN command is as follows:

OPEN #IOCB,I/O CODE, SPECIAL, DEVICE

Parameters can take on the following values:

IOCB - Any number from 0-7, Usually only 1-5 is best since the operating system uses IOCB 0 for the screen/editor, 6 for any graphics window (I'm sure you all have used a PRINT #6 statement), and 7 for LPRINT and Cassette I/O.

I/O CODE - 4=INPUT, 8=OUTPUT, 12=INPUT and OUTPUT, 6=DISK DIRECTORY INPUT, and 9=OUTPUT (APPEND TO END OF FILE)

SPECIAL - Is usually 0 but can be filled in based on the device you are using. If you are opening a screen mode other then GR.0, you would need to put the GR. mode number in the SPECIAL parameter. If you have a sideways printing printer (say that 10 times quickly), you could get it to print sideways by putting 83 as the SPECIAL parameter. When in doubt, use 0.

DEVICE - Devices which we can control and which BASIC knows about are the KEYBOARD "K:", GRAPHICS WINDOW "S:", PRINTER "P:", CASSETTE "C:", DISK FILE "D:filename.ext", SCREEN EDITOR "E:", and RS232 PORTS "R:"

When opening a device we must make sure that the parameters make sense. We wouldn't want to open a printer for INPUT and OUTPUT since most printers only allow OUTPUT. It also wouldn't make sense to open the graphics window for DISK DIRECTORY INPUT. See...it's not all that complicated now is it??

NOW WHAT HAPPENS?

Once we have opened a device there are many things which can be done. Commands such as PUT #, GET #, PRINT #, etc can be executed by BASIC directly to the device we have opened. The only thing we have to remember is not to use an invalid command for the I/O CODE selected. If we opened the GRAPHICS WINDOW for OUTPUT for example, then we could not use the GET command. Experiment using OPEN with its associated commands and you'll soon become proficient in the mysterious world of ATARI I/O.

WE NOW RETURN TO EARTH OR HOW UTILITY #4 USES THIS STUFF

This issue's utility opens 2 IOCBs. IOCB 1 is opened for output to the printer LINE 220 and IOCB 2 is opened for disk directory input LINE 230. The filename to get has been set to "D:*.*" since we want them all. DEV$ is simply set to "P:" for the printer, I set all my codes to constants for easier reading. The values can be found in LINES 115-125. With these two IOCBs open the rest of the utility is a snap. We input a file name in LINE 380 and output it to the printer. A nice thing about the directory input command is that it also returns the number of FREE SECTORS after the last filename has been input. Line 385 checks for this and routes us to LINE 420 when we are done. Another item to note is that the printer now recognizes ; and , so that we can format our output. LPRINT under certain circumstances will recognize these two characters but it's best to open a channel to the printer and do a PRINT # instead. This way we can be sure of obtaining the desired results. The remainder of the utility performs error checks and issues prompts for the user. All of the major sections have been block commented and should present no major problems when you try and figure out what is being done.

HOW TO USE UTILITY #4

Type in the listing and save it to your disk. You can now run the program. If you forget to turn on your printer or disk you will be razzed until you do. Just follow the prompts and you'll soon have a listing of all your directories. You can even print a title (18 characters max) for each of your directories to help jog your memory. One last note. If your printer doesn't support the expanded print mode then you must change LINE 305 by deleting the ESC ESC CNTL N sequence and also deleting the *2) from the centering calculation. If you have an EPSON printer just change the code for expanded print to your appropriate code.

That wraps it up for this issue. Have fun and I hope I have provided you with another useful aid. Keep those ideas, questions, and comments rolling in. Till next issue HAPPY COMPUTING!! □

```
10 REM ********************************
15 REM *        UTILITY  #4           *
20 REM *       DISKCAT VER.1          *
25 REM *      BY TONY MESSINA         *
30 REM * FOR A.N.A.L.O.G. COMPUTING *
35 REM ********************************
40 REM *
45 REM ************************
50 REM * MAKE SCREEN TITLE *
55 REM ************************
60 REM *
65 GRAPHICS 2:START=PEEK(560)+PEEK(561
)*256:POKE START+9,6:POKE START+10,6:P
OKE START+11,5:POKE START+13,5
70 POKE 712,32:POKE 711,10
75 ? #6;"     Utility # 4":? #6:? #6;"
   Disk Dir DuMP":? #6;" =============
=======":? #6;"          BY"
80 ? #6;"     Tony Messina":? #6;"  Co
pyright  A.N.A.L.O.G  Computing":? #6;
"      1983"
85 ? #6;"                Issue # 10":?
#6;" ================="
90 REM *
95 REM ******************
100 REM * VARIABLE INIT *
105 REM ******************
110 REM *
115 DIM DEV$(2):DIM TAB$(40):DIM DIREC
TORY$(5):DIM FILENAME$(19):DIM AN$(1)
120 DIRECTORY$="D:*.*":TAB$="
                            "
125 DISK=2:PRNTER=1:DIRTAB=10:COLWID=4
0:OUTPUT=8:NULL=0:DIRIN=6:COUNT=3:SPAC
E=3
130 REM *
135 REM ******************
140 REM * GET USER INPUT *
145 REM ******************
150 REM *
155 ? "K"
160 DEV$="P:":TRAP 505:? "COLUMN WIDTH
 (40 OR 80) ";:INPUT WIDTH
165 IF WIDTH<>40 AND WIDTH<>80 THEN GO
TO 160
170 IF WIDTH=80 THEN COLWID=WIDTH:GOTO
 215
175 DIRTAB=1:COUNT=2:SPACE=2
180 ?
185 REM *
190 REM ***********************
195 REM * OPEN DEVICE$ FOR *
200 REM *   INPUT/OUTPUT   *
205 REM ***********************
210 REM *
215 TRAP 495:LPRINT
220 OPEN #PRNTER,OUTPUT,NULL,DEV$
225 TRAP 500
230 OPEN #DISK,DIRIN,NULL,DIRECTORY$
235 REM *
240 REM ************************
245 REM * ASK FOR HEADER NAME *
250 REM ************************
255 REM *
260 ? "ENTER DISK TITLE ";:INPUT FILEN
AME$
265 IF FILENAME$="" THEN FILENAME$="-D
EFAULT NAME-"
270 REM *
275 REM ******************
280 REM * PRINT TITLE OUT *
285 REM ******************
290 REM *
295 IF LEN(FILENAME$)>18 THEN GOTO 510
300 TRAP 510
305 PRINT #PRNTER;TAB$(1,INT((COLWID-(
LEN(FILENAME$)*2))/2));"K_";FILENAME$
310 ? #PRNTER:? #PRNTER;TAB$(1,DIRTAB)
;
315 REM *
320 REM ******************
325 REM * PRINT COLUMN ID *
330 REM ******************
335 REM *
340 FOR HEADCNT=1 TO COUNT:? #PRNTER;"
  FILNAME/EXT LEN";TAB$(1,SPACE);:NEXT
 HEADCNT:? #PRNTER
345 ? #PRNTER:? #PRNTER;TAB$(1,DIRTAB)
;
350 REM *
355 REM ***************************
360 REM * GET FILENAMES AND PRINT *
365 REM ***************************
370 REM *
375 FOR X=1 TO COUNT
380 INPUT #DISK,FILENAME$
385 IF LEN(FILENAME$)<17 THEN ? #PRNTE
R:? #PRNTER;TAB$(1,((COLWID-16)/2)-1);
FILENAME$:GOTO 420
390 ? #PRNTER;FILENAME$;TAB$(1,SPACE);
:NEXT X:GOTO 345
395 REM *
400 REM ************************
405 REM * CK IF USER WANTS MORE *
410 REM ************************
```

```
415 REM *
420 CLOSE #DISK:CLOSE #PRNTER
425 ? "DO ANOTHER Y/N ";:INPUT AN$
430 IF AN$<>"Y" AND AN$<>"N" THEN GO
TO 420
435 IF AN$="N" THEN ? "DIRDMP DONE!":
GOTO 460
440 ? "USE SAME PARAMETERS (Y/N) ";:IN
PUT AN$
445 IF AN$<>"Y" AND AN$<>"N" THEN GO
TO 440
450 IF AN$="Y" THEN GOSUB 490:GOTO 22
0
455 GOSUB 490:RUN
460 END
465 REM *
470 REM **************************
475 REM *  ERROR TRAPS FOLLOW  *
480 REM **************************
485 REM *
490 ? "INSERT NEW DISK AND HIT <RETUR
N>.";:INPUT AN$:RETURN
495 ? "PRINTER DOES NOT RESPOND!!!":G
OTO 160
500 ? "DISK DOES NOT RESPOND!!!":CLOS
E #PRNTER:GOTO 160
505 ? "INPUT ERROR (ONLY NUMBERS PLEA
SE).":GOTO 160
510 ? "NAME TOO LONG!!!":? "MAX LENGT
H IS 18":GOTO 260
```

•

(see D:CHECK 2, p. 26)

```
10 DATA 771,6,123,386,973,790,73,36,95
7,38,77,893,96,789,414,6422
85 DATA 138,83,555,565,775,274,620,478
,181,280,600,328,603,286,382,6148
160 DATA 891,741,931,154,909,300,49,94
0,821,29,276,732,876,711,271,8631
235 DATA 287,288,220,291,293,179,615,2
94,811,693,814,300,828,705,370,6988
310 DATA 166,283,793,563,796,289,603,1
80,290,366,580,369,296,778,660,7012
385 DATA 23,135,307,293,438,296,285,96
5,318,322,55,17,334,135,534,4457
460 DATA 50,300,117,84,120,306,488,404
,898,979,580,4326
```

•

D:CHECK II

16K disk

D:CHECK by Istvan Mohos
Revision 2 changes by Tom Hudson

In issue #8 of **A.N.A.L.O.G.** we introduced a program called D:CHECK, written by Istvan Mohos. D:CHECK's purpose was noble enough: help disk users to find typographical errors in the programs they typed in from the magazine. Unfortunately, D:CHECK has a minor flaw that can cause some confusion. This article will present a set of modifications to D:CHECK that will correct the problems.

The Changes

For those who already use D:CHECK, there are only a few changes. The lines affected are 105, 125, 130, 140, 150, 360 and 365. For those who do not use D:CHECK yet, the entire program with changes is listed at the end of this article.

The main problem with D:CHECK shows up if (1) an entire line is missing or (2) a line is mistyped with a different number of characters than the original. Either of these problems may confuse the checksum routine in D:CHECK, giving incorrect checksum values for the rest of the program.

Since the new checksum routine will only work with programs starting with issue #10, D:CHECK2 will ask for the issue number. If the program being checked is from an earlier issue, D:CHECK2 will use the old checksum routine, and so will match the D:CHECK DATA from that issue. This was done so that readers who order back issues will be able to check those programs with the new CHECK program.

The last modification allows the user to simply enter the filename (D:filename) to be CHECKed. □

Description of Changes

LINE	DESCRIPTION
105	Revision 2 credit.
125	Set up a string for the filename.
130	Accept the filename via INPUT statement. (Remember to use the "D:" prefix!)
140	Find out what issue the program is from.
150	OPEN the requested file (LIST format).
360-365	Adjust checksum routine if program is from issue #10 or later.

Abbreviated Instructions

For those who have not used D:CHECK, here is a step-by-step explanation of how to use D:CHECK2:

1. Type in the program listing from the magazine. (DO NOT type in the "D:CHECK2 DATA"!)
2. LIST your program out to the disk (i.e. LIST "D:yourprog").
3. RUN D:CHECK2.
4. D:CHECK2 will ask for filename. Respond "D:yourprog".
5. D:CHECK2 will ask for the issue number. If the program you are checking is from issue 10, type "10".
6. D:CHECK2 will execute and display final instructions. At this time you can check the D:CHECK2 DATA from the magazine against the results D:CHECK2 put out to the file called "BUG".
7. If your BUG data does not match the D:CHECK2 DATA, check the line that corresponds to the DATA value that is incorrect. For example:
   100 DATA 234, 34, 120, 254, 23, 78, 34,
   198, 202, 134, 233, 102, 97, 134, 33, 1910

In the above line of BUG, if the value 254 is incorrect, then the third line after line 100 in your program is incorrect. Note all errors and then ENTER your program in order to correct it. □

```
100 REM CHECK DEBUGGING AID
    BY  ISTVAN MOHOS
105 REM VERSION 2 MODS BY TOM HUDSON
110 GRAPHICS 0:? :? "This run will LIS
T data statements    with the name: BU
G, to the disk."
120 ? :? "The BUG DATA is created by e
valuating each character of a user pro
gram,     LISTed to disk.":?
125 DIM FI$(15)
130 ? "ENTER FILENAME";:INPUT FI$
135 PIK=PEEK(559):Z=0:REM Constants
140 ? :? "ENTER ISSUE NUMBER";:TRAP 14
0:INPUT ISSUE
150 TRAP 130:OPEN #1,4,0,FI$
160 ON X GOTO 230,330
170 ? "K":? "DISABLING SCREEN...STAND
BY...":FOR I=1 TO 800:NEXT I:POKE 559,
Z:REM debug before poking
180 LINECOUNT=Z:DIM I$(126)
190 TRAP 210:INPUT #1;I$:LINECOUNT=LIN
ECOUNT+1
200 GOTO 190
210 CLOSE #1:Q=INT(LINECOUNT/15):DIM C
(LINECOUNT),R(Q),S$(5):IF (LINECOUNT=Z
 OR I$="") THEN 560
215 IF ASC(I$(1,1))<48 OR ASC(I$(1,1))
>57 THEN 560
220 X=1:GOTO 150
230 RANGE=Z:LINE=Z:FOR I=1 TO 5:S$(I,I
)=" ":NEXT I
240 COUNT=Z
250 INPUT #1;I$:T=1:COUNT=COUNT+1
260 IF I$(T,T)<>" " THEN S$(T,T)=I$(T,
T):T=T+1:GOTO 260
```

```
270 LINE=VAL(S$)
280 R(RANGE)=LINE:RANGE=RANGE+1
290 TRAP 320:INPUT #1;I$
300 COUNT=COUNT+1:IF COUNT=15 THEN 240
310 GOTO 290
320 CLOSE #1:X=2:GOTO 150
330 FOR I=1 TO LINECOUNT:CHECKSUM=Z
340 GET #1,NUMBER:PRODUCT=X*NUMBER:CHE
CKSUM=CHECKSUM+PRODUCT:X=X+1:IF X=4 TH
EN X=1
345 IF NUMBER=155 THEN 360
350 GOTO 340
360 CHECKSUM=CHECKSUM-1000*INT(CHECKSU
M/1000):C(I)=CHECKSUM:IF I55UE)9 THEN
X=2
365 NEXT I
370 CLOSE #1:OPEN #1,8,0,"D:BUG":LINE=
R(Z):ITEM=Z
380 COUNT=15:TOTAL=Z:IF LINECOUNT(15 T
HEN COUNT=LINECOUNT
390 PRINT #1;LINE;" DATA ";
400 FOR I=1 TO COUNT:DATUM=C(15*ITEM+I
):PRINT #1;DATUM;",";:TOTAL=TOTAL+DATU
M:NEXT I
410 PRINT #1;TOTAL
420 ITEM=ITEM+1:LINECOUNT=LINECOUNT-15
:IF LINECOUNT(1 THEN 450
430 LINE=R(ITEM)
440 GOTO 380
450 CLOSE #1:POKE 559,PIK
460 ? "↖↘To check BUG data against pri
nted     data statements, type NEW. Th
en type:"
470 ? "ENTER ";CHR$(34);"D:BUGRETURN
                    Type LIST after the
READY prompt."
480 ? :? "The line number of each data
 statementcoincides with the first lin
e of the"
490 ? "user program which the data sta
tement evaluates."
500 ? "Numbers within each data statem
ent     represent consecutive lines of
the     user program."
510 ? "The last number is the total."
520 ? :? "Check the last number of eac
h state-  ment against the printed ver
sion;"
530 ? "only in case of a discrepancy c
heck    each number in the data stateme
nt."
540 ? "Make note of the lines containi
ng the bugs. Then ENTER ";CHR$(34);"D:
yourprogRETURN"
550 ? "to make the corrections.";:END
560 POKE 559,PIK:? "↖↘":? "Your typed-
in program was not properlyLISTed to d
isk."
570 ? :? "Please LIST your program to
disk, thenRUN ";CHR$(34);"D:CHECK";CHR
$(34);" again.":CLR :END
```

(see D:CHECK 2, p. 26)

```
100 DATA 198,8,224,960,864,530,628,951
,694,717,939,611,599,712,970,9605
215 DATA 480,344,376,683,582,817,457,5
76,232,67,719,435,930,528,324,7550
350 DATA 718,723,755,436,253,444,269,5
65,540,450,729,508,812,331,524,8057
490 DATA 255,665,387,213,132,709,489,7
83,509,4142
```

CONTROL CHARACTERS

Some program listings reproduced in A.N.A.L.O.G. may contain "strange" characters not shown on the ATARI keyboard. These are special characters which use the CTRL, ESC and "ATARI LOGO" (INVERSE) keys. Shown below is a list of these characters and the keystrokes used to get them. □

♥ --- CTRL ,
├ --- CTRL A
┤ --- CTRL B
┘ --- CTRL C
┤ --- CTRL D
┐ --- CTRL E
/ --- CTRL F
\ --- CTRL G
◢ --- CTRL H
▝ --- CTRL I
◣ --- CTRL J
▘ --- CTRL K
▖ --- CTRL L
▔ --- CTRL M
▁ --- CTRL N
▗ --- CTRL O
┼ --- CTRL P
┌ --- CTRL Q
▬ --- CTRL R
┼ --- CTRL S
● --- CTRL T
▄ --- CTRL U
▕ --- CTRL V
┬ --- CTRL W
┴ --- CTRL X
▌ --- CTRL Y

└ --- CTRL Z
ESC ESC
↑ --- ESC CTRL UP-ARROW
↓ --- ESC CTRL DOWN-ARROW
← --- ESC CTRL LEFT-ARROW
→ --- ESC CTRL RIGHT-ARROW
♦ --- CTRL .
♠ --- CTRL ;
↖ --- ESC SHIFT CLEAR
◀ --- ESC BACK S
▶ --- ESC TAB
♥ --- INVERSE CTRL ,
▒ --- INVERSE CTRL A
▒ --- INVERSE CTRL B
▒ --- INVERSE CTRL C
▒ --- INVERSE CTRL D
▒ --- INVERSE CTRL E
▒ --- INVERSE CTRL F
▒ --- INVERSE CTRL G
▒ --- INVERSE CTRL H
▒ --- INVERSE CTRL I
▒ --- INVERSE CTRL J
▒ --- INVERSE CTRL K
▒ --- INVERSE CTRL L

▒ --- INVERSE CTRL M
▒ --- INVERSE CTRL N
▒ --- INVERSE CTRL O
▒ --- INVERSE CTRL P
▒ --- INVERSE CTRL Q
▒ --- INVERSE CTRL R
▒ --- INVERSE CTRL S
▒ --- INVERSE CTRL T
▒ --- INVERSE CTRL U
▒ --- INVERSE CTRL V
▒ --- INVERSE CTRL W
▒ --- INVERSE CTRL X
▒ --- INVERSE CTRL Y
▒ --- INVERSE CTRL Z
▒ --- ESC DELETE
▒ --- ESC INSERT
▒ --- ESC CTRL TAB (CLR)
▒ --- ESC SHIFT TAB (SET)
▒ --- INVERSE SPACE
▒ --- INVERSE _
▒ --- INVERSE CTRL .
▒ --- INVERSE CTRL ;
▒ --- INVERSE |
▒ --- ESC CTRL 2
▒ --- ESC CTRL BACK S
▒ --- ESC CTRL INSERT

MAGIC KEYPAD

A Program that writes Data Statements for your ATARI

16K disk

by Greg Peck

I'm sure that you will agree that one of the most tedious activities on your computer is typing in DATA statements. Whether it's from a listing in your favorite magazine or a piece of music to dress up your program, it tends to be more work than it's worth.

Well, your worries are over. MAGIC KEYPAD will take care of the work for you. All you do is type in the data and MAGIC KEYPAD will take care of line numbers, the command, commas, how much will fit on each logical line and LIST the file to your disk. And that's not all! You also have the option of a numeric keypad.

The program checks keyboard input and changes U,I,O into 4,5,6; J,K,L into 1,2,3 and M into 0. Presto! You've got a numeric keypad. Granted, it's not perfect, but for the price it will do quite well. I got the idea from an ad for that little Epson computer.

To use the program, begin by answering the prompts. First, you select to either pack (fill to capacity) the DATA statements or have from 1 to 9 separate elements in each DATA statement. Then choose whether you want the keypad or not. After that, type in the first line number to be used in the DATA statements. The lowest line number available is 500 to prevent the DATA statements from writing over part of the program. The last prompt to answer is the file name. Your DATA statements will be LISTed under this name, so be sure it hasn't been used before. Later, you can ENTER the DATA statements into your program.

You will then be told the line number and the current number of the "data element" you are working on. Just type in whatever you want in the DATA statement and press RETURN. Everything will be taken care of. Type "1E9" if you want to move to the next line number. When you're done just type "END" as your response to the prompt. The screen will go blank while the program is erased and the data statements are LISTed to the disk drive. The READY prompt will then appear on the screen. If you type LIST you will see the DATA statements that the program wrote. □

Lines 10-100 set up the strings and prompts the user. Each input is trapped so that an error will not stop the program.

Lines 110-120 establishes the file name to be listed later and sets LL (Line Length) to 10 to cover the line number and command.

Lines 130-240 contains the loop that controls data input. It loops once for each element in the DATA statement. NOE is the variable for the Number Of Elements. Then, it checks FLAG to see if the user wants to use the keypad. Lines 170 & 180 check for flags to jump out of the loop. Lines 190 & 200 check the line length. Line 210 adds a comma if needed. Line 220 takes care of the first element in the DATA statement. Line 230 adds the most recent input to LINE$.

Lines 250-290 clear the screen, print the DATA statement, turns on the FORCED READ, stops the program, turns off the FORCED READ and returns to the main program loop.

Lines 300-390 create the numeric keypad. If the RETURN key is pressed, K will equal 155 and the program will return to the main loop.

Lines 400-470 deletes the program and LIST the DATA statements to the disk drive under the name input at the beginning of the program. Line 470 ends the program and returns the computer to the normal operating mode.

Variable Table for MAGIC KEYPAD.

E$ - holds user input
LINE$ - the content of the DATA statement
C$ - a comma ","
CO$ - the command "DATA"
NAME$ - name of file
NM$ - "D: (added to NAME$ for disk operation)
K - number of character from Keyboard
NOE - Number Of Elements

FLAG - 1=keypad input 1=normal input
LN - current Line Number
I - counter in main program loop
LL - Line Length
X - first line number and counter in keypad
for - next loop

```
10 DIM E$(200),LINE$(200),C$(5),CO$(10
),NM$(10),NAME$(10):C$=",":CO$=" DATA
"
20 GRAPHICS 0:? :? :? " ENTER NUMBER O
F ELEMENTS (LIMIT 9)     OR PRESS 'P' T
O PACK DATA"
30 OPEN #3,4,0,"K:":GET #3,K:CLOSE #3:
IF CHR$(K)="P" THEN NOE=50:GOTO 60
40 TRAP 40000:TRAP 40:IF VAL(CHR$(K))>
0 AND VAL(CHR$(K))<10 THEN NOE=VAL(CHR
$(K)):GOTO 60
50 GOTO 20
60 ? :? " PRESS 'K' TO USE KEYPAD":OPE
N #3,4,0,"K:":GET #3,K:CLOSE #3:POKE 7
64,255:IF CHR$(K)="K" THEN FLAG=1
70 TRAP 40000:TRAP 70:? :? :? " INPUT
FIRST LINE NUMBER ":INPUT X:LN=X-10:IF
 X<500 THEN 70
80 TRAP 40000:TRAP 80:? :? :? " INPUT
NAME OF FILE (8 LETTERS MAX.)":INPUT N
AME$
90 IF LEN(NAME$)<1 OR LEN(NAME$)>8 THE
N 80
100 IF NAME$(1,1)=" " THEN 80
110 READ NM$:NM$(LEN(NM$)+1)=NAME$:LL=
10
120 DATA "D:
130 FOR I=1 TO NOE:? "K";? :? "1E9 WRI
TES DATA     'END' ENDS PROGRAM":E$=" "
140 ? "↓↓↓INPUT ELEMENT NO. ";I;" LINE
 NO. ";LN+10
150 IF FLAG<>1 THEN INPUT E$
160 IF FLAG=1 THEN GOSUB 300
170 IF E$="1E9" THEN GOTO 250
180 IF E$="END" THEN 400
190 LL=LL+(LEN(E$))+1:IF LL>114 AND NO
E<10 THEN GOTO 20
200 IF LL>114 THEN 250
210 IF I>1 THEN LINE$(LEN(LINE$)+1)=C$
220 IF I=1 THEN LINE$=E$
230 IF I>1 THEN LINE$(LEN(LINE$)+1)=E$
240 NEXT I
250 POKE 709,4:? "K":LN=LN+10:POSITION
 2,5:? LN;CO$;LINE$:? " CONT "
260 POSITION 0,0:POKE 842,13:STOP
270 POKE 842,12:? "K":POKE 709,10:IF E
$="1E9" THEN I=0:GOTO 130
280 IF I<NOE THEN I=1:LL=10:GOTO 220
290 GOTO 130
300 FOR X=1 TO 111:OPEN #3,4,0,"K:":GE
T #3,K:CLOSE #3:IF K=155 THEN RETURN
310 IF CHR$(K)="U" THEN ? "4";:E$(X,X)
="4":GOTO 390
320 IF CHR$(K)="I" THEN ? "5";:E$(X,X)
="5":GOTO 390
330 IF CHR$(K)="O" THEN ? "6";:E$(X,X)
="6":GOTO 390
340 IF CHR$(K)="J" THEN ? "1";:E$(X,X)
="1":GOTO 390
350 IF CHR$(K)="K" THEN ? "2";:E$(X,X)
="2":GOTO 390
360 IF CHR$(K)="L" THEN ? "3";:E$(X,X)
="3":GOTO 390
370 IF CHR$(K)="M" THEN ? "0";:E$(X,X)
="0":GOTO 390
380 ? CHR$(K);:E$(X,X)=CHR$(K)
390 NEXT X:RETURN
400 POKE 709,4:? "K":POSITION 2,5:FOR
I=10 TO 180 STEP 10:? I:NEXT I:? "CONT
 "
410 POSITION 0,0:POKE 842,13:STOP
420 POKE 842,12:? "K":POSITION 2,5:FOR
 I=190 TO 300 STEP 10:? I:NEXT I:? "CO
NT"
430 POSITION 0,0:POKE 842,13:STOP
440 POKE 842,12:? "K":POSITION 2,5:FOR
 I=310 TO 400 STEP 10:? I:NEXT I:? "CO
NT"
450 POSITION 0,0:POKE 842,13:STOP
460 POKE 842,12:? "K":POSITION 2,5:FOR
 I=410 TO 470 STEP 10:? I:NEXT I:? "LI
ST ";NM$:? :? :? :? :?
470 ? "POKE 842,12:POKE 709,10:GR.0:EN
D":POSITION 0,0:POKE 842,13:STOP
```

•

(see D:CHECK 2, p. 26)

```
10 DATA 134,191,649,809,610,952,247,99
0,298,357,291,664,520,121,843,7676
160 DATA 791,551,59,999,874,559,141,56
9,742,566,615,871,834,721,176,9068
310 DATA 144,116,142,105,116,127,118,7
15,795,588,604,205,610,199,616,5200
460 DATA 349,679,1028
```

The Light Pen at the Right Price:

Shown actual size.

$29.95 Each

SPECIAL INTRODUCTORY OFFER!

Less is more. This maxim has never been more true than now with the introduction of our new Edumate Light Pen. This affordable and reliable tool was originally designed and developed for use with our Learning Center educational software—however, it is the perfect accessory for your Atari 400/800, VIC-20 or Commodore 64, regardless of application. Response has been so overwhelming that we now announce a new price schedule for quantity orders:

1-4—$29.95 each

5-24—$20.97 each 25-99—$19.48 each

100 and more—$17.97 each

Order now! See your local dealer or order direct.
New catalog $2.00. Visa and MasterCard accepted—
please add $2.00 for postage and handling.
Call toll free!

1-800-334-SOFT

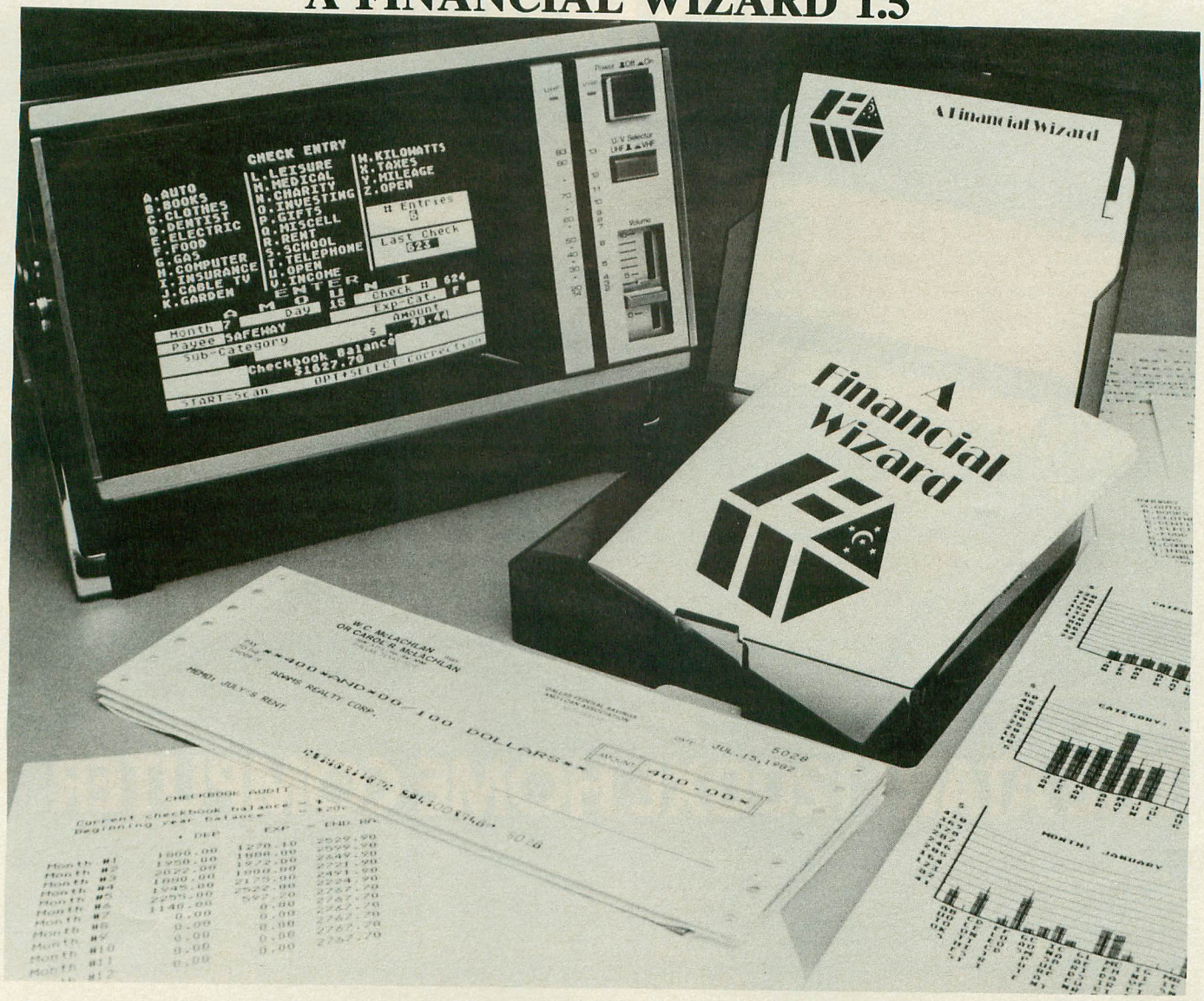
DEALER INQUIRIES INVITED

programmer's institute

a division of **FUTURE HOUSE** — dept. al
p.o. box 3470, chapel hill, north carolina 27514, 919-967-0861

1983 - Take Control

A FINANCIAL WIZARD 1.5



THE HIGHLY ACCLAIMED PERSONAL FINANCE SYSTEM FOR ATARI*

- **Budget Forecast**–26 expense categories
- **Check Entry**–easy data entry–scan & modify 26 major & 36 sub-categories–information block
- **Check Search**–single or multiple parameters–(up to seven) to search entries
- **Tabulations**–detailed expense vs. budget comparisons by month, year-to-date, category
- **Bar Graphs**–screen displays in graph form expenses vs. budget–by month or category–printing with graphic capable printers
- **Check Reconciliation**–fast clearing of resident checks & deposits, complete summary report
- **Checkwriter**–prints your custom checks
- **Printouts**–most popular printers • **Audit Report**
- **Multi-Colored Graphics** • **Audio Enhancements**
- **7 Utility Programs** • **User-Friendly Operation**
- **Easy To Use Instruction Manual**
- **Handsome Tinted Plastic Storage Case**

The system is designed for Atari computers having a minimum of 24K and operating from a disk drive. The price is only $59.95 plus $3 for handling/postage. If your dealer does not have A Financial Wizard . . . Telephone orders are accepted on Mastercharge or Visa credit cards. Mail order must be accompanied by check or money-order or credit card #. Dealer Inquiries invited. (405)751-2783.

***trademark of Atari Inc.** **OK residents ad 4% Tax.**

A Financial Wizard Exclusively thru

ON LINE COMPUTER CENTERS of OKC ™

10944 North May
Oklahoma City, OK 73120
(405) 751-2781

☐ CHECK ENCLOSED ☐ VISA ☐ MASTERCHARGE

NAME (Print) _____

Address _____

City _____ State _____ Zip _____

Card # _____ Exp. _____ Sig. _____

IT'S HERE!

THE ATARI 1200XL HOME COMPUTER.

by Lee Pappas

"We at ATARI believe that the model 1200XL is a new generation in home computing, a culmination of our experience in hardware design." These words come from Raymond Kassar, ATARI's chairman and chief executive.

ATARI has just pulled the post-Christmas wrapping off of its latest personal computer — the 1200XL. New design. New features. New questions as to ATARI's place in the computing world. Last issue's editorial covered many of the problems ATARI has been experiencing of late, and although hardware wasn't the main problem we were concerned with, suddenly the 1200XL has been thrown upon us. Just what is the 1200; and what does it do that the 800 (and, for that matter, the 400) does not?

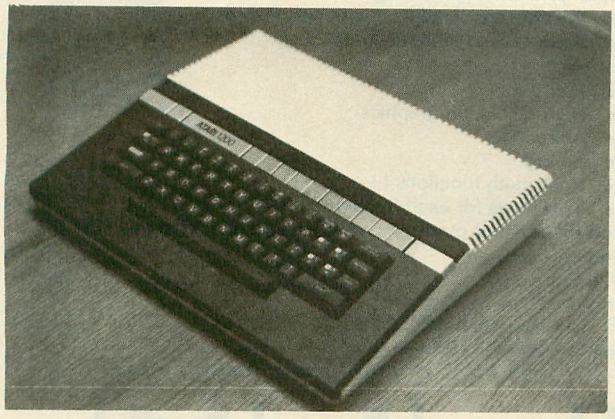
The 1200XL Differences

The 1200XL comes with 64K of RAM. As with the 800, once the BASIC cartridge is used, you are down to 37902 bytes of free RAM. However, there the similarities end. The 1200 has a 16K ROM pack compared to the 10K unit of its predecessors. The 16K ROM can be completely bypassed, and — with no ROM cartridge in the slot — it allows 64K. However, the computer will now be incapable of doing anything until the user puts in some sort of operating system. The expanded ROM operating system capabilities will be explained later on.

The most important feature of the 1200 however, is that it is **ALMOST** fully software compatible with the 400 and 800. Read ALMOST. We didn't have enough time to try all the software available, but we do know that Letter Perfect and several other programs will not operate on the 1200. LJK, for instance, has announced they will have a revised version for the 1200. Cartridges now go in the left hand side of the new computer. There is no door to open and close, and the power is automatically triggered to "reboot" any new cartridge inserted (no need to turn power on and off by hand — the computer knows how). Because of some physical differences, many third party cartridges will **NOT** fit in the 1200XL.

On the left panel is the on/off switch, and near the front, angled at about 30° are only two controller ports, not four. There are no openings of any kind on the front or right hand side; no cables dangling out all over the place. The channel selector switch, monitor

jack, TV cable plug, and serial port are all on the rear panel. The television cable has RCA type connectors and is removable so that all cables can be disconnected from the computer. The serial port is identical to that on the 400/800 and will take all the peripherals of its predecessors, although a new version of the 410 and 810 are on the way. The newer disk drive is rumored to have 180K of disk storage.

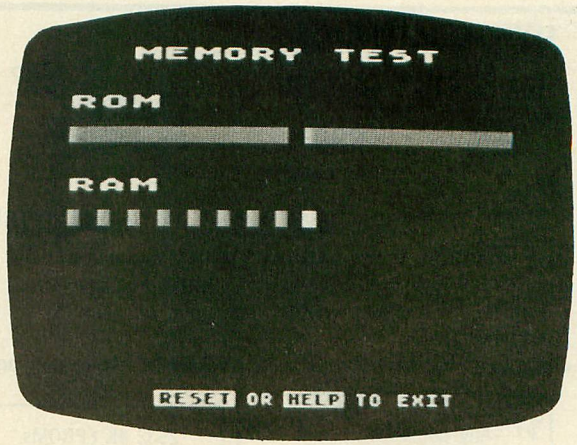


The 1200XL cabinet is a cream and dark brown high impact plastic, with a new brushed metal strip, where the new keys lie. Just above that is a clear plastic strip covering the 3 LEDs and key labels.

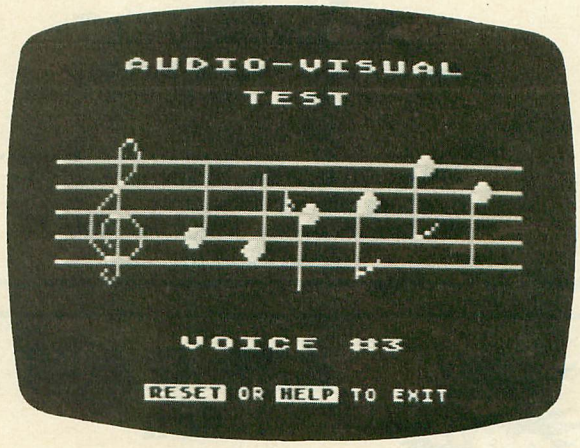
Special Features

The most radical difference in the 1200XL is the strip of metal keys residing just above the slightly rearranged keyboard. The 11 metal pushbuttons consist of the System Reset key, remotely located to the left of the 1200XL logo. This key is more difficult to press, making programming "accidents" less likely. To the right of the logo are the newly-positioned START, SELECT, and OPTION keys, followed by 4 new function keys, the HELP button, inverse video key (no more ATARI logo key on the keyboard), and the BREAK key.

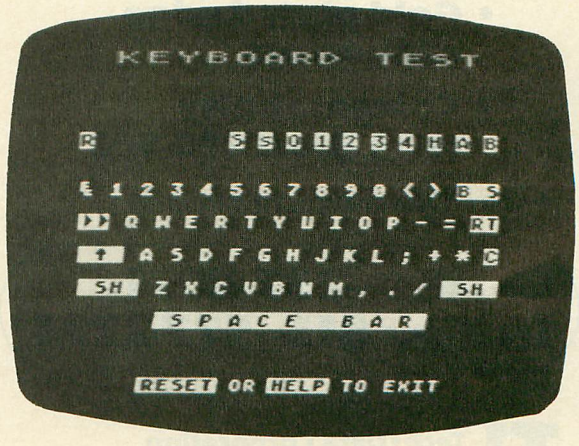
The HELP key will work with selected new programs, to aid the user in the use of that piece of software. When pressed with no cartridge in place, for instance, the computer displays the self-diagnostic mode. From here you can check for ROM errors, bad memory locations, the sound channels, and all the keys on the keyboard. All this is a little gimmicky, but it does work. The new function keys allow the user to move the cursor up, down, left, or right (these replicate those also found on the keyboard, but are one touch and don't require the use of the CONTROL key). If pressed with the SHIFT key, F1 will bring the cursor to the top left (HOME) position without clearing the screen. F2+SHIFT will bring the cursor to the bottom left corner. Function key F3+SHIFT will cause the cursor to move to the far left of a logical line, and F4+SHIFT moves the cursor to the far right of a line.



Selection 1 of the diagnostic HELP screen displays a ROM and RAM memory test.

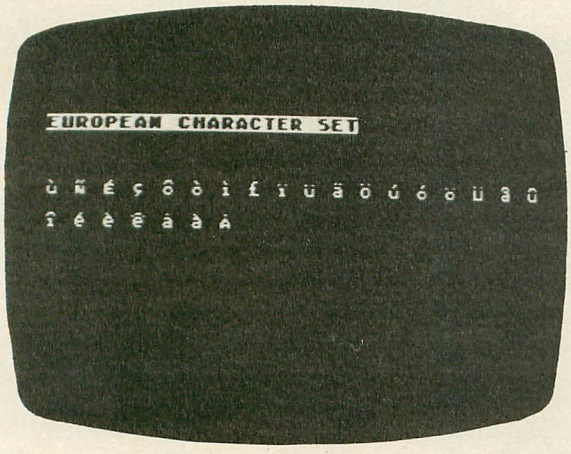


An audio-visual test in the diagnostic mode plays musical notes to check the POKEY chip for operation of all 4 voices.



The keyboard test allows the user to check any of the keys on the 1200XL for proper operation and contact.

When used with the CONTROL key, F1 will now disable the keyboard ("locking" it up so no one can type), and when pressed again will free it up. F2+CNTRL shuts off the screen DMA: when DMA (Direct Memory Access) is disabled, the screen goes black, and the processing of the computer is increased, as now it doesn't have to waste time putting information on the screen. Math calculations can be speeded up by as much as 35% by using this feature. At any time during a program, you can enable the screen to check what's going on, then shut the screen off again to speed things up. Function F3+CNTRL will shut off the keyboard "click". The 1200XL has no internal speaker — the keyboard clicking sound now comes from the TV or monitor. F4+CNTRL will give you the European character set.



Function key F4, when pressed with the CONTROL key, will provide the European Character set.

Also...

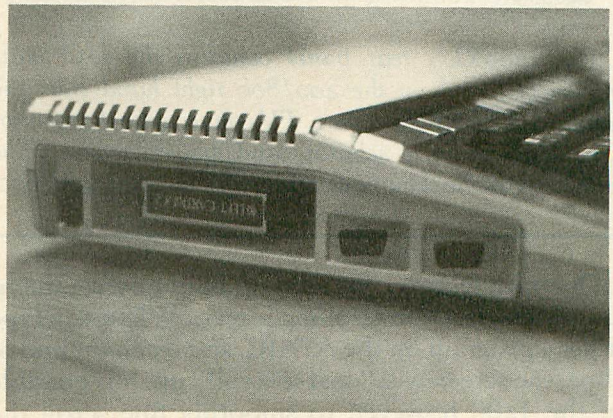
The inverse video key replaces (or rather duplicates) what the ATARI logo button on the 400/800 accomplished. There are also three LEDs, just above the 1200XL logo. One is for power ON; the others show various functions, such as European character set in use, etc.

Some of the software features of the 1200 include user programming of the function keys (even the HELP key). Also, most of the keys on the 1200 keyboard are redefinable. The keyboard is of the QWERTY type found on most typewriters, but through software you can change the keyboard format to Dvorak or alphabetical (see Issue 9, page 105).

The new operating system allows you to alter the rate of the auto-repeat. Through software you can have the characters put on the screen at either faster or slower rates, while holding down one character key.

Of course, the most visible attribute to the 1200XL is its sleek, low cabinet. I always thought of the 400/800 as quite futuristic, but next to the 1200XL, they do look rather "clunky." The inside of the 1200 is also sleek, as nearly all of the components are on a single board, thus reducing problems in reliability.

To quote ATARI, "with its user aids and beautiful packaging, the model 1200XL is one of the 'friendliest' computers ever built...it will be a handsome and useful addition to any home." I quite agree. □



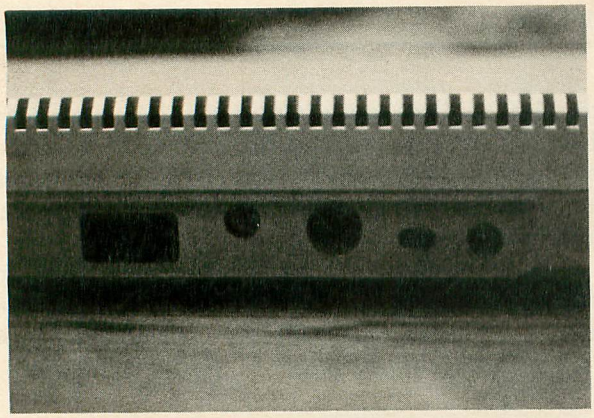
The power switch, single cartridge slot, and ***two*** *controller ports now reside on the left side. ATARI responded to user comments that the joystick/paddle wires were always in the way on the computer's front. They also, apparently, feel that only two controller ports are necessary.*

FEATURES OF THE 1200XL OPERATING SYSTEM

The operating system of the 1200XL has been altered as much as possible to give it additional features, but at the same time, increase its computing power. Compatibility between this model and the 400/800 was of prime concern to ATARI, thus technical material on the two previous models applies to the 1200 as well. Here I will attempt to cover some of the additional functions of the 1200.

As mentioned in the overview of the 1200XL, many new features are implemented, such as one-touch cursor control, the HELP key, DMA enable/disable, and the additional European character set. All of the keys can be user defined with the exception of the BREAK, SHIFT, CONTROL, SYSTEM RESET, and CONTROL+FUNCTION KEYS. In addition, the HELP, START, OPTION, and SELECT keys must be handled somewhat differently.

Some important features on the 1200XL are the additional graphic modes that were previously unavailable to the 400/800, except through machine language. What we at **A.N.A.L.O.G** call graphic modes 6½ and 7½, plus the multi-color character sets, are now readily accessible, even through BASIC. Of course, to utilize the 4-color character set, you must still redefine the characters.



The 1200XL's rear panel contains the I/O ports previously found on the 400/800 right hand side: the standard ATARI serial port, TV connector jack, monitor jack, channel 2/3 selector, and power socket. The 1200XL uses the same power transformer as the 400/800.

One nice feature, not used up until now on micro computers, is a fine scrolling screen. When you type or list a program on the ATARI, and reach the end of a line, the screen will "coarse scroll" up. It is possible on the 1200 however, to smoothly fine scroll the screen; an impressive feature.

A more serious feature is the added disk handling system. One setback on the 400/800 was the limited string length of 128 bytes. The 1200XL can read and write sectors on the disk from between 1 and 65536 bytes. The default, as in the 400/800, is set at 128 bytes, however under software control you can reset that value. The 1200 also has the capability to ignore the read-after-write verification on disk I/O operations.

We will cover the how-to-get-all-of-these-neat-things-to-work in a later issue, once there are 1200XLs out on the market. As you may have noticed, the 1200 attempts to take the idea set forth by the 400 and 800 just one more step towards human engineering. □

The 1200XL in all of its glory. This prototype (one of only 5 in the US!) lacks the white lettering that will appear just above the strip of metal keys, making their functions clearly marked to the user.

ATARI®
A Warner Communications Company

1200XL Specifications:

ROM: 16K
RAM: 64K (empty)
37K (w/BASIC + OP. System)

GRAPHIC MODES:

0	40 x 24 (1 color, 2 lum)	TEXT
1	20 x 24 (5 colors)	TEXT
2	20 x 12 (5 colors)	TEXT
3	40 x 24 (4 colors)	GRAPHICS
4	80 x 48 (2 colors)	GRAPHICS
5	80 x 48 (4 colors)	GRAPHICS
6	160 x 96 (2 colors)	GRAPHICS
7	160 x 96 (4 colors)	GRAPHICS
8	320 x 192 (1 color, 2 lum)	GRAPHICS
9	80 x 192 (1 color, 16 lum)	GRAPHICS
10	80 x 192 (9 colors)	GRAPHICS
11	80 x 192 (16 colors, 1 lum)	GRAPHICS
12	40 x 24 (5 colors)	TEXT
13	40 x 12 (5 colors)	TEXT
14	160 x 192 (1 color, 2 lum)	GRAPHICS
15	160 x 192 (4 colors)	GRAPHICS

I/O: Monitor output
Serial I/O
Television 75 ohm
2 parallel (controller) ports
1 cartridge slot

256 colors; 4 sound channels — 3½ octaves

FEATURES: HELP key
4 user programmable function keys
1 touch cursor control
user DMA enable/disable
user keyboard enable/disable
user definable console keys

DIMENSIONS: 15"w x 12½"d x 2⅝"h
weight = 6½ pounds

Cabinet: brown & cream high impact plastic with brushed metal trim and transparent plastic accenting; Three LED indicators

STONE of Sisyphus

Come into our dungeon!

We want to take you on a journey — a journey into an age undreamed of. When a man's worth was measured by his courage and his cunning. With STONE OF SISYPHUS, we have re-created the wonderment of that ancient era. The Maces & Magic Series allows you to interact with the adventure on an intensely personal level. You create your own character, giving him (or her) the attributes of strength, IQ, constitution, dexterity and charisma. You then arm and prepare your creation for the challenges ahead. Amazingly, your character will evolve and grow as the journey progresses.

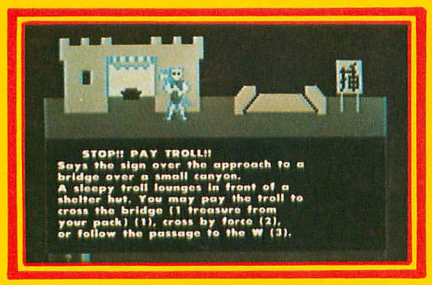
Prepare yourself — breathe deeply, and step into the enchantment . . . the enchantment of STONE OF SISYPHUS and the Maces & Magic Series.

INCLUDES 2 JAM-PACKED DISKS OF DATA BUT WILL WORK ON YOUR 1-DRIVE MICROCOMPUTER

APPLE AND TRS-80
TEXT-ONLY VERSION
$34.95

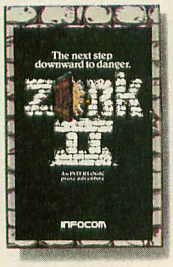
ATARI
VERSION WITH FULL COLOR GRAPHICS
$39.95

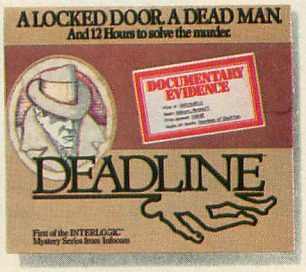
PRICES SUBJECT TO CHANGE
SHIPPING & HANDLING EXTRA



Adventure INTERNATIONAL
A DIVISION OF SCOTT ADAMS, INC.

NOW AVAILABLE FROM YOUR LOCAL DEALER OR DISTRIBUTOR
OR ORDER TOLL FREE (800) 327-7172 OR
BY MAIL FROM ADVENTURE INTERNATIONAL • BOX 3435 • LONGWOOD, FL 32750





WE'RE WRITING

THEM AS FAST AS WE CAN!

At the rate we're going, we'll have these pages filled by 2083. And by 2084, people will be clamoring for the next Infocom creation.

We hate to disappoint our public. So we keep you waiting. Because while the software factories are cranking out arcade game after arcade game, pulpy adventure after trite fantasy, we're writing and rewriting, honing and perfecting. Before a single person enters one of Infocom's worlds, it must be crafted into a living, riveting, definitive experience.

Judging from the public's reaction, it's worth the wait. For instance, *Creative Computing* welcomed DEADLINE™ as "thoroughly engrossing and realistic," while a *Softalk* readers' poll recently voted ZORK™ I and ZORK II the most popular adventures of 1981.

And now, for the moment, your wait is over. ZORK III, your final step in the underground trilogy, and STARCROSS,™ an exploration of a new dimension in science fiction, are ready for you.

Look at them up there, the little worlds of Infocom. As our universe expands, companions will come to help fill that vast expanse of white space. Till then, they'll continue to stand alone as the best of all possible worlds.

INFOCOM™

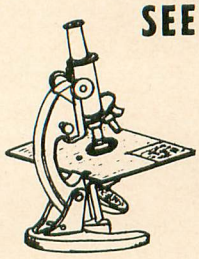
55 Wheeler Street, Cambridge, MA 02138

Infocom's worlds are available for Apple,® Atari,® IBM, TRS-80,® Commodore, NEC, Osborne, CP/M,® and DEC.™

TAKE A CLOSER LOOK AT YOUR DISKS

SEE WHAT'S REALLY THERE

WITH



DISKED

(disk´ ◦ ĕd)

by Mark Logies

THE DISKED UTILITY PACKAGE contains numerous utility programs plus a comprehensive users' manual. With *DISKED* you can view and edit the contents of any sector in HEX, DECIMAL or CHARACTER (ATASCII or SCREEN CODE). You can disassemble programs into 6502 mnemonics using virtual addressing. You can recover deleted files, save crashed diskettes, map used and crashed sectors, copy any sector or block of sectors, move cassette boots up to disk and vice versa, create immediate mode files and multi-boot disks, PLUS MUCH MORE!

Each program is listable and user adaptable.

Runs in 24K . . . . . ONLY $89.95

Call or write for more information on all of our software.

GET MORE OUT OF YOUR INVESTMENT
EXPAND YOUR ABILITIES WITH DISKED

TO ORDER SEND CHECK OR MONEY ORDER TO:

master charge

Amulet ENTERPRISES
P.O. BOX 25612
GARFIELD HEIGHTS, OH 44125
(216) 475-7766
ORDERS MUST INCLUDE $1.50 SHIPPING AND HANDLING.

VISA

NEW FOR YOUR ATARI

MAGIC MAIL*

An exciting New Data Base Mailing and Personal Information System for your Atari 400/800** Personal Computer. Never before have all these features been designed into a single Mailing and Information System, so easy to use and so powerful.

COMPARE THESE FEATURES:

- Data Fields: Name, Address, City, State, Zip Code, Area Code, Phone Number, Birthday (m/d/y), and Entry Type.
- Up to 1027 records per Diskette!
- Less than 1 second Search Time over 95% of your Data, and 2-4 seconds over the other 5%.***
- Up to 62 SEPARATE and UNIQUE files permitted per Diskette.
- Single or Double Disk Drive Capability.
- Built in SORT, capable of Sorting ANY Data File by ANY Field with up to 10 Sub-fields.
- Command-Driven with simple English-like commands: FIND, MODIFY, PRINT, ADD, SORT, etc.
- Position Independent & Position Dependent Fields.
- Files compatible with Atari DOS II.**
- Recorded on High-Quality Verbatim Diskettes.
- Every Diskette Pre-tested for Bad Sectors and recording integrity.
- Versions for: Epson MX-80, Prowriter, Centronics
- Print Single-width Mailing Labels or Directory Listing.
- 100% Machine Language.
- 16 K Minimum Memory.
- 60-Page User Manual.
- 90 Day Buyer Protection Guarantee.

Call or write for FREE additional information.

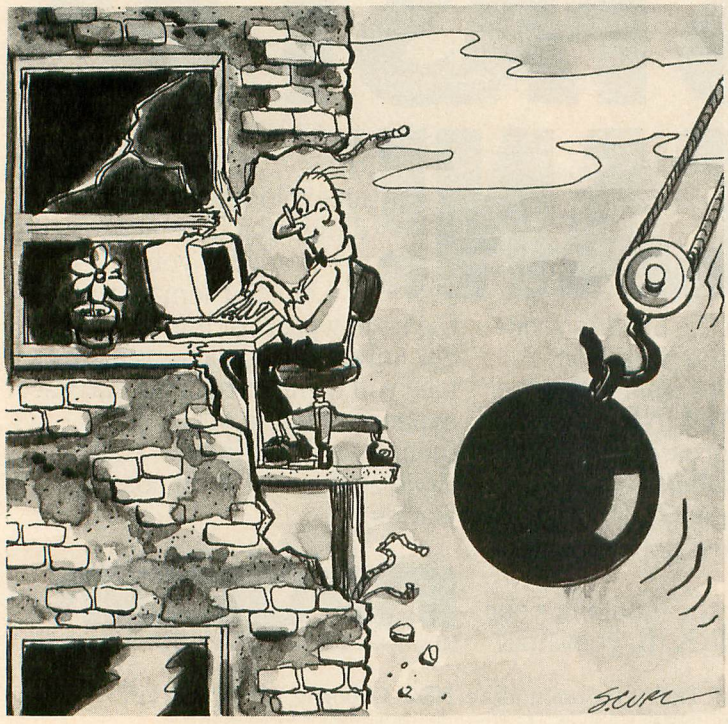
*MAGIC MAIL is a Trademark of A-BIT-BETTER Software
**ATARI is a Registered Trademark of Atari Inc.
***Search time is for an Indexed File.

ABBS
A-Bit-Better Software
Post Office Box 28
Laurel Md 20707
(301) 953-7256

Dealer Inquiries Invited.

ONLY $59.95
*Plus tax, shipping and handling
VISA AND MASTERCARD ACCEPTED.

Q: What is the hardest thing in the world?
A: Tearing yourself away from an EPYX game.



Nobody but nobody builds more lasting playing value into their computer games than EPYX.

EPYX—computer games thinkers play. EPYX—producers of award-winning games (including "Crush, Crumble and Chomp"; "Dragon's Eye"; "Temple of Apshai"...and dozens of other thinking games.) For Atari,* Apple,* Commodore,* Radio Shack,* and IBM* personal computers. EPYX—the leader in computer game quality, creativity, innovation.

You will love them all.
Write or phone for our latest catalog; it's absolutely free...we even pay the postage. Or stop in at your favorite computer dealer. He should have a supply of catalogs and he can also show you some of those marvelous EPYX games in action.

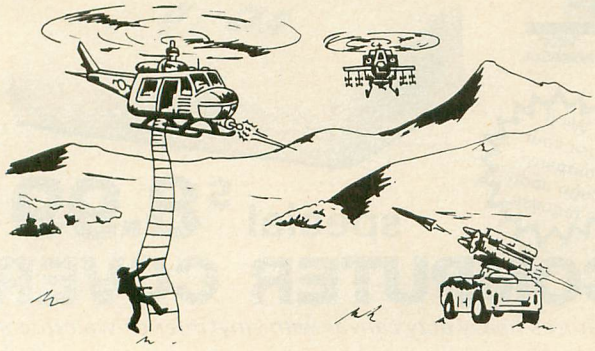
*The trademarks, respectively, of Atari, Inc.; Apple Computer, Inc.; Commodore International; Tandy Corp.; International Business Machines. And EPYX is the trademark of Automated Simulations, Inc., just so you don't forget.

EPYX

AUTOMATED SIMULATIONS
1043 Kiel Court
Sunnyvale, California
(408) 745-0700

Experience the MicroProse Challenge!!!

Now On Cassette!



CHOPPER RESCUE

Zip up your flying suit and strap yourself into your sleek assault chopper: CHOPPER RESCUE challenges your skill and daring. Pilot your nimble craft through the treacherous underground labyrinth. Search out and rescue the captives trapped inside. Danger approaches from all sides as defenders fire winged missiles and sparkling energy bursts at your fragile craft. But you are not defenseless, your explosive tipped rapid-fire missiles dart out to blast a path through the dense minefields. Thread your bomb directly into the heart of their pulsating nuclear furnace. And just when you think the path is clear, a swift patrol drone appears from behind a ledge, spitting missles as you scramble for a firing position! CHOPPER RESCUE features three scenarios, multiple skill levels, and competition in solo or team configurations for 1 to 4 players. Immerse yourself in the non-stop excitement of CHOPPER RESCUE. You'll keep coming back for more!

Requires ATARI® 32K, Disk or Cassette . . . $29.95

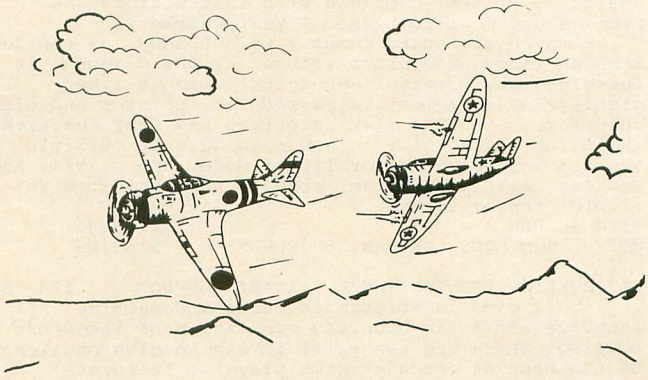
HELLCAT ACE

HELLCAT ACE is a superbly realistic re-creation of WWII Air-to-Air combat in the Pacific using a fully three-dimensional airspace. HELLCAT ACE puts you in the fighter cockpit with its unique pilot's eye view. To escape and destroy the tenacious enemy fighters, HELLCAT ACE allows you a full range of high-performance aerobatics; including loops, stalls, rolls, immellman turns, and spins. The fifteen well documented scenarios include combat air patrol, night action, and kamikazes --- and, if things get out of hand, you can bail out or attempt a water landing in your damaged fighter! HELLCAT ACE includes multiple skill levels and options for up to four players. Can you avoid being shot down and win five victories to become a HELLCAT ACE?

Requires ATARI® 40K, Disk or 32K Cassette . . . $29.95

For aerial combat challenge and excitement over Europe in WWII fly the SPITFIRE ACE!

Requires ATARI® 40K Disk or 32K Cassette . . . $29.95



FLOYD OF THE JUNGLE

Looking for a fun game you can play with your family and friends? FLOYD OF THE JUNGLE is a great game up to four people can play simultaneously! Can you be the first to guide Floyd through the jungle perils to save the lovely Janice? It isn't easy! Floyd must leap the poisonous snakes, climb the slippery vines, ride the elephants, and cross the raging rivers. FLOYD OF THE JUNGLE includes fully-animated wild animals, music, sound effects, and five different multi-color jungle adventures.

Requires ATARI® 32K, Disk or Cassette . . . $29.95

MicroProse Software is dedicated to bring you games that will challenge you far beyond the first few plays. We promise you hours of excitement and pleasure. Our games are created using "MicroProse", our own proprietary assembly language gaming system, and are available at select computer stores.

PHONE: (301) 357-4739

For Fast Delivery by C.O.D.,
MasterCard or Visa . . . Or
Send Check or Money Order . . .
Please add $2.50 shipping/handling.
Maryland residents add 5% tax.

Dealer Inquiries Welcome!

MicroProse Software
One Caribou Court
Parkton, Maryland 21120

ATARI 400/800 UPGRADES FROM NEWELL INDUSTRIES GET THE MOST OUT YOUR COMPUTER

FASTCHIP - ATARI 400/800 $41.95

FASTCHIP can give you up to three and 1/2 times the speed of the original floating point routines. Atari BASIC uses these routines for almost everything. FASTCHIP is a pin compatible ROM that replaces the original. It can be installed in minutes, and is a permanent replacement for the original rom. There are no modifications, cuts, or wires to add. FASTCHIP comes with a 90 day full warranty. Return undamaged during this period for a full refund.

Some reference times (in seconds) (in 1000 loop):

FUNC:	OLD ROM:	FASTCHIP	FUNC:	OLD ROM:	FASTCHIP
ATN	128	62	CLOG	120	30
LOG	129	33	EXP	112	34
^	236	65	COS	84	33
SIN	85	30	SQR	135	55

RAMROD MMOS - ATARI 800 ONLY $159.95 (less memory)

RAMROD is a new operating system board that replaces the existing board. It gives the user the flexibility of using either the existing operating system roms or it is switch selectable to use EPROMS. This allows the user to change the operating system to meet any needs that might arise.

RAMROD also addresses the 4K of memory not currently accessible in the system. It also is switch selectable and may be used as RAM, ROM, or a combination. This ram is usable by software such as SPREADSHEETS, WORD PROCESSORS, and certain LANGUAGES to mention a few, without modification to the existing operating system. Complete with instructions and recommended modifications. 1 year warranty.

PLUS, every board comes with SUPERMON!, a resident machine language monitor written by David Young. It features many powerful debugging commands like display/ alter memory, disassembler, printer and disk interface, etc. The disk interface has many features, including the ability to access single or multiple sectors in sequential or linked mode, S/D or D/D. And you can call it up at any time. A sophisticated yet simple program to use.

WITH 4K RAM $169.95
WITH 12K MEMORY (4K RAM, 8K EPROM) $189.95

PRO BOWLING VERSION THREE - ATARI 400/800 $24.95

This game is written in Basic and machine language and is an accurate simulation of the sport of bowling. There are ten skill levels to give challenge to the best of computer game players. Features redesigned character set, automatic scoring, sound, and P.M. graphics.

REQUIRED ACCESSORIES:
DISK DRIVE
BASIC LANGUAGE CARTRIDGE 32K MIN. MEM.
ONE JOYSTICK CONTROLLER PER PLAYER

ATARI SOFTWARE(LIMITED SUPPLY)

ENTERTAINER/CX481	$59
MISSILE COMMAND/CXL4012	$24
STARRAIDERS/CXL4011	$27
CONV FRENCH/CX4119	$33
STOCK ANALYSIS/CX8107	$14
STOCK CHARTING/CX8108	$17
BOND ANALYSIS/CX8106	$14
MORT & LOAN ANALYSIS/CX4115	$11
MAIL LIST/CX4104	$13
ENERGY CZAR/CX4121	$11
EDUCATION CARTRIDGE/CXL4001	$15
BUSINESS COMMUNICATIONS/CX6010	$17
SUPERVISORY SKILLS/CX6003	$17
MUSIC COMPOSER/CXL4007	$30
VIDEO EASEL/CXL4005	$20
COMPUTER CHESS/CXL4009	$26
BASKETBALL/CXL4004	$20
EDUWARE COMPUMATH DECIMALS/CASS	$16
EDUWARE COMPUMATH FRAC./CASS	$16
JAWBREAKER/DISK	$18

To order:Call 214-423-1781 or send check or money order to NEWELL INDUSTRIES, 3340 Nottingham ln., Plano TX. 75074. Texas residents add 5% sales tax. Orders outside the U.S. add 3% for shipping. C.O.D. orders add $1.50. Sorry, no charge cards. Call or write for additional information. Dealer inquiries welcome. All NEWELL products also distributed by JERSEY SYSTEMS 800-526-3647. In NJ. 201-821-9441.

ATARI 400/800 are Trademarks of ATARI INC.

ATARI
400/800
16K

COMMODORE
64 VERSION
AVAILABLE
3-1-83

DISK
AND
TAPE
$29.95*

"THRAX LAIR" A FAST ACTION GAME WITH EXCEPTIONAL ANIMATION, VARIETY, AND RESPONSE... FLY THROUGH TWISTING CAVES...DODGE ENERGY TORPEDOES...DESTROY THE EVIL THRAX!!

VISA®

master charge
THE INTERBANK CARD

TO ORDER,CALL OR WRITE:

(303) 949-6646
BOX 5480 AVON,CO 81620

ATTENTION PROGRAMMERS: ASK ABOUT OUR 60/40 SPLIT AND OUR NEW DISK UTILITY.

RANTOM
Software

ATARI is a trademark of ATARI, INC.

An Adventure Game

16K cassette 24K disk

by Michael Duboy

An Adventure is designed for joystick input only. Move the joystick right for a yes answer or left for a no answer. Use north (top of joystick) and south directions to increase or decrease the amount of food and water being purchased by you. At other times these joystick positions will input the direction of travel. When you have the desired amount of food and water, press the fire button to acknowledge purchase.

The hero in the game starts out with only enough food and water to last one day. Three moves are a day's journey in game time. Abdul the loan shark is always ready to loan a hero enough gold to provision a short journey. He can be found at the "c" in "city."

There is a limit of 100 weight units that can be carried by the hero. This should be taken into account when buying food and water. These provisions can be obtained at the "i." Water is cheap, but food is not. You buy these in amounts used in one day's travel.

The journey to the lost city is long and perilous; having a psychic companion along is always an advantage. A companion doubles the amount of weight that can be carried. You can only have one companion at a time, but if he dies you can always hire another companion. Remember though, that debts must be paid. Companions can be found at the "t;" but be prepared to pay their price or go alone. The more a companion's asking price, the stronger he'll be. Don't forget food and water for your companion!

Beware of the sea, as you're likely to drown. The forest is swarming with bandits. The trail is longer but safer than the forest, and — of course — there is also a storm that can flood the trail.

When you arrive at the lost city you will notice strange symbols on the ground. You must guess the number these symbols represent. Here a psychic companion will prove invaluable. His hints will reduce the number of guesses necessary to open the stones. (Hint: Don't guess a number over 26.) Evil spirits roam the ancient city. The longer you stay in one place, the likelier it will be that they will appear to steal food and water from you. When you tire of adventuring, you can end the game and obtain a rating by occupying the "y" in "city." You'll find leaving the lost city a lot harder than entering it.

The following variable descriptions should give the reader the opportunity for modifying the game. For example, islands and a sea adventure can be added to the game; also a trading post or another city. □

DOCUMENTATION

Variable(s)	Purpose
A C D O	Represents constants in order to save memory
ITY	Turns off(1)/ on(0) loan subroutine
A$ B$ C$	Used to randomize alphabet; C$ also holds output strings
HP	Strength of Hero
GD	Amount of gold carried by hero
F	Food units
W	Water units
WT	Weight units
WT$	Used to round off weight units
GX GY H	x y coordinates and shape of pixel moving to
X Y H1	x y coordinates and shape of pixel
S	Direction of joystick moved
RD	Probability factor of an event
B	Number of adversaries
DEC	Number of adversaries killed
NAME$	Contains various phases
E	Used in interpreting joystick moves
HPB	Damage done by Adversaries
HPC	Strength of companion
I1 I2 I3	Temporary variables
IT	Amount of loan repayment
I	Temporary indicator of who is being hit
T	Increases or decreases amount of gold found
GUESS	As GUESS increases in value the probability of Evil Spirits increases
ITC	Amount of gold in debt to companion for

```
3 A=1:C=A:O=0:D=4:ITY=0:GRAPHICS A:GOS
UB 1240:GOTO 1270
4 ? CHR$(125):RETURN :REM Clear screen
5 GX=GX+A:GY=GY+A:RETURN :REM Movement
 5, R. lines 5-14
6 GX=GX+A:GY=GY-A:RETURN
7 GX=GX+A:RETURN
9 GX=GX-A:GY=GY+A:RETURN
10 GX=GX-A:GY=GY-A:RETURN
11 GX=GX-A:RETURN
13 GY=GY+A:RETURN
14 GY=GY-A:RETURN
15 RETURN
30 FOR I1=A TO 1000:NEXT I1:RETURN :RE
M DELAY
40 RD=INT(100*RND(O)+A):RETURN
50 FOR I2=A TO 11:READ I1:SOUND O,I1,1
0,6:FOR I3=A TO 25:NEXT I3:NEXT I2:RES
TORE :RETURN :REM Play tune
99 IF ITY=A THEN RETURN :REM Loan 5. R
.
100 GOSUB D:? " You have ";GD;" gold p
ieces."
101 ? " Greetings I'm Abdul. Need a lo
an?":GOSUB 160:IF E=11 THEN GOSUB 250:
GOSUB 30:RETURN
102 GOSUB 40:? "I offer you ";(RD+50);
" gold pieces.":IT=2*(RD+50):? "Repaym
ent will be ";IT:GOSUB 30
103 ? "    Accept?":GOSUB 160:IF E=7 T
HEN GD=GD+RD+50:ITY=A:GOSUB 250
104 RETURN
105 GOSUB D:? "Food for how many":NAME
$=" days?":GOSUB 30:E=O:GOSUB 200:GD=G
D-E*2
106 IF GD<O THEN GD=GD+E*2:GOSUB D:? "
      NOT ENOUGH GOLD!";CHR$(157):GO
SUB 30:GOTO 105
108 F=F+E*6:GOSUB 250:IF GD<1 THEN RET
URN
109 GOSUB 30:GOSUB D:? " Water for how
 many":GOSUB 30:E=O:GOSUB 200:GD=GD-1:
W=W+E*3:GOSUB 250:RETURN
116 IF C=2 THEN RETURN :REM Hire compa
nion
117 GOSUB D:? " Need a companion?":GOS
UB 160:IF E=11 THEN GOSUB 250:RETURN
118 GOSUB D:? " Your companion wants "
;:GOSUB 40:ITC=RD*(250-HP):? ITC;" in
gold "
119 ? " to be payed to him or his heir
 after the adventure. Accept?":GOSUB 1
60:IF E=11 THEN RETURN
120 C=2:HPC=INT(0.01*ITC+0.5*HP):GOSUB
 250:RETURN
121 IF GD<200 THEN RETURN :REM RATING
122 GD=GD-(ITC+IT):GRAPHICS 2:POSITION
 0,4:? #6;"YOUR RATING IS:"
123 IF GD>2000 THEN C$=" AVENTOR"
124 IF GD>10000 THEN C$=" GORDENT"
125 IF GD>20000 THEN C$=" OVERGORD"
126 IF GD<2001 THEN C$=" MINDMOST"
127 IF GD<O THEN GOSUB D:? #6;" YOU'VE
 BEEN PUT IN DEBTORS PRISON!"
128 GOSUB 30:? #6;C$:? "WANT TO PLAY A
GAIN?":GOSUB 160:IF E=7 THEN POP :RUN
129 END
150 RD=INT(100*RND(O)+A):RETURN
160 E=O:IF STICK(O)=7 THEN E=7:RETURN
:REM lines 160-180;yes/no routine
170 IF STICK(O)=11 THEN E=11:RETURN
180 GOTO 160:REM YES  NO ROUTINE
190 REM Counting S. R.
200 E=E+1:IF STICK(O)=13 THEN E=E-2:IF
 E<O THEN E=O
210 GOSUB D:? NAME$;E:IF STICK(O)=13 O
R STICK(O)=14 THEN 200
220 IF STRIG(O)=A THEN 210
230 RETURN
240 S=STICK(O):GOSUB S:RETURN
250 POKE 77,O:WT=F/6+GD/1000+W/2:WT$=S
TR$(WT):WT=VAL(WT$):IF WT>100*C THEN G
OTO 590
260 IF W<O THEN C$="DIED: LACK OF WATE
R":GOTO 330
270 IF F<O THEN C$=" starved to death!
":GOTO 330
280 IF HP<A THEN C$="  DIED FROM WOUND
S":GOTO 330
290 IF HPC<A AND C=2 THEN GOSUB D:? "
Compaion is dead.":GOSUB 30:C=A:GD=GD-
ITC:ITC=O
300 GOSUB D:? CHR$(157);"HERO";" ";"HP
=";HP;" ";"GD=";GD;" ";"WT=";WT;" ";"F
=";F;" ";"W=";W
310 IF C=2 THEN ? "COMPANION";"  HP=";
HPC
320 RETURN
330 GRAPHICS 1+16:POSITION O,10:POKE 7
12,232:POKE 708,32:POKE 709,196:? #6;C
$:GOSUB 30:GOTO 128
590 GOSUB D:? CHR$(157);WT;" Is too mu
ch weight!"
600 ? " Throw away how much gold?":NAM
E$="GOLD=":GOSUB 30:E=O:GOSUB 220:IF G
D>=E THEN GD=GD-E
610 GOSUB D:? " How much food?":NAME$=
"FOOD=":GOSUB 30:E=O:GOSUB 220:F=F-E
620 GOSUB D:? " How much water?":NAME$
="WATER=":E=O:GOSUB 30:GOSUB 220:W=W-E
:NAME$="":GOTO 250
630 REM DEC BANDITS
640 DEC=INT(I1*RND(O)):IF DEC>B THEN I
EC=B
660 B=B-DEC:? " There are ";B;C$;" ";N
AME$;" killed ";DEC;C$:RETURN
670 GOSUB D:? " There are ";B;C$:RETUR
N
690 GOSUB 40:RD=RD+Y:REM Drowning
710 IF H=160 AND C=2 THEN IF RD>40 TH
N GOSUB D:? " Companion has drown.":C=
A:GOSUB 30:GOSUB 250:RETURN
```

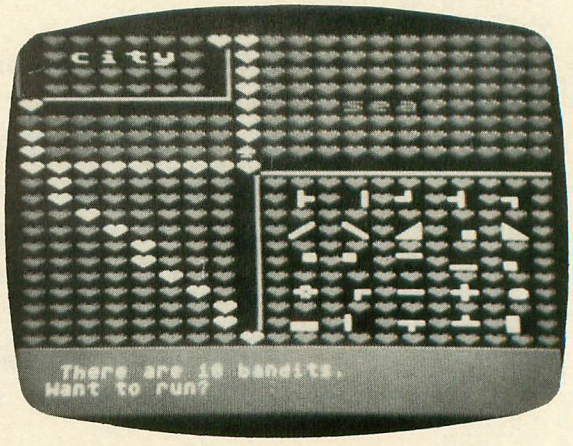
```
720 IF H=160 THEN IF RD)60 THEN C$="
 You've drown!":GOTO 330
730 IF H=160 THEN RETURN
740 IF H=0 AND RD)99 THEN B=A
750 IF H=32 AND RD)80 THEN B=A
760 IF  NOT (B=A) THEN RETURN
770 REM BANDITS
780 B=INT(RD/10)+Y*(H<>0):GOSUB D:C$="
 bandits. ":GOSUB 670
790 DEC=0:I=C:GOSUB 30:? "Want to run?
":GOSUB 160:IF E=7 THEN RETURN
800 NAME$="You've":HPB=INT(B*RND(0)+1)
:IF B>0 THEN ON I GOTO 840,850
820 RD=INT((X+1)/(Y+1)*(T)*RD^2+(RD*X*
Y)/10):? "You've found ";RD;" in gold
on the ";C$
830 GD=GD+RD:GOSUB 50:RETURN
840 HP=HP-HPB:GOSUB 250:GOSUB 30:I1=HP
:GOSUB 630:GOSUB 30:I=C:GOTO 800
850 NAME$="Your companion has ":HPC=HP
C-HPB:GOSUB 250:GOSUB 30
860 IF C=2 THEN I1=HPC:GOSUB 630:GOSUB
 30
870 I=1:GOTO 800
880 REM TREASURE SQ.
890 GOSUB D:? " Treasure square!":GUES
S=0:NAME$="Guess is "
900 ? "Do you wish to go to another sq
uare?":GOSUB 160:IF E=7 THEN RETURN
910 GOSUB 40:IF RD)84-GUESS THEN GOSUB
 D:? "Evil spirts!":GOSUB 30:W=INT(W-0
.1*W):F=INT(F-0.1*F):GOSUB 250
920 GOSUB 30:GOSUB D:? " What is your
guess?":GOSUB 200:I1=E+64:GUESS=GUESS+
1:IF CHR$(I1)=A$(H,H) THEN 970
930 IF C=1 THEN 900
940 IF CHR$(I1)>A$(H,H) THEN ? "Compan
ion says go lower."
950 IF CHR$(I1)<A$(H,H) THEN ? "Compan
ion says go higher."
960 GOTO 900
970 GOSUB D:? " The stone has opened!"
:H=0:T=1:GOSUB 50
990 I1=INT(3*RND(0)+A):ON I1 GOTO 1000
,1010,1020
1000 C$=" Goblins ":GOTO 1030
1010 C$=" Orcs":GOTO 1030
1020 C$=" Ghouls"
1030 GOSUB 40:B=RD:GOSUB 670:GOSUB 790
:T=0:RETURN
1050 SOUND 0,0,0,0:IF GX<0 THEN GX=0:S
OUND 0,250,12,4
1070 IF GY<0 THEN GY=0:SOUND 0,200,12,
4
1080 IF GX>19 THEN GX=19:SOUND 0,180,1
2,4
1090 IF GY>19 THEN GY=19:SOUND 0,140,1
2,4
1100 REM **  Stores Pixel **
1110 LOCATE GX,GY,H:IF H=130 OR H=150
OR H=142 OR H=141 THEN H=H1:GX=X:GY=Y:
SOUND 0,100,4,6:HP=HP-A:GOSUB 250
1120 REM the IF THEN in 1110 changes n
ew values obtained by LOCATE back to o
riginal if move is illegal
1130 IF X<>GX OR Y<>GY THEN F=F-2*C:W=
W-C:GOSUB 250:REM Decreases food and w
ater on move
1140 H1=H:X=GX:Y=GY:REM keeps old valu
e of location and pixel until legal mo
ve is made
1150 IF GD)5000 THEN PLOT 3,8:POSITION
 3,12:XIO 18,#6,0,0,"S:":GOSUB 1240
1160 SOUND 0,0,0,0:COLOR 251:PLOT GX,G
Y
1170 IF H1>=1 AND H1<=25 THEN GOSUB 88
0
1180 IF H=0 OR H=32 OR H=160 THEN GOSU
B 690
1190 IF H=99 OR H=105 OR H=116 OR H=12
1 THEN GOSUB H
1200 IF STICK(0)=15 THEN 1200
1210 SOUND 0,WT,12,6:GOSUB 240:COLOR H
:PLOT X,Y:GOTO 1050
1240 GRAPHICS 33:POKE 708,180:POKE 712
,224:POKE 710,132:POKE 756,226:POKE 75
2,1:RETURN :REM CHANGES COLORS
1270 REM ** DRAW GRID AREA **
1280 POSITION 1,1:? #6;" city":POSITIO
N 10,10:I=A
1300 FOR Y=10 TO 19 STEP 2:FOR X=10 TO
 19 STEP 2:COLOR I:SOUND 0,I,10,4:PLOT
 X,Y:I=I+1:NEXT X:NEXT Y
1310 COLOR 150:PLOT 0,0:DRAWTO 0,3:COL
OR 141:PLOT 0,4:DRAWTO 7,4:COLOR 130:P
LOT 7,0:DRAWTO 7,3
1320 COLOR 142:PLOT 9,8:DRAWTO 19,8:CO
LOR 130:PLOT 8,19:DRAWTO 8,9
1330 COLOR 0:PLOT 8,8:POSITION 8,0:POK
E 765,160:XIO 18,#6,0,0,"S:"
1350 PLOT 8,19:DRAWTO 0,8:DRAWTO 7,8:P
LOT 0,7:PLOT 0,6:PLOT 0,4:PLOT 7,0:POS
ITION 12,4:? #6;"SEA"
1370 REM **    RANDOM  ALPHABET    ***
*
1380 DIM A$(25),B$(25),C$(25),WT$(4),N
AME$(20)
1390 A$="ABCDEFGHIJKLMNOPQRSTUVWXY"
1400 FOR X=1 TO 10:I=INT(15*RND(0)+5):
B$=A$(1,I-1):A$=A$(I):A$(LEN(A$)+1)=B$
:C$=A$(11,20)
1410 C$(LEN(C$)+1)=A$(1,10):C$(LEN(C$)
+1)=A$(21,25):A$=C$:NEXT X
1420 HP=INT(100*RND(0)+100):GD=3:F=6:W
=3
1430 GOSUB 250:GX=1:GY=0:H=32:REM init
ial position of Hero
1440 GOTO 1140
1450 DATA 53,64,85,81,102,108,96,81,64
,53,0
```

•

(see D:CHECK 2, p. 26)

```
3 DATA 438,587,508,738,420,746,720,796
,806,811,767,88,265,251,638,8579
100 DATA 600,8,640,34,585,633,67,495,8
87,505,486,181,711,307,107,6246
122 DATA 513,201,396,262,468,966,553,4
1,210,417,890,383,565,609,689,7163
220 DATA 361,592,344,509,108,920,433,6
31,671,326,591,549,365,42,975,7417
620 DATA 764,852,451,24,765,187,140,18
0,583,709,927,979,241,574,452,7828
800 DATA 929,638,970,333,130,180,342,7
52,878,391,522,471,545,410,761,8252
960 DATA 733,253,540,910,530,389,481,7
35,942,954,946,284,518,654,374,9243
1140 DATA 802,83,138,837,401,551,368,3
82,268,530,685,945,278,481,289,7038
1350 DATA 575,448,303,953,772,394,118,
476,721,871,5631
```

•



We have over 1000 Educational Programs for use on your Atari 400/800 Computers!

You and your family will enjoy learning in your home when you

Stop Playing with Your Atari

All along you've heard there isn't much of a selection of low cost microcomputer courseware. Well, do you want to learn Physics, Psychology, or Philosophy? Accounting or Auto Mechanics? Sociology, Supervision or Statistics? Economics or Electronics? How about English as a Second Language? Would you like to teach your children Math or Reading? If you do, then we have the educational programs for you—and at affordable prices.

It's true there aren't many companies that offer full-length courses in subjects other than reading and arithmetic, and what is offered seems to be drills, tests, games, or simulations. What you really want is a course that covers the subject with, say, 16 full-length lessons called tutorial programs, where you interact with an expert programmer backed by a staff of experts. That's exactly what we have.

ASK THESE QUESTIONS

Why haven't you heard of us before? We're a public company that's been trading over the counter for 16 years. We've been developing interactive learning systems since 1957. We sell hardware and software for interactive film, slide, video and computer learning to the educational field, vo-techs, industries, military, and several state and federal agencies. Our programs are used in all 50 states and even in some foreign countries! In 1975, we started to convert to the Talk & Teach Computer-Assisted Instruction (CAI) System, licensed Atari to use it in 1977, and in 1981 licensed Radio Shack to use our Talk/Tutor System. So, why haven't you heard of us? Frankly, we've kept a low profile. Until now.

Is there something wrong with our software? Well, we don't ask you to enter your name so we can drop it into some later text. We don't ask you to type in your answer and refuse to accept it if it's not spelled just right. And, we don't branch around a lot when you make an error. Our programs simply let you know if you're wrong by proceeding only when you select the right multiple-choice answer.

This proven learning-by-positive-reinforcement method lets you proceed quickly and smoothly through the programs, without a lot of cute tricks. But, if you're a devoted computerist or game freak you may be disappointed at the lack of motion in most of the pictures, or our special visual effects. We have some dandies, like the mushroom cloud that rises over Hiroshima in our History series, but your learning is not distracted by needless special effects.

OVER 1000 PROGRAMS

We have 64 courses of 16 half-hour programs: 1024 programs! All are easy-reading, upper-and-lower-case. All are in Atari color. All are illustrated by frequent graphics, composed of special and regular characters. And, best of all, every frame of every program is accompanied by high-quality, full-time audio narration by professional voice talent. David Stanton, James Mathers, Pam Barrymore. Recorded and played back, not synthesized or digitized!

- If your child is having trouble with Reading or Math, or if he or she is exceptional, and could benefit from professionally programmed lessons or courses, then you need our educational programs for your Atari 400 or 800 to help your child.
- If you want to build your math skills, we have programs on Numbers and their meanings, Addition, Subtraction, Multiplication, Division, Fractions, Decimals, Percents, Angles, Graphs, Word Problems, Algebra, Statistics. There are ten series in all, 160 math programs. Again, all with color, pictures, and a friendly tutor's voice—all the time.
- If your verbal skills need polishing, try our Talk & Teach programs on the alphabet, spelling skills, and every level of vocabulary; Sight Words or Learn by Phonics; develop Reading Comprehension skills from stories and articles. There's even a series on the Great Classics.
- For self-development, try a 16-program course in Economics or Psychology. Or Supervision, Sociology, Counseling (Personal, School, or Employee), Writing, Business, Philosophy, Government, World History, U.S. History, or Accounting.
- For vocational skills, study our 16-program courses in Electronics, Fluid Power, Auto Mechanics, Shop, Carpentry, Construction, Meat Processing, Military Skills (64 programs), and there are many more.

YOU HAVE WHAT IT TAKES

You'll need your Atari 400 or 800, and the Atari Cassette recorder. And to present the Talk & Teach programs you need the Educational System Master cartridge: it's **$25** from us, if you don't have one.

We say these courses, which are recorded one program per side of C20 to C30 (half hour) cassettes, are the equivalent of a chapter, or perhaps an hours lecture. We've been told that by studying our Economics or Psychology course, a student could pass a secondary or college test for credit. Many who have such credits never learned all that's in these courses. And while some of our courses have 1980 copyrights, most are 1981 and 1982. In U.S. History, for example, you'll learn about America's foreign policy during the Falklands crisis as well as that in the Mideast in 1982. And we're putting this information at your fingertips.

Not sure whether you agree more with Rationalists or Existentialists? Do you commit logical fallacies? Try our Philosophy course. If you're not sure about neurosis or psychosis, classical or instrumental conditioning, then you need our Psychology course. Just how independent is the Federal Reserve? Get Economics, Program 12. Confused about the changes in traditional roles of political parties? It's Government 5. And let our tutor tell you patiently and clearly about measures of dispersion and central tendency. Our Statistics goes through F tests. We even have 16 full-length audio-computer programs with Spanish words and phrases.

Remember, these are all for your Atari! Yes, we've done programs for TRS80 Model I, III, Color, for the Apple and T. I. But that's another story.

Would you like to do something more than play games on your Atari? Tired of squeaks and robotics and want to hear a human voice? Do you want to further your education or help your children along in theirs? Now you can. For just **$9.90**, we'll send you one cassette with 2 programs from the course of your choice, 100% guaranteed to work in your Atari, and you can try us out. Better yet, get one full course of 16 programs on 8 cassettes for only **$59.90**. For full documentation, 32 pre-post tests, fancy binder, 8 cassettes with 16 programs of the course you want, send **$79.00**. That's less than books and tuition for most college classes. And we offer a 10 day, 100% exchange allowance. Does your alma mater? Send us your check, or call us at (405) 288-2301 with your Visa/Master Card number. We'll send your educational software pre-paid. Please allow 15 days delivery. Or see your Atari dealer. He may have some of our courses in stock. You've got nothing to lose but your games!

DORSETT
Educational Systems, Inc.

P.O. Box 1226, Norman, OK 73070
(405) 288-2301 VISA MasterCard

Four smart ways to make your Atari 400/800, TRS-80 COLOR, VIC-20 and Commodore 64 much more intelligent.

1

The Color Accountant pays for itself. This *complete* personal financial package is designed to make your money easier to manage. Included are:

1. *Checkbook Maintenance*
2. *Chart of Accounts*
3. *Check Search*
4. *Income/Expense Statement*
5. *Net Worth Statement*
6. *Color Graph Design Package*
7. *Home Budget Analysis*
8. *Color Payments Calendar*
9. *Mailing List*
10. *Decision Maker*

This unique menu-driven package requires less than one hour data input per month. The Color Accountant has over 60 pages of documentation including examples and step-by-step instructions. TRS-80 COLOR requires Ext. Basic and 16K for cassette, 32K for diskette; Atari 400/800 requires 24K for cassette, 32K for diskette; VIC-20 requires 16K Expander. Now available for Commodore 64.

$74.95 cassette;
$79.95 diskette

2

The Tax Handler makes April 15th just another day. This is the perfect complement to our Color Accountant. The Tax Handler will help prepare your tax returns and probably save you money. Included are:

1. *Form 1040 (Long Form)—filing status, exemptions, income, income adjustments, computation of tax, tax credits and payments or balance/refund due.*
2. *Schedule A (Itemized Deductions)—medical and dental deductions, taxes, interest expenses, contributions, casualty/theft losses, miscellaneous deductions and summary.*
3. *Schedule G (Income Averaging)—base period income and adjustments, computation of averageable income and computation of tax.*

Additional schedules or alterations to the tax codes will be available separately in our monthly magnetic magazines. Atari 400/800 requires 24K for cassette, 32K for diskette. VIC-20 requires 16K Expander. Now available for Commodore 64.

$34.95 cassette;
$39.95 diskette

3

You'll love your computer with The Magnetic Magazine. Our magnetic magazines will entertain, inform, educate, challenge and delight you. Each issue contains 4 to 7 ready-to-use quality programs, all fully listable. Every issue includes a newsletter containing instructions, tips on programming techniques and a line-by-line examination of the feature program. And starting with issue number 8, the first in a series of tutorials on machine language programming, Database I with a new application every following issue and a new utility in our Utility-of-The-Month section. And word processing is coming soon!

A full year's subscription consists of 10 issues—over 50 programs a year at a mere fraction of their cost. Available for TRS-80 COLOR Ext. Basic, Atari 400/800; all require 16K. Back issues available.

One year subscription:
$50.00 cassette;
$75.00 diskette
Half year subscription:
$30.00 cassette;
$45.00 diskette
Sample issue:
$10.00 cassette;
$15.00 diskette
VIK VIDEO issue 1 available for VIC-20; $12.95 cassette

4

The Learning Center teaches and enlightens children. Our exceptional educational programs are classroom designed and tested. These unique packages have been invented to introduce 3 to 9 year olds to the ease of computer learning. Through the use of basic concepts such as colors, shapes, numbers and letters, children understand counting, math and language skills. Each program is designed to develop a specific skill, rewarding each correct answer with music and a happy face. Most are compatible with our new Edumate Light Pen $34.95.

Available for Atari 400/800, VIC-20 and Commodore 64; all require 8K for cassette, 16K for diskette. Also available for Timex/Sinclair 1000 and TI-99.

Please ask about programs available and their prices for Pre-School, Kindergarten and Grades 1 & 2. Prices range from $8.95 for a single cassette to $79.95 for a complete set on diskette.

Order now! See your local dealer or order direct. New catalog $2.00. Visa and MasterCard accepted—please add $2.00 for postage and handling.
Call toll free!

1-800-334-SOFT

DEALER INQUIRIES INVITED

programmer's institute

a division of **FUTURE HOUSE** — dept. al
p.o. box 3470, chapel hill, north carolina 27514, 919-967-0861

ACCESSING BULLETIN BOARD SYSTEMS

by William W. Hough
16K cassette or disk

Computer bulletin boards are systems that are accessed over the telephone network and offer file space for messages, questions, answers, want ads, phone numbers for other bulletin boards, and public domain software. They are provided by hobbyists, user groups, or dealers, and once your ATARI is equipped with a modem and terminal software, the cost of using a bulletin board service can be limited to telephone charges. Some boards do limit general use to portions of their files by requiring passwords. For example, a user's group might give the password for their best programs only to paying club members. The major services, Dow Jones, CompuServe, and the Source, are the largest bulletin boards, and these services bill for usage.

This article presents information about smaller bulletin board systems, particularly those catering to ATARI users, and details on how to get a novice started with the ATARI Communicator package or equivalent pieces. First, a bit of background on the capabilities of the ATARI and the functions of the pieces in the Communicator kit is in order.

The ATARI offers significant advantages over other home computers in its own (and higher) price classes when called upon to double as a remote terminal. When shopping for a home computer, my list of requirements included two very specific items only the ATARI could deliver!

1) Full ASCII character set from the keyboard.

and:

2) Minimum of 40 characters per line on a TV display.

I intended to use the micro-computer at home to access a mini at the office, and the full ASCII character set (particularly lower case) was necessary for work-related purposes. While you will not find all of the 128 ASCII codes pictured on the keyboard, they are there when the TELELINK I cartridge is installed. Table 1 gives the keystroke sequences that, when used with the TELELINK cartridge, will produce the non-obvious ASCII codes.

TABLE 1

CHAR.	ASCII CODE*	NAME	KEY-SEQUENCE
	0	NUL	CONTROL-SPACE
`	96	Grave Accent	CONTROL-; (semicolon)
{	123	Opening Brace	CONTROL-, (comma)
}	125	Closing Brace	CONTROL-. (period)
~	126	Tilde	CONTROL-+ (plus)
DEL	127	Rubout (line)	SHIFT-DELETE
		BREAK	SHIFT-BREAK

My ATARI Communicator kit was ordered the same day as the computer, and within an hour after opening the boxes, I was conversing perfectly with the mini 20 miles away. (It would have taken less time, but my son naturally insisted on a few Star Raider missions before I linked up.)

The Communicator kit includes the interface module, an acoustic coupled modem, the TELELINK I terminal program cartridge, and appropriate power supplies and connecting cables. There are also instructions on introductory access to three of the great big bulletin boards that charge for usage after your free hour is gone. The kit is a bargain when compared to ATARI's individual prices, but there are alternatives to most of the pieces which may reduce the overall cost, or increase the capabilities. I'll treat each piece separately:

INTERFACE MODULE

The function of the IM is to "interface" the ATARI peripheral port to an RS-232 serial interface port (it has four) and a single Centronics parallel interface port. Serial ports? Parallel port? Really quite simple. A serial interface or port puts the bits that represent a character, 7 bits for ASCII, 8 bits for ATASCII, a parity bit with ASCII, and control bits (called start and stop bits) in SERIES on one wire for each direction of transmission, plus a ground return. A series of bits, in time, is necessary when a data signal is to be carried over the telephone network. A parallel interface or port puts each bit on a separate

wire, so there are seven PARALLEL wires carrying the seven bit ASCII code, an eighth wire for parity, and a ground return. The parallel port on the ATARI IM is intended for connection to a printer, and a printer only receives characters. Since data transmission is one-way, there is only one set of eight wires. In both the serial and parallel interfaces, additional wires carry control signals back and forth.

"RS-232" is the name given by the Electronic Industries Association to their particular standard for the serial interface that operates at the speed range of interest. This standard defines voltage levels and connector pin assignments (at the modem), and is used universally in the United States. "Centronics parallel interface" is also a specification of voltage levels and pin assignments (at the printer). An American printer manufacturer, Centronics, defined this interface years ago, and it has been adopted by the printer industry as a standard. The ATARI 825 dot matrix impact printer is in fact a Centronics 737 parallel printer.

You can get into telecommunications without buying the ATARI interface module. At least one manufacturer (Microbits) offers a modem that plugs into a joystick port. However, should you want to add a parallel "Centronics type" printer, or upgrade your modem capabilities (higher speed or auto-dialing) later on, you will be out of luck. This type of modem does not have the standard RS-232 interface, and requires special software to drive it. Therefore, all the great public-domain smart terminal software described later on in this article won't work. While you would be saving about 35% on hardware cost, my personal opinion is that, for future flexibility, you would be better off sticking to the RS-232 standard.

MODEM

The next item in the Communicator kit is a modem. "Modem" is a contraction of modulator/demodulator, and its function is to transform the low-voltage, serial digital signal on the RS-232 interface wire to an analog signal that can be transmitted over telephone lines, and vice-versa. Modems come in two basic varieties: acoustic-coupled and direct-connect. A third variety, which the manufacturer calls direct-connect, but which is really a hybrid, is also available. There are modems capable of operating at several different speeds, which actually means different analog (telephone line) modulation techniques that increase in sophistication (and cost) as the speed increases. However, only two are of interest in bulletin board applications. These are: 300 bits per second (bps), where the modulation technique is simply two standard audio tones that represent the state (0 or 1) of the bit; and 1200 bps, where the modulation technique is somewhat more complex.

Both modulation techniques are based on Bell System standards; the 300 bps technique is often called Bell 103 compatible and the 1200 bps technique is called 212 or 212A. These designations come from the names of the Bell modems that operate with the respective modulation techniques. As all 1200 bps modems that operate with the 212A technique are built under Bell patents, most manufacturers call these modems 212As. And most 212As also operate at 300 bps with the flick of a switch. Rather than buying a modem, you have the alternative, at least for a while, of leasing one from your local telephone company. Because of recent FCC rulings, you may be able to buy a Bell direct connect 103 type or 212A modem after the first of the year 1983.

The modem that comes with the ATARI Communicator kit is a 300 bps, acoustic coupled unit that is a Novation Cat in ATARI clothing. An acoustic coupled modem has two cups in which you place a standard telephone handset after establishing a call to the other computer. As used here, "standard" means plain-old-ordinary; dial-in-handset and designer models won't fit.

The hybrid modem installs between the base and handset of a standard phone (which has a plug-ended handset cord.) For other reasons, dial-in-handset model phones will likewise not work with the hybrid modem.

As the telephone instrument is doing part of the work with acoustic-coupled and hybrid modems, these modems are less expensive than true direct-connect modems. But there are none in these categories that are capable of greater than the 300 bps speed. The acoustic-coupled modems are less reliable because they are subject to interference from room noise, TV speakers, computer buzzers, etc. True direct-connect modems are more reliable, more expensive, and often offer some added features, such as automatic answering and automatic dialing.

A word of caution. If you subscribe to two or more party telephone service, it is against FCC rules to use a true direct-connect modem. Such use could in fact cause you and the other party(s) difficulty and embarrassment at billing time. Further, another party trying to initiate a phone call when you are transmitting or receiving data will surely mess up your data (even with a legal acoustic-coupled or hybrid modem). If you are a party line subscriber, you will want to convert to individual line service before trying data communications.

Finally, not all (probably "few" is more accurate) of the small bulletin boards devoted to ATARI are presently capable of 1200 bps. After all, they would have to buy the more expensive modem too. But the higher speed cuts their phone bills, so we can expect that more and more will be offering the higher speed in the future. All that are capable of 1200 bps are also capable of 300 bps. Your decision on 300 vs. 1200 should be based on the capability of boards you want to access and a trade-off between phone bills and

modem cost, which of course depends on your contemplated use.

TERMINAL SOFTWARE

The next piece of the Communicator kit is the TELELINK 1 cartridge. Its function is to provide the software to turn your ATARI into a remote terminal. It automatically sets some interface module options — specifically 300 bps, ATASCII/ASCII conversion which ATARI calls light translation, no parity, and a few other control functions. Once you have dialed the host computer (bulletin board), your ATARI becomes what is known as a "dumb" terminal.

TELELINK I is convenient to use, but has no capability to capture files in memory. It does have a dump-to-printer option, but if you are after a new BASIC game on the bulletin board, dumping it to the printer only means you have to type it all in to play the game. You might as well have typed it in from the magazine. TELELINK I not only sends and receives a full ASCII character set (per Table 1), but it also displays grave accents, curly braces, and carets properly on the screen. Not all terminal programs have such a character set.

So how do you turn your ATARI into a smarter terminal, one which can capture that program in memory or a magnetic media (cassette tape or disk)? Well, you can buy one of several smart terminal programs, or you can save some money and get a copy of one of the very fine smart terminal programs that are in the public domain. But, you say, you don't know anybody who has one. The answer should be obvious — you download if from a bulletin board. Later on in this article, we will discuss several of the public domain smart terminal programs, and show you step-by-step how to download one from a bulletin board using the TELELINK I cartridge and a short basic program. First, however, there is one more item in the Communicator kit which deserves discussion.

CONNECTING CABLES

The cable that connects the computer to the interface module is no problem; it comes with the IM which you buy separately or as part of the Communicator kit, (If you choose the direct-connect modem that plugs into a joystick port, you don't need it at all.)

If you buy the ATARI modem, either separately or as part of the kit, you will also get the IM to modem cable. However, if you choose another modem, you may have to buy or build a cable. The IM end of the cable is not a standard RS-232 connector, but a smaller one that I presume ATARI chose so they could fit four serial ports on one edge of the IM. ATARI supplies a cable that will work with any standard RS-232 modem, but bought by itself, it is quite expensive. If you have a wire stripper and a small soldering iron, building a cable is straightforward. You will need a DB-9 male plug for the IM end and a DB-25 male plug for the modem end. You'll also need a short piece of cable with at least eight individual conductors, and the following table of pin-to-pin connections.

TABLE 2

MODEM CABLE

1	DTR	20	5	GROUND	7
2	CRX	8	6	DSR	6
3	XMT	2	7	RTS	4
4	RCV	3	8	CTS	5
			9	no IM connection	11

ESTABLISHING A CONNECTION

Now that you have all the pieces you need — the interface module, a modem, and terminal software — it's time to explore a bulletin board. You must turn on the interface module before you turn on the computer. If you are using TELELINK or a terminal program on cassette, the RS-232 handler will boot from the interface module when you turn the computer on. If your terminal program is on a disk, the diskette must also have a copy of the AUTORUN.SYS file that came with the ATARI DOS 2.0S master diskette. When the computer is turned on, AUTORUN.SYS boots the RS-232 handler. The instructions that come with the interface module are quite clear on the proper order for powering-on the different pieces.

Set your modem for call-originate and full-duplex, and make sure it is also turned on. Now, load and run your terminal program. (TELELINK I, being a cartridge, will automatically gain control.) If the terminal program asks for options (TELELINK doesn't), pick these: download, light-translation, no-parity, full-duplex. Also make sure your modem is set for the right speed as determined by your terminal program (300 bps for TELELINK and most other programs if unmodified to run at the higher rate). If things don't go quite right, you might have to try a different parity setting (try even first) or translation option.

Call the bulletin board as though you were placing a voice telephone call. If the bulletin board system is on-line, it will automatically answer after one or two rings and return a high-pitched tone. This is your signal to switch to the data mode. If you have an acoustic coupler, this means placing the telephone handset into the cups on the modem. With a direct-connect modem, there is probably a switch that says "talk/data". Turn it to "data".

On your modem, a lamp is lit that indicates it too can hear the high-pitched tone. If nothing else happens, press RETURN a few times; the bulletin board should wake up and announce itself on your screen. Many bulletin boards first ask how many "nulls" you need. Your ATARI needs none, so type "0" (zero). It will also ask for your name, (probably) location, and possibly some other questions; for instance, can you support lower case (Yes).

After it is satisfied that you haven't dialed a wrong number, it will tell you about itself and how to access the message file and the program files available for downloading. Pay close attention to the commands it needs to pause (usually CONTROL-S), to resume (usually CONTROL-Q or any character), to abort a file listing (usually CONTROL-C), and to disconnect (usually CONTROL-D or "BYE"). It may or may not understand a BREAK, and your terminal program may or may not send one. (TELELINK I does if you type a SHIFT-BREAK, and CONTROL-TAB seems to work with some other programs.)

The reason for the differences in commands and responses is that different bulletin board programs are used by the host computers. By far the most popular for bulletin boards in general is a CP/M program, but this is not true of boards devoted to ATARI users. Naturally, most ATARI boards are ATARIs, and ATARIs don't run CP/M. There are at least three fine bulletin board programs for ATARI: AMIS, ARMUDIC, and TARI-BOARD. What you need to do is explore the board, following its instructions, until you are comfortable using it.

CAPTURING A FILE

I promised that I would explain how to capture a listed file on magnetic media if you are starting with TELELINK I dumb terminal software. You need a short BASIC program like the following one. I call it QD (quick and dirty) DUMP. It is customized for CP/M. I chose CP/M simply because CP/M needs some extra translation not required with the ATARI programs, but this extra translation won't (except as noted) bother AMIS, ARMUDIC or TARI-BOARD. If you use it with one of the ATARI programs, there are some changes that will have to be made to incorporate their different commands. The statements needing attention are identified by remarks. None of the interface module's default options are changed, which makes QDDUMP the same as TELELINK (300 bps, light-translation, no-parity). QDDUMP also assumes your magnetic media is a cassette tape. If you have a disk drive, change line 210 appropriately.

```
10 DIM INLINE$(120),QUIT$(5)
19 REM : DEFINE EOF FROM CP/M
20 QUIT$=CHR$(10):QUIT$(2)="DONE"
29 REM :FIND MEMORY AVAILABLE
30 N=FRE(0)-256
40 N=N*(N<=32767)+32767*(N>32767)
50 DIM TXT$(N)
59 REM :OPEN RS-232 PORT
60 OPEN #2,13,0,"R1:"
70 XIO 40,#2,0,0,"R1:"
80 PRINT #2;CHR$(17):REM :START CP/M
89 REM :LOOP TO GET PROGRAM FROM CP/M
90 FOR I=0 TO 1 STEP 0
100 INPUT #2;INLINE$:TRAP 150
110 PRINT INLINE$
120 IF INLINE$=QUIT$ THEN 150
129 REM : APPEND INLINE$ TO TXT$
130 TXT$(LEN(TXT$)+1)=INLINE$
140 NEXT I
148 REM : WAIT (BLINDLY)
149 REM : FOR CP/M PROMPT
150 FOR T=1 TO 2000:NEXT T
159 REM : SIGNOFF FROM CP/M
160 PRINT #2;"BYE"
170 CLOSE #2
190 STOP
198 REM : TO WRITE CASSETTE,
199 REM : TYPE "GOTO 200" OR "CONT"
200 DIM BYT$(1)
209 REM : OPEN CASSETTE
210 OPEN #3,8,0,"C:"
219 REM : LOOP TO WRITE TO CASSETTE
220 FOR I=1 TO LEN(TXT$)
230 BYT$=TXT$(I)
240 BYTE=ASC(BYT$)
250 IF BYTE=10 THEN NEXT I
260 PUT #3,BYTE
270 NEXT I
280 CLOSE #3:END
```

You will need a loadable copy of QDDUMP on cassette or disk before you use it. Using TELELINK, log onto the bulletin board system and get to the point where the board is ready to send you the listed file. With CP/M, this will follow your command "TYPE" followed by a space and the filename. With other systems, it may be as simple as picking a number from a menu. You will have to tell CP/M to stop after its initial response by sending a CONTROL-S. Other systems may wait for you to type RETURN before sending the file. The point is that either it must stop or you must stop it, because you've some fast work to do.

Replace the TELELINK I cartridge with your BASIC cartridge and load and run QDDUMP. The first thing it does is dimension a string called INLINE$, which we will use to download a line at a time, and a string called QUIT$, which is the string that the board sends when it is finished outputting a file. With CP/M and a TELELINK in your ATARI, this string appears to be "DONE". However, CP/M speaks pure ASCII, and pure ASCII uses two characters to delimit lines, a carriage-return (decimal 13) followed by a line-feed (decimal 10). The light-translation option we picked changes the carriage-return into an ATASCII EOL (end of line character - decimal 155), but leaves the line-feed intact, and it will appear at the beginning of the next line. TELELINK throws the line-feed away, and we will do that too when we record the file. The reason we don't throw it away when we get it is that we would have to look for it and, in BASIC, that takes time. We want the part of the BASIC program that is accepting lines to be as fast as possible so we won't miss anything. Line 20 of QDDUMP defines the CP/M end-of-file as it appears to the ATARI, without TELELINK. If you are talking to one of the ATARI bulletin board programs, and you have told it you don't need line-feeds, then omit the CHR$(10) from the end-of-file definition.

Lines 30-50 find the maximum free memory that can be used for a string and dimension it accordingly. The more memory you have, the longer the file that can be downloaded, as we will be adding each line we download to the string, TXT$.

Line 80 starts CP/M; CHR$ (17) is CONTROL-Q. This line should start any system, as it automatically ends with a return. Lines 90 through 140 are the loop for receiving downloaded lines, printing them on the screen, and adding them to the string in memory. On an error, or when it sees the string the board sends when it is done downloading, QUIT$, we go to line 150 which waits blindly for a prompt from the board and signs off. The "BYE" in line 160 is the string CP/M recognizes as a signoff. Having the program do this is to save phone time. You've got to save the file you've captured on magnetic media before you turn off the computer, so you can't put TELELINK back in just yet.

Watch the light on the modem which lit when the board responded with its high-pitched tone. It will go out when the board recognizes your signoff, or when it gets tired of waiting for another instruction. (This is the dirty part of quick and dirty.) Hang up your end of the phone connection, and return your attention to your ATARI.

The TV screen should say "STOPPED AT LINE 190". At this point, you can type "PRINT TXT$" to see what you've captured. If there are funny triangles at the beginning of each line except the first, those characters are the line-feeds we will get rid of in the next part. If there are no triangles, you don't need line 250, but it does no harm, other than to waste a bit of time, to leave it there. After you have installed a blank cassette in your 410, or changed line 210 to "D:filename" if you are using a disk drive, type "GOTO 200" or "CONT" and an enterable copy of the downloaded file will be written to your magnetic media.

Type "NEW" and ENTER the listed BASIC file. You might get a couple of error messages if it finds some statements that it doesn't understand, but you don't want those anyway. Now you can RUN the program, SAVE it, or anything else you could do if you had typed it in.

PUBLIC-DOMAIN TERMINAL SYSTEMS

If you have followed the admittedly cumbersome technique outlined above, then you don't already have a smart terminal program. When you have one, you can throw QDDUMP away, because never again will you need it. Don't throw TELELINK away, however, because none of the public-domain terminal programs have the full ASCII capability from the keyboard that TELELINK does. Some programming languages, notably 'C', make extensive use of these characters.

There are several public-domain smart terminal programs available. A version of one can usually be found on any bulletin board catering to ATARI users. I have used three, and while they all do a fine job, each has unique properties. All three are written in BASIC, but have machine-language routines to handle character transfers at high speed.

JTERM, written by Frank Jones, is my favorite for AMIS, ARMUDIC and TARI-BOARD applications, primarily because a few additions let it work at 1200 bps. It is the only one of the three that does. Although written for disk, it is easily converted to read and write listed files on cassette. With a little bit more modification to get rid of line feeds (such as is done in QDDUMP), it will write an enterable program file to cassette or disk. (Of course, this isn't necessary when the bulletin board is running on an ATARI, because ATARIs won't send the stray line feeds.) To make maximum memory available for the download or upload buffer, JTERM erases some of its statements after initialization, so it can't be restarted with a simple RESET and RUN command.

ATERM originated with two modem programs published in **A.N.A.L.O.G. Computing** (*Download Terminal*, issue no. 2, and *Upload Terminal*, issue no. 3). These two programs were combined and extended by Bob House and Marshall Abrams. ATERM has the unique advantage of a help (instruction) file that should be written on the same disk as the program. As it comes in three parts, it is inconvenient for cassette users.

AMODEM, written by Jim Steinbrecher, is THE program for CP/M applications. It works in conjunction with a program called XMODEM on the CP/M machine. With it you can upload and download machine language, tokenized BASIC, and Music Composer files as well as listed BASIC and text files. And it's all automatic, including retrials if it determines an error has been made during file transfer. Version 4 of AMODEM works with a cassette recorder. Version 4 can also be used with AMIS, ARMUDIC and TARI-BOARD bulletin boards to transfer listed files. Jim Steinbrecher has also provided a nice documentation file for Version 4. Another very nice document is called "The XMODEM, AMODEM, CP/M Saga," by Greg Leslie. I downloaded both from bulletin boards. AMODEM's only deficiency is that it won't work at 1200 bps. I guess the machine language routines have so much else to do.

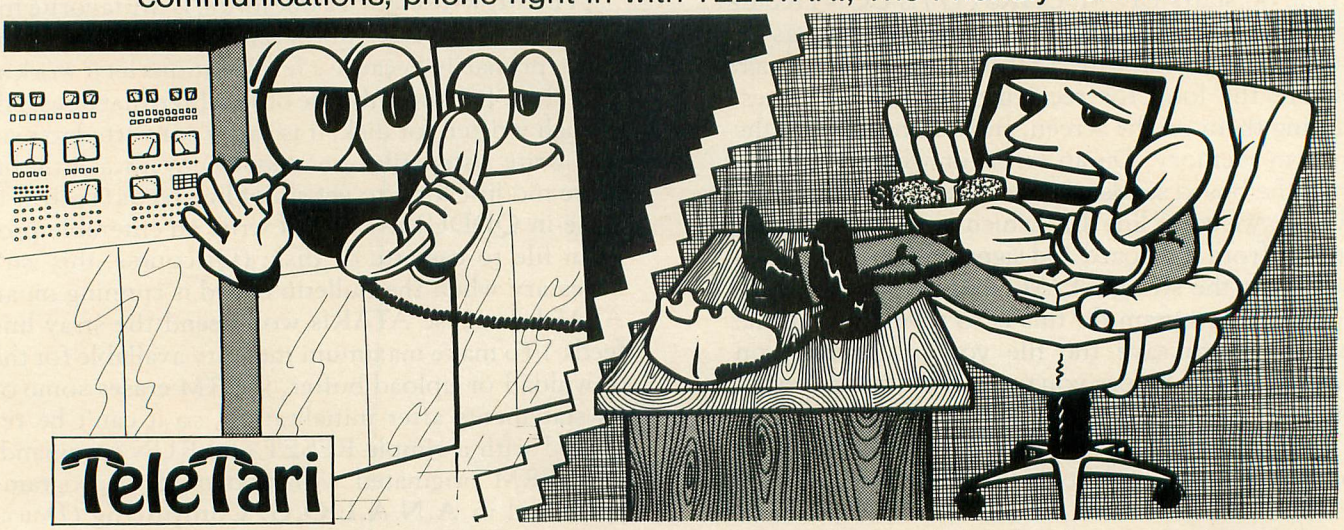
PHONE NUMBERS

So, you say, now I know how to access a bulletin board. But how do I locate one to call? Never fear, for the final table gives a list. I won't guarantee its accuracy, and certainly not its completeness, as new ATARI boards are cropping up all the time. Current lists are kept as files on many of these bulletin boards. Many of these boards are not 24-hour-a-day operations, but most will be on-line nights and weekends. If a voice instead of a tone answers, the voice will be able to tell you the hours of operation. Who knows, maybe soon you will be the "SYSOP" of your own ATARI bulletin board. □

(continued on page 55)

DON'T ASK PROVIDES THE MISSING LINKS

⟷ the link between your modem and the outside world. For hassle-free communications, phone right in with TELETARI, The Friendly Terminal.

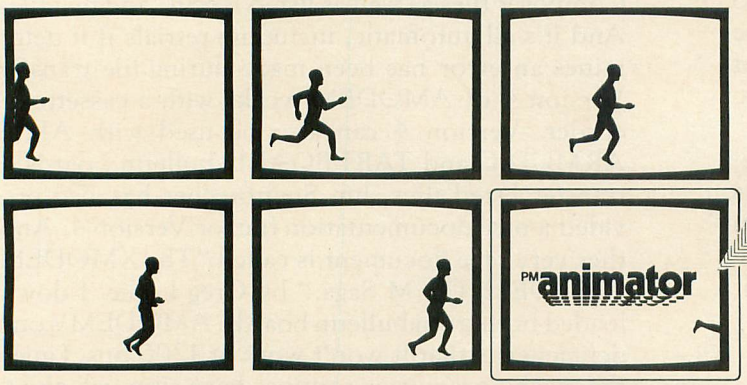


Your Atari has never had such easy access to the whole world of telecommunications – bulletin boards, news reports, large time-sharing computers, the works. Now it's a snap to tap into all these, and it's just as easy to transfer your program or text files to and from a remote computer. Meet TELETARI, The Friendly Terminal. It's just what your modem needs: a powerful, adaptable telecommunications package that's a cinch to use. With TELETARI, you simply choose the desired communications function from a menu. Commonly used terminal parameters are included in the program, but you can change them to suit your needs with a couple of keystrokes, using another handy menu, and store the ones you plan to use again. TELETARI's generous buffer stores up to 20K, so you can review, print, or save received information long after you've hung up the phone. You never knew using a modem could be so convenient. Because it's very flexible, TELETARI is compatible with most modems and a wide variety of computers. And because it works through the RS 232 port, TELETARI is not limited to modem/telephone uses. Put it to work in any RS232 application your imagination can devise – even operating a laser disk!

- buffer of up to 20K
- menu-driven
- highly adaptable
- supports all 850 options
- compatible with 1200 baud modems and BiT 3 Full-view 80™ board
- suitable for any RS232 application

$39.95 Requires Basic, 32K RAM, disk, 850 Interface

⟷ the link between BASIC and arcade-style graphics. Draw and animate pictures for your own BASIC games and other programs with pm ANIMATOR. Create running men, flying rockets, moving figures of all kinds.

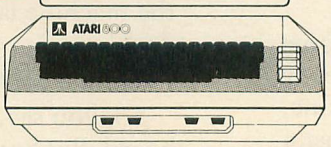


Coming soon from DON'T ASK.

BASIC programmers, pm ANIMATOR puts the power of Player-Missile Graphics at your fingertips.

$34.95 Requires 32K RAM, BASIC, disk.

PM animator

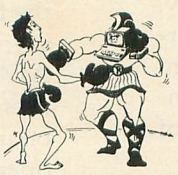


To order direct from Don't Ask, send a check or money order, or call to order COD. Add $2.00 for shipping and handling. California residents add 6% sales tax (6.5% if you reside in L.A. County).

⟷ the link between fast game action and verbal learning:

WORDRACE

Kids and adults, increase your vocabulary while you compete in this exciting word game.
Disk version:
3 levels of play – Beginner, Regular, Challenge
Requires 32K RAM, disk, BASIC. $24.95
Cassette version:
2 levels of play – Beginner, Intermediate
Requires 16K RAM, cassette, BASIC. $19.95
turn WORDRACE into a history game or a famous athletes game, and get more vocabulary words, with the WORDRACE accessory disk: CLAIM TO FAME/SPORTS DERBY. 3 new games in all.
Disk only. Requires WORDRACE disk. $19.95



⟷ the link between you and what your Atari is really thinking:

ABUSE

the insult-exchange program.
Have you cursed out your computer? Now it can understand you and answer back!
Requires 40K RAM, BASIC, disk. $19.95
Release your aggressions! Inflict ABUSE on anyone who's got it coming!

DON'T ASK

⟷ the link between technical excellence and the fun of computing. Why do we give you so much? Don't Ask.

DON'T ASK COMPUTER SOFTWARE INC.

2265 Westwood Bl., Ste. B-150
Los Angeles, CA 90064
(213) 475-4583 or 397-8811

TABLE 3
ATARI BULLETIN BOARDS

(Readers should be advised that some phone numbers may have changed between the time of publication and the readers' access of a particular system.)

AMIS		
Cupertino	CA	408-253-5216
San Jose	CA	408-298-6930
San Jose	CA	408-244-6229
San Jose	CA	408-942-6975
Denver	CO	303-758-6233
Miami	FL	305-238-1231
Honolulu	HI	808-833-2616
Chicago	IL	312-789-3610
Boston	MA	617-876-4885
Detroit	MI	313-589-0996
Grand Rapids	MI	616-241-1971
Sterling H'ghts	MI	313-978-8087
Monroeville	PA	412-372-0616
Seattle	WA	206-228-9401
Spokane	WA	509-582-5217
Madison	WI	608-251-8538
ARMUDIC		
San Francisco	CA	415-527-8276
Washington	DC	202-276-8342
Silver Spring	MD	301-587-2132
New York	NY	212-598-0719
Oklahoma City	OK	405-722-5056
Eugene	OR	503-343-4352
Pittsburgh	PA	412-655-2652
CP/M		
Chicago	IL	312-789-0499
Baton Rouge	LA	504-273-3116
Boston	MA	617-266-7789
Royal Oak	MI	313-759-6569
Oklahoma City	OK	405-848-9329
Allentown	PA	215-398-3937
Philadelphia	PA	215-836-5116
Hawkins	TX	214-769-3036
TARI-BOARD		
Denver	CO	303-221-1779
Atlanta	GA	404-252-9438
Madison	NJ	201-377-4084
Mount Holly	NJ	609-267-7825
Princeton	NJ	609-924-5875
Beechwood Falls	OH	216-582-2792

The Challenge of the Quest

by Brad Griffin

In a remote part of *Angola*, the fair maiden, *Glanoa*, shivers with fear and disgust as the evil *Captain Moonglug* approaches. Her skin crawls as the vile scientist, caressing the silken strands of her hair, whispers in her ear, "You are mine now. No one can save you." As the foul stench of his breath causes our lady to recoil, a gust of fresh air with a hint of honeysuckle pervades the dark room of her imprisonment. Could this be an omen of hope? Or is it something too perverse to imagine? Far away, in the outer reaches of the desert known as *Gala No*, a lonely figure wanders aimlessly from dust to dune. *Alan Og*, a soldier of fortune, about to give up all hope of surviving, catches the faint hint of honeysuckle in the wind. A mystifying force surges through the sinewy body, as the wanderer feels a sense of purpose. He knows that the fairest maiden of all is a captive of the dreaded one, and he, *Alan Og*, is her only salvation. He begins the search anxious to encounter the one known as "pond scum", the villainous *Captain Moonglug*.

So begins your adventure into lands unknown, against never-before-dreamed-of foes. Among the scores of games in the burgeoning software market, the computer adventure is a genre of its own. What is an adventure? How does one play it? Who plays adventures? Are they all the same? We shall explore the computer adventure with all of its variations and review representative simulations from the different groups.

Deciding what games should be included in the category of adventure is becoming increasingly difficult. As programmers search for original ideas and games to attract the public, combinations of arcade and adventure games further cloud the issue. An adventure has been defined as a bold undertaking, in which hazards are to be met and the issue hangs upon unforeseen events. Using this definition as a guideline, we shall explore computer adventures.

There is stark contrast between the adventure game and the arcade game. Frequently, this same contrast exists in people. Arcade addicts with their lightning quick reflexes and unparalleled persistence must eventually succumb. They may achieve a higher score, but the invaders (centipedes, et al) always prevail, and losing is inevitable. The adventurer knows there is always hope, and, if one is clever and possesses dogged determination, The Quest will be accomplished. It is the possibility, even the probability, of success, that truly differentiates the adventure from other simulations. An arcade game is like shooting basketball; the more one does it, the better one becomes. A variety of obstacles may prevent one from reaching perfection or totality. Distance from the hoop, angle of the shot, fatigue, and the ever present, "in your face!", all enhance the game, but deny perfection. An adventure is like reading a book. The story line exists and the resolution is sought. The adventure game differs from the book in that one must be an active participant instead of an omniscient observer or reader. There is jeopardy in a computer adventure. The ever-present risk of being wasted in an encounter with a monster of low degree always exists; however, the true peril is failing to solve the puzzle and never achieving the final goal. This is like reading a mystery and never having the opportunity to finish the final chapter. The exhilaration of discovering the clue which finally enables one to get the key from the ogre by tickling its froboosh is not found in any other game. The exasperation of being unable to cross the ravine, beyond which is a buried treasure, is unmatched. The sense of accomplishment and pride when success is at hand is universal. The desire to complete the quest, and the anxiety in mastering the final obstacle give way to the feeling that a friend has been lost. Much the same feeling one has when a book is finished. The only way to rid oneself of this depression is to begin a new adventure. Quite a hardy lot these adventurers. Some of the newer adventures have random features assuring one of a different adventure with each new game.

The basic scheme in an adventure is to advance through a series of mazes to reach a final goal. Each section of the maze may be depicted as a room, a forest, or even the inside of a tourbillion? Traveling from one section to the next may simply require a command, such as, "GO DOOR." Certain items may be needed to allow progress. E.g., one must use the stick to knock the apple from the tree to throw at the fire-breathing Galumph, who, being terrified of apples (specifically, Golden Delicious), runs away, dropping the key to the secret door. Most objects have a purpose, but not one that is always apparent. There is usually a limit to the number of items one is permitted to carry, requiring discrimination in the load carried. Drawing a map is essential for most adventures. Dropping objects as one explores the

maze, ala Hansel und Gretel, avoids traveling in blind loops, and the search for the way in or out is simplified.

The basic concept in computer adventure games is to reach an ultimate goal, whether it be to accumulate a certain number of *TREASURES*, rescue the princess, or discover the guilty culprit. However, adventures are not all the same. The most fundamental difference is the format of the adventure. These have been described by others, but the use of generalized terms has made these distinctions confusing. The most commonly abused term is "graphic adventure." Every adventure games uses graphics to some degree. How does one discern the difference between a game with a static graphic display of what the adventurer sees and one with a scrolling graphic map, where the adventurer is seen as a figure within the representation? Both are described in advertisements as graphic adventures. The following categorization may remove some of this confusion. There are two basic types of computer adventure games; the text adventure and the action adventure.

TEXT ADVENTURES

Here the adventure scenario and progress through it are conveyed with the written word. There are three kinds of text adventures. The *Pure Text Adventure* uses only written text. Usually, the adventurer sees through the eyes of a "puppet" and communicates using two word commands, a noun and a verb. The surroundings are described in some detail and the objects in view are listed. Objects are used by typing specific commands, such as, "TAKE AXE", or "USE AXE". The program responds with "OK" if it is an appropriate command, or with "I DON'T KNOW HOW TO USE AN AXE." At times, one may feel compelled to "USE AN AXE" on the computer. The possible routes of exit from each location are displayed. Movement is accomplished using directional commands. Most adventures permit use of abbreviations, so instead of typing "GO NORTH", using "N" is sufficient. Other directions are abbreviated as S,E,W,U (up), and D (down). An inventory (I or INV) command displays the objects one possesses at that moment. Hints to aid the novice may suggest the correct word to use in a certain situation. Hints may also provide a classic straight man setup, as Scott Adams demonstrates when he suggests using the command "WEIGH ANCHOR". The more advanced adventure games do not contain hints within the program itself, although many hint books are available separately. (The Zork Users Group superbly complements Infocom's series of adventures with maps, blueprints, posters, hint books, T-shirts, etc.). Scott Adams' Adventures fall into this category, as do most of the APX adventures. Infocom's adventures allow the input of full sentences with multiple commands, successfully simulating actual conversation.

Slightly different is the *Enhanced Text Adventure* in which something extra is added to the basic text format. This may be done using sound or a simplified illustrated panel to embellish the overall effect. LABYRINTHS from P. C.A. is an example of an enhanced text adventure. Commands are selected from a menu, while sound effects for combat and changes in the background color for different locations are used.

The third type is the *Illustrated Text Adventure* where every location (room, panel, portion of the maze) is a picture of what the adventurer would be seeing. The static graphic display is accompanied by text in the lower window. Keyboard commands, as with other text adventurers, are used. If an object is picked up, or an action taken that would alter the scene depicted, e.g. cutting down a tree, the pictorial display is redrawn to show the changes. Although challenging in their own right, these adventures may be limited in scope, since an illustrated, and hopefully recognizable, object must appear on the screen. WIZARD AND THE PRINCESS, an Sierra-Online Systems Inc. Hi-Res Adventure, is an example of an exciting adventure scenario with high quality graphic illustrations that does not sacrifice the challenge of pure text adventures.

ACTION ADVENTURES

There are two sub-groups in this category. The *Personified Adventure* is a group that is most varied and difficult to classify. They are often referred to as graphic adventures, mapped adventures, or role-playing fantasy adventures. The adventurer is usually represented by a symbolic human figure (ergo, personification) which is able to be moved about the screen from one location to another. As the edge of the screen is approached, it scrolls to the adjacent area. Control is through a combination of keyboard commands and joystick manipulation. The commands are most often in menu form and are quite limited. Consequently, the commands are known to the player and the challenge (or frustration) of discovering the game's special vocabulary is missing. Random encounters with danger highlight the quest, and combat is frequent. After achieving the final goal, the random nature of these games allows them to be played repeatedly. ALI BABA AND THE FORTY THIEVES by Quality Software is an example of this type of adventure.

Arcade Action Adventures are unique in that they require use of motor skills to facilitate interaction with the game. Features of the other adventure formats are incorporated, but quick responses to invading aliens, etc. are necessary. The display may be similar to the illustrated text, and animation added by having foes appear periodically. Unlike other adventures, the goal may be to attain a high score, rather than achieve a final success, although

both goals are usually embodied in the arcade action adventure. The cerebral challenge of decifering clues and the mental images created by the text-based adventures are replaced with the reflex response to the droid which just appeared and blasting it to Cleveland where it will never be heard from again. STAR WARRIOR from Automated Simulations is a personified adventure with arcade action.

There are adventure players who consider themselves purists and only play the text adventures. They are involved in the challenge of the word game aspects and solving the mystery. The illustrated text and action adventures provide an enjoyable variety. There may be major differences between adventures with the same format. Documentation, game-save feature, real-time element, completion time, and originality of the scenario are a few areas where these differences occur.

The only way to find out if you will enjoy adventure gaming is to try it. For the beginner, Scott Adams' PIRATE ADVENTURE or Online's MISSION ASTEROID provides a good introduction. They are both available in illustrated text versions (PIRATE ADVENTURE is also available as pure text and on cassette for less money). Both are challenging, but not impossible, and will give hours of pleasure. If you want greater challenges after whetting your appetite, a bounty of adventures await you — many reviewed in this issue. Naming the best adventures is difficult because of wide variation in individual preferences. All of Scott Adams' Adventures are well done and original. WIZARD AND THE PRINCESS (Online Systems Inc.) was the first high quality illustrated text adventure available for the ATARI. This Hi-Res Adventure by Ken and Roberts Williams is still the standard of excellence in its field. ALI BABA (Quality Software) is without peer in the personified adventure arena. Stuart Smith has created a role-playing fantasy with many special features that no other adventure of this type has even remotely approached. ALI BABA's originality, playability, and use of ATARI's unique sound and graphics capabilities are unparalleled. Though not considered here as a true adventure game, CRUSH, CRUMBLE, AND CHOMP (Epyx Simulations) is a role-playing fantasy with the player starring as one of many available movie monsters attempting to destroy any of four major world cities. It is great fun. SNOOPER TROOPS (Spinnaker) offers an excellent combination of all the above formats, and though its advertisements seem to be aimed at children, it is challenging and fun for all ages.

No article on adventures would be complete without mentioning the creators of the first adventure, Don Woods and Willy Crowther. Their original trek through Colossal Cave has been recreated by many. A version of this classic adventure game should be part of every serious adventurer's collection. Let The Quest begin. □

COMPANY/GAME	FORMAT	REQUIREMENTS	SKILL LEVEL	GAME SAVE	INTER-FACE	EXTRA FEATURES
ADVENTURE INTERNATIONAL						
Adventures 1-12	Text	24K/Cass, 32K/Disk	Novice⇨Advanced	Yes	K	
S.A.G.A. 1-?	Illustrated Text	48K/Disk	Novice⇨Advanced	Yes/Multiple	K	2,3
Curse of Crowley Manor	Text	16K/Cass	Advanced	Yes	K	
Escape from Traam	Text	16K/Cass	Advanced	Yes	K	
ATARI PROGRAM EXCHANGE						
Alien Egg	Text	24K/Disk (BASIC)	Novice	No	K	
Castle	Text	24K/Disk (BASIC)	Novice	No	K	
Chinese Puzzle	Text	24K/Disk (BASIC)	Intermediate	No	K	
Galahad and the Holy Grail	Personified	32K/Disk	Novice	No	J	
Sleazy Adventure	Text	32K/Disk (BASIC)	Intermediate	No	K	
Sultan's Palace	Text	32K/Disk (BASIC)	Novice	No	K	R-Rated
Wizard's Gold	Text	24K/Disk (BASIC)	Novice	No	K	
Wizard's Revenge	Text+	24K/Disk (BASIC)	Intermediate	No	K	
AUTOMATED SIMULATIONS						
Crush, Crumble & Chomp	Person/Arcade	32K/Cass/Disk	Novice	No	K	1
Crypt of the Undead	Personified	40K/Disk	Novice	No	J	
Curse of Ra	Personified	32K/T/D	Intermediate	No	K	
Temple of Apshai	Personified	32K/T/D	Intermediate	No	K	
Datestones of Ryn	Person/Arcade	32K/Cass, 32K/Disk	Novice	No	JK	1
Dragon's Eye	Personified	40K/Disk	Novice	Yes	J	
Escape-Vulcan Isle	Personified	40K/D	Novice	No	J	
King Arthur's Heir	Personified	40K/D	Novice	No	J	
Rescue at Rigel	Personified	32K/T/D	Novice	No	K	
Star Warrior	Person/Arcade	32K/Cass/Disk	Novice	No	K	1
AVALON HILL						
Empire of Overmind	Text	40K/T/D	Advanced	Yes	K	
Lords of Karma	Text	40K/T/D	Novice	Yes	K	
DATASOFT						
Sands of Egypt	Illustrated Text	16K/Disk	Intermediate	Yes/Multiple	K	Animated
INFOCOM						
Deadline	Text	32K/Disk	Intermediate	Yes/Multiple	K	1,2
Starcross	Text	32K/Disk	Intermediate	Yes/Multiple	K	1,2
Zork I, II, & III	Text	32K/Disk	Intermediate	Yes/Multiple	K	1,2
JV SOFTWARE						
Action Quest	Arcade	16K/T/D	Novice	No	JK	
Ghost Encounters	Arcade	16K/T/D	Novice	No	JK	
ON-LINE SYSTEMS						
Mission: Asteroid	Illustrated Text	40K/Disk	Novice	Yes/Multiple	K	
Softporn Adventure	Text+	40K/Disk	Novice	Yes	K	R-Rated
Ultima I & II	Illustrated Text	48K/Disk	Intermediate	Yes/Multiple	K	
Ulysses and the Golden Fleece	Illustrated Text	40K/Disk	Intermediate	Yes/Multiple	K	
Wizard and Princess	Illustrated Text	40K/Disk	Intermediate	Yes/Multiple	K	
P.C.A.						
Labyrinths	Text+	32K/T/D (BASIC)	Novice	No	K	1
QUALITY SOFTWARE						
Ali Baba and the 40 Thieves	Personified	32K/Disk	Novice	Yes/Multiple	K/J	1,4
SPINNAKER SOFTWARE						
Snooper Troops #1	Mixed	40K/D	Novice	Yes/Multiple	K	Educational
Snooper Troops #2	Mixed	40K/D	Novice	Yes/Multiple	K	Educational
SYNERGISTIC SOFTWARE						
Probe 1 — Transmitter	Arcade	40K/Disk	Novice	?	JK/PK	1
Warlock's Revenge	Illustrated Text	40K/D	Novice	Yes	K	

LEGEND

FORMAT — Text = Pure Text; Text+ = Enhanced Text; Illustrated = Static Graphics; Person = Personified Graphic or Mapped; Arcade = Mobile Enemy, Motor Skills needed; Mixed = Unique Combination, animated/personified, motor skills.

SKILL LEVEL — Level of expertise or experience needed to successfully interact or complete adventure.

INTERFACE — K = Keyboard alone; J = Joystick; JK = Joystick and Keyboard used together; K/J = Either utilized

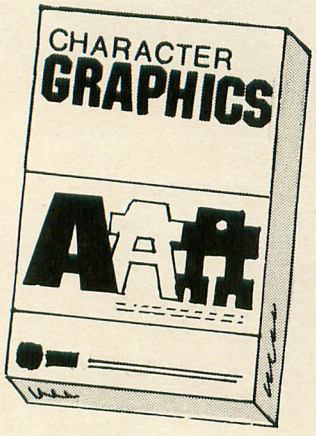
EXTRA FEATURES — 1) Random variations; 2) Printer output; 3) Voice synthesizer; 4) Two or more players possible.

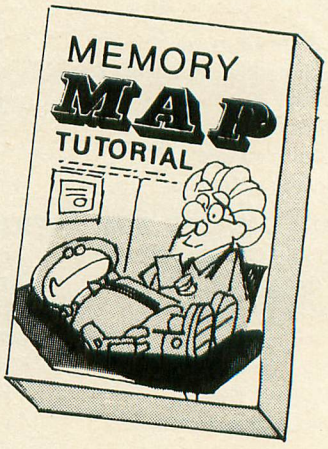
EDUCATIONAL SOFTWARE

PROUDLY PRESENTS

TRICKY TUTORIALS™ 8 Thru 11

FOR ATARI® COMPUTERS





16K TAPE OR 32K DISK ONLY $29.95 EACH!

#8 - Create and animate your own character sets using the same methods used in many of your favorite games. Includes a great editor, utilities, examples, and a complete Space Invaders look-alike, all explained in detail.

#9 - Learn to use Graphics modes 9, 10 & 11 giving you 16 shades or 9 colors, all from BASIC. Create programs never before possible such as three dimentional shapes and digitized pictures, all explained in great detail.

#10 - Find that perfect sound effect for your games and programs. Includes over 50 effects ready to use and explains how they were written. Special utilities are included to allow you to develop your own sound effects.

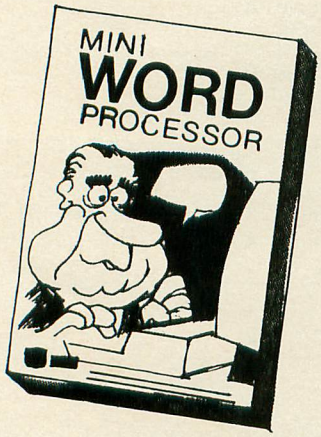
#11 - Our famous Memory Map now COMES ALIVE in this TUTORIAL. Included are thirty of the most useful POKE locations within the ATARI, each fully explained with interactive examples. See the tricks you have always heard about.

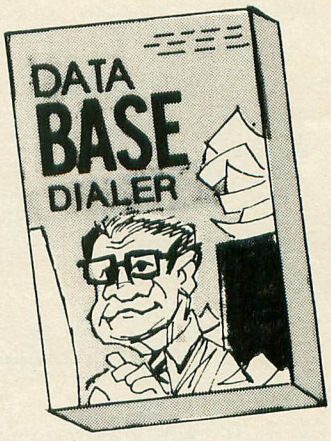
ESI
PROGRAM
EXCHANGE
EDUCATIONAL SOFTWARE inc.

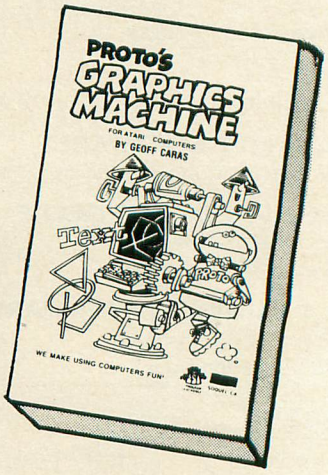
OUR NEW PROGRAM EXCHANGE

FEATURING THE FINEST PROGRAMS

FROM AUTHORS AROUND THE WORLD:

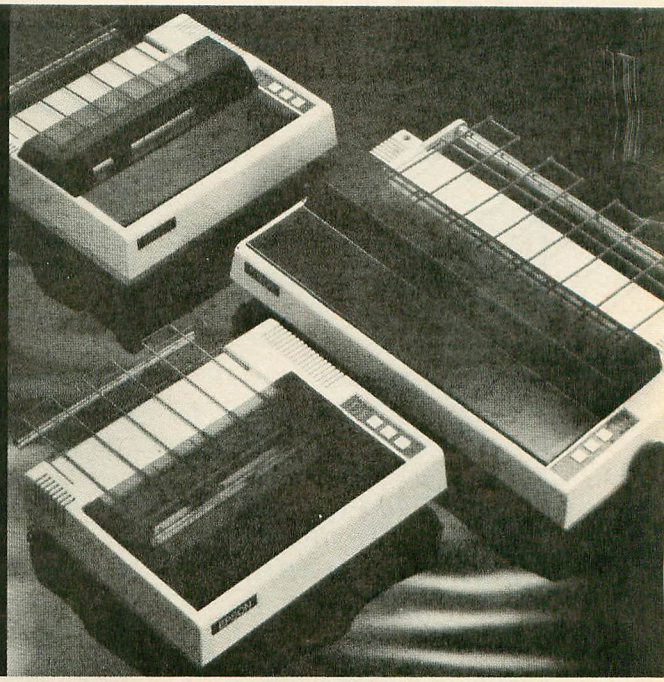






THE ESI PROGRAM EXCHANGE OFFERS A $24.95 WORD PROCESSOR (TAPE OR DISK), A $19.95 GRAPHICS TOOL THAT USES SINGLE WORD COMMANDS, A FAMOUS CHARACTER EDITOR FOR ONLY $19.95, A DATABLE PROGRAM ($24.95) *THAT ACTUALLY* DIALS YOUR PHONE AS WELL AS KEEP YOUR RECORDS, AND OVER 20 MORE!

EPSON PRINTING MODES SIMPLIFIED



by Thomas M. Krischan

Tired of coding all those CHR$(xx) statements to generate an EPSON printing mode? The User's Manual uses the Model I TRS-80 as its teaching system. Consequently, ATARI computer owners find, that many of the well documented examples don't work. At first glance, the EPSON printing modes seem strangely and lengthily encoded. For illustration, say we wish to print a line of double strike compressed expanded mode. We would have to type in this:

```
LPRINT CHR$(27); CHR$(71); CHR$(27); C
HR$(70); "text"; CHR$(27); CHR$(72); C
HR$(27);CHR$(69)
```

That accounts for 72 keystrokes dedicated for control codes. Half to enable the mode and half to disable it back. Rejoice, there is a simpler way. GRAFTRAX-80 and the ATARI computer are a great combination.

CHR$(27) is an escape code CHR$(69), CHR$(70), CHR$(71), and CHR(72) set printing modes. Each of these express a single ASCII value which just so happens to also represent a single printable screen character. Try typing this:

```
? CHR$(27); CHR$(27); CHR$(69); CHR$(7
0); CHR$(71); CHR$(72)
```

Aha! ESCEFGH. Note that ESC corresponds to the ESC key and that only one ESC is printed. The first ESC is used by the computer, but that's another story. Back to the printing modes. Try typing this little gem:

```
LPRINT "ESCGESCHtextESCHESCE"
```

(Remember to use the ESC key twice for each ESC symbol).

Hey, that's the same print mode as our first illustration. And this uses only 8 keystrokes for control codes, or 12 if you're a purist and consider double presses. In either case it's much less than 72.

Before you go racing off to your printers, let's explore more about character codes. There are only 5 true character control codes (Table 1).

TABLE 1.

ON CODE	OFF CODE	FUNCTION
E	F	Emphasized
G	H	Double Strike
P	Q	Compressed
R	S	Expanded
4	5	Italics

We must include the necessary preceeding escape code before each of these. By specifying all possible combinations we obtain 32 character modes (2**5 = 32). These are displayed in Table 2. Note that only 24 character modes are unique. The Emphasized code (E) nullifies the Compress code (P). The first line in Table 2 was generated by:

```
LPRINT "ESCFESCHESCQESCSESC500000FHQSS"
```

. . . where "ESCFESCHESCQESCSESC5" are the necessary control codes and "00000FHQSS" is the printed text.

By the way, if you use escape codes in a program it becomes non-listable on the printer, but will list to the screen.

TABLE 2

```
00000FHQS5
00001FHQS4
00010FHQR5
00011FHQR4
00100FHPS5
00101FHPS4
00110FHPR5
00111FHPR4
01000FGQS5
01001FGQS4
01010FGQR5
01011FGQR4
01100FGPS5
01101FGPS4
01110FGPR5
01111FGPR4
10000EHQS5
10001EHQS4
10010EHQR5
10011EHQR4
10100EHPS5
10101EHPS4
10110EHPR5
10111EHPR4
11000EGQS5
11001EGQS4
11010EGQR5
11011EGQR4
11100EGPS5
11101EGPS4
11110EGPR5
11111EGPR4
```

Now we will explore spacing codes. If you have tried the underlining example in the EPSON User's Manual you found that it doesn't space correctly with the ATARI computer. Try typing in this example:

```
10 LPRINT "ESC A CTRL U UNDERLINE"
20 LPRINT "----------ESC A CTRL G"
30 LPRINT "IS FAKED!ESC A CTRL L"
40 LPRINT "NORMAL LINE."
   and RUN

NOTE: ESC=ESC ESC  CTRL U=CTRL E  CTRL G=CTRL G
      CTRL L=CTRL L
```

Let's explain how it works. Standard (i.e. default) spacing consists of 12 vertical dots or 1/6 inch. Upper case letters use the top seven dots (dots 1-7), leaving the bottom five dots blank (dots 8-12). Vertical line spacing can be changed using an ecA control code. The number following the control code signifies the number of vertical dots in a line, from 1 to 85. The ATARI keystroke which corresponds to 1 is "ctrl A", 2 is "ctrl B", etc. In our illustration we do not specify a type of vertical line spacing. The default is twelve vertical dots. The top of our line is dot #1 and the base of our line is dot #12. Statement (10) activates the top seven pins in our printer head and we print "UNDERLINE" on dots #1 through #7. We then change our line spacing to a five dot vertical line. In statement (20) we skip to the next printer line. Our top is now dot #6 and base is dot #17. We activate pin number four and print several dashes. Pin number four is located on dot #9. We again readjust our line spacing to a seven dot vertical line. Then, in statement (30) we skip another printer line. Our top is now dot #13 and base is dot #24. We are positioned on a standard spacing base line (i.e. 24 is divisible by 12). We then print "IS FAKED!" and reset the vertical spacing to a standard 12 dot line. Statement (40) shows us that we're back to normal.

Table 3. illustrates the five spacing codes.

TABLE 3

ATARI CODE	DESCRIPTION
ESC 0	Sets 9 dot vertical line
ESC 1	Sets 7 dot vertical line
ESC 2	Sets 12 dot vertical line
ESC 3 n	Sets n/3 dot vertical line
ESC A n	Sets n dot vertical line

Why are there so many spacing codes? Well, the first three are intended as quick and easy spacing for normal text printing. The last two codes concern more specialized text printing, like underlining and graphics.

Unfortunately, once you activate any of these spacing codes, except ec2, the printer forgets where the top of the form is. The form feed counts the number of whole lines, not dots. You could readjust for this by manipulating with fewer or greater dots in successive print statements.

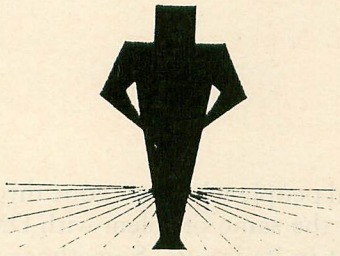
For example, in our illustration we use four LPRINT statements. But, it appears that we've only printed three lines. One of our LPRINT's is the underline. We are actually one whole line, 12 dots, behind the form feed counter. To catch up we simply add one 24 dot line, like this:

```
50 LPRINT "ESC A CTRL X" (CTRL X=CTRL X)
```

With this information in hand, EPSON printer users can write programs with much more efficient operation, not to mention the savings on keystrokes when entering programs. □

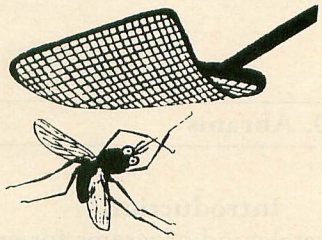
NEW FOR ATARI FROM MMG MICRO SOFTWARE

*NOW — THE **TWO** MOST POWERFUL AIDS FOR ATARI BASIC!!*



BASIC COMMANDER

- **Single key entry file commands**
  - — ENTER "D:
  - — SAVE "D:
  - — LIST "D:
  - — RUN "D:
  - — LOAD "D:
- **Single Key DOS functions from BASIC**
  - — FORMAT a disk
  - — LOCK a file
  - — RENAME a file
  - — UNLOCK a file
  - — DELETE a file
  - — DISK DIRECTORY
- **THREE PROGRAMMABLE KEYS!!**
  - — single keys programmed for your own use, even whole subroutines
- **AUTONUMBER**
  - — automatically generates line numbers for you — speeds program entry 25-75%
- **BLOCK DELETE**
  - — deletes any range of lines instantaneously!
- **RENUMBER**
  - — renumbers lines and all references
  - — extensive error trapping
  - — 3 seconds to renumber 500 lines



MMG BASIC DEBUGGER

- **TRACE through your Basic program**
  - — Single step
  - — TRACE while
  - — TRACE UNTIL
  - — change variables
  - — LIST line numbers executed
  - — examine variables' values
- **Full screen BASIC editing**
  - — scroll up or down by cursor
  - — edit your whole program easily
  - — no more LIST line number ranges
- **Split screen mode**
  - — view two parts of your BASIC program at once, and edit both!
  - — scroll each window independently
- **CROSS REFERENCE**
  - — provides a list of variables and the line numbers in which they are used in your program
- **SEARCH FOR PHRASE**
  - — search your BASIC program for any phrase, command or string of characters; let your computer do the searching for you!

EACH PRODUCT ALONE REQUIRES 16K, AND IS AVAILABLE ON DISK FOR *ONLY* $34.95

Now, the convenience of both powerful utilities together in your Atari *at once*

The Combined Basic Commander and MMG Basic Debugger requires 24K. $74.95

ADDITIONAL PRODUCTS

NECESSITIES

RAM TEST II - The fastest and most thorough memory test available for the ATARI has now been further improved! Tests not only all locations, but also tests the memory addressing system. This all machine language program takes 4 minutes to test 48K. It's the only program that tests the cartridge area of RAM. Good for new 400/800 computer owners, for testing new RAM boards and for use in computer stores to test and pinpoint bad memory locations. Bad memory locations are pinpointed so repair is as simple as replacing a chip!

Requires 8K, Disk or Cassette **$29.95**

DISK COMMANDER II - Just save this program on your BASIC disks and it will autoboat and automatically list all programs for the disk into your screen. Simply run any program by typing a single number.

Requires 16K, Disk Only **$29.95**

TUTORIALS

ASTEROID MINERS - This 50 page book and program provides for a unique intermediate to advanced tutorial. A 32K BASIC game utilizing over 25 players in player-missle graphics, machine language subroutines, a redefined character set, multiprocessing utilizing the vertical blank interrupt interval, and much more! The 50 page book included with the program documents each part of the entire program and contains the fully documented source code for both the BASIC and assembly language parts of the program. Use these routines in your own programs. These examples make it easy!

Requires 32K, Disk or Cassette **$34.95**

GAMES

CHOMPER - An all machine language arcade style game with intelligent monsters. Requires 16K Ram, 1 Joystick and nerves of steel.

Available on Disk or Cassette **$29.95**

BUSINESS/HOME

MAILING LIST - Extremely fast BASIC and machine language program. Each data disk holds over 500 files. Sort on any of 6 fields at machine langugage speed or search on any fragment of a field! Use any size labels or envelopes.

Require 40K, Disk Only **$39.95**

NEW

MMG DATA MANAGER - If you frequently find yourself looking for something, only to find it eventually right under your nose, then MMG DATA MANAGER is for you. Organize virtually anything into a computer-searchable format, and let your ATARI do the hunting for you. MMG DATA MANAGER is the first of a series of business applications from MMG MICRO SOFTWARE, all of which will share the ability to access files created by any of them. This flexible database manager will allow many fields, with machine language sorting, on any field. In addition, you have total control of the structure of your data, allowing you to design a database which you feel most comfortable. A special feature of MMG DATA MANAGER is its ability to select for a given value of any single field, or any combination of values from many fields. You could, for instance, determine who lived in Las Vegas, Nevada, and bought item #3145 from you, and whose last name began with SM, and whose telephone number began with (702) 873-4. You'll never lose track of information again! Multiple print options add to the versatility of MMG DATA MANAGER.

Requires 40K, Disk Only **$49.95**

Available At Your Favorite Computer Store

OR Send a Check or Money Order to:

MMG MICRO SOFTWARE

P.O. Box 131 • Marlboro, NJ 07746

OR CALL

(201) 431-3472

For MasterCard, Visa or COD Deliveries

(Please Add $3.00 For Postage & Handling)

NJ RESIDENTS ADD 5% FOR SALES TAX

A MASTER FILE DIRECTORY USING DMS

16K disk

by Marshall D. Abrams

Introduction

There are several good programs for creating and maintaining a master composite directory of all one's disk files. So why did I write another one? The answer is time and convenience. In all the existing programs which I tried, I found that the effort required was trivial when the number of files was small and very time consuming when the number of files grew above a few hundred. I found that I didn't need a master file directory (MFD) when I had only a few disks, but when I got to over 40 sides, I started having trouble finding files. I had even more trouble keeping track (no pun intended) of multiple copies made for backup. When I modified the working copy of a file, I wanted to also change the backup if I could find it!

This article describes a program, MAKEDIR, which creates and updates such a master directory. MAKEDIR gets you off to a fast start in creating a MFD. It also lets you update the MFD when you change which files are on which disk. The MFD is compatible with the Data Management System (DMS) which appeared in COMPUTE! November 1981 and the improved ATARI Program Exchange (APX-20059) version. As described below, DMS may be used to sort, edit, and print the MFD.

Design criteria

MAKEDIR was designed to interface with DMS. It creates and edits a file named MASTRDIR.DB which is completely compatible with DMS. MASTR DIR.DB is also designed for listing on the TV screen and 40-column printers. Accordingly, the total column count is restricted to 38. Fields are defined with an extra column so that they are separated and readable when directly copied to the screen or printer. If this feature is not important to you, but the limit of five columns to identify a file type is too confining, you may easily change the field widths.

Getting Started

Run DMS and create the database file MASTRDIR. The extension .DB will be automatically added by DMS. The following fields should be created:

Name	Width	Editing
1 FILE.EXT	13	none
2 Sec	4	numeric
3 Disk	7	none
4 Date	7	numeric
5 Type	5	none

Several people who have gone through these steps have had the same problem with DMS. DMS is inconsistent in its inputs. Sometimes it wants you to type RETURN; at other times it does not. If you type RETURN when DMS doesn't want it, it doesn't read it when you type it. It reads the RETURN for the next command! Horrors! You have gone through much work to set up MASTRDIR, but it gets thrown away because there was a RETURN laying around waiting to be read when you wanted to type Y. Be sure to type a capital Y; lower case won't work. This is an easy mistake to make if you have been entering titles in mixed case.

Running MAKEDIR

The program MAKEDIR will read the directories of your disks and create the file MASTRDIR.DB. First, you will be asked for the date in YYMMDD format. No doubt this format looks strange, but there is a good reason for it. This format will sort correctly when treated as a character string, which is the way that DMS's sort works. It would also work if the format were YY-MM-DD, which is more readable but takes more columns. To be more general, the format should be YYYYMMDD, but YY will correctly sort this century.

MAKEDIR will attempt to read the disk id (see below for disk id format); if it fails, it will ask you to type in "diskid". The program assumes that all files on each disk are of the same type, or purpose, and asks you for this information. If you have organized your disks this way, with games on one disk and utilities on another, MAKEDIR will save you lots of time. If a few files are of a different type, you can use DMS to change their types. Common types are GAME, GRAPH, WORDP, and UTIL. MAKEDIR will ask you to load new disks as necessary. When creating a new MASTRDIR, MAKEDIR fills up all of available memory before requesting that you load the disk onto which it will write MASTRDIR.DB. Generally you will be able to catalog all your disks before this.

Recataloging a disk

If you have made many additions or deletions to the files on a disk you may want to recatalog that disk using the Update command in MAKEDIR. After reading your disk, MAKEDIR will search MASTR DIR for all entries previously made for that disk and mark them as deleted. It will then append the new entries.

Adding non-directory files using DMS

Many boot disks do not have directories. Some way is needed to make MFD entries for such disks. In addition, you may wish to make an entry for an AUTORUN.SYS that identifies the content of the file (GAMENAME.ATO, for example). One way to do this is with the DMS update command. If you run DMS and select the update option, you will be prompted into creating as many entries as you like. The editing tests will even prevent you from entering alphas in numeric fields.

Editing MASTRDIR

Since MASTRDIR.DB is a text file, it can be edited with a text editor, such as the Program-Text Editor (APX-20075). Using an editor is often more convenient than DMS for a small change. Similarly, searching MASTRDIR.DB for a specific file may be done with the editor's search command. An alternative way to add records to MASTRDIR.DB is to use an editor. In general, an editor will let you see a screenful of records, so it will be easy to create new records by lining up the fields above and below. Further, an editor lets you insert the new record anywhere you want. For a few additions it is probably more convenient to insert that in the right place in a sorted list rather than have to resort after insertion.

Disk Name

MAKEDIR assumes that a file DISKNAME.TXT exists containing a single record in the format

(...title... diskid).

Diskid may be any string, preceded by at least one blank and followed by a greater-than character. If MAKEDIR discovers that DISKNAME.TXT does not exist, if offers to write it for you. So even if you hadn't previously numbered your disks, you can number them at the same time that you catalog them. Since MAKEDIR is written in BASIC, it may easily be changed to work with other disk identifiers.

Other Features

MASTRDIR.DB records occupy 38 columns, making it very convenient to list them to the screen or a 40-column printer. From DOS, type C (for copy). Then specify

MASTRDIR.DB,E:

to have the MFD scroll on the screen. Typing CTRL +1 will stop and restart the scrolling at will. To print the MFD, type

MASTRDIR.DB,P:

To avoid multiple entries which would convey little information, MAKEDIR excludes files with extension .SYS and MINIDOS. However, since each AUTORUN.SYS may have a different purpose, I manually enter progname.ATO (where progname is the name/purpose of the AUTORUN) in the directory.

Program description

Lines 10 to 90 set up the program variables and color the screen. I like to have a unique color identifying each program or program type. Lines 100 to 120 get the date. Lines 200 to 460 constitute the main menu. The disk type is input in lines 540 to 588, with all 5 characters padded with blanks as necessary. If you want to allow more characters for type identification, change the count here as well as the DIM on line 30. The disk name is read and padded in lines 600 to 720. If one doesn't exist, lines 800 to 860 allow you to identify the disk and to optionally write the DISKNAME.TXT file. Line 890 pads the diskid to 6 characters if necessary.

The disk directory is read in lines 900 to 1020 and written to the internal buffer, the record being terminated with an asterisk and an EOL. If the buffer is full, line 1060 sends us off to 1500 to empty it. If we are updating MASTRDIR by recataloging a disk, lines 1040 and 1100 to 1420 mark the previous entries for this disk for deletion by changing the asterisk to a D. The entire buffer contents are appended to MASTRDIR.DB in lines 1520 to 1580. If you have two disk drives, this section could be easily changed to eliminate diskette changing.

Error checking is handled in lines 1560 to 1580, calling on a subroutine at 2200 to 2280. The menu at 1600 to 1800 allows another copy of MASTRDIR to be written, another disk to be read, or program termination. □

```
10 CLR :OFF=44444:OPEN #3,4,0,"K:"
20 COLOR 1:SETCOLOR 2,0,0
30 DIM TMP$(1),DISKID$(6),FULNAM$(20),
FNAM$(20),TYP$(5),REC$(38),DSKNAM$(125
),DATE$(6)
40 FULNAM$="D1:"
50 SIZ=FRE(1)-50:DIM BUF$(SIZ)
70 GRAPHICS 18:POSITION 4,3:PRINT #6;"
Master Disk"
80 POSITION 1,5:PRINT #6;"Directory Ma
ker":POSITION 6,7:PRINT #6;"V 628":FOR
 I=1 TO 400:NEXT I
90 GRAPHICS 0:COLOR 1:SETCOLOR 2,0,0
100 PRINT :PRINT :PRINT "Enter date as
 YYMMDD ";:INPUT DATE$
120 IF LEN(DATE$)<>6 THEN 100
200 PRINT "K                Main Menu":?
 :?
240 PRINT "R to read a new disk"
280 PRINT "U to update this disk's "
340 PRINT "W to write directory to dis
k."
380 PRINT :PRINT "?";:GET #3,TMP:PRINT
 CHR$(TMP)
400 IF TMP=82 THEN UPDATE=0:GOTO 540
420 IF TMP=87 THEN 1500
440 IF TMP=85 THEN UPDATE=1:GOTO 540
460 GOTO 200
540 PRINT :PRINT "Enter 5 letter code
identifying type":PRINT "of files on t
his disk ";:INPUT TYP$
580 L=LEN(TYP$):IF L<5 THEN FOR I=L+1
TO 5:TYP$(I,I)=" ":NEXT I
599 REM Get disk id--------------------
--------------------
600 TRAP 800:FULNAM$(4)="DISKNAME.TXT"
620 CLOSE #2:OPEN #2,4,0,FULNAM$:INPUT
 #2;D$KNAM$:CLOSE #2
640 FOR I=LEN(D$KNAM$) TO 1 STEP -1:IF
 D$KNAM$(I,I)=">" THEN POP :GOTO 680
660 NEXT I:GOTO 800
680 K=I-1:FOR I=K TO K-6 STEP -1:IF D$
KNAM$(I,I)=" " THEN POP :GOTO 720
700 NEXT I:GOTO 800
720 TRAP 800:J=I+1:DISKID$=D$KNAM$(J,K
```

```
):TRAP OFF:GOTO 890
799 REM No file DISKNAME.TXT----------
--------------------
800 ERR=PEEK(195):IF ERR()170 THEN 228
0
810 TRAP 800:PRINT " DISK ID";:INPUT D
ISKID$:TRAP OFF
820 PRINT "Do you want to write DISKNA
ME.TXT on this disk";:INPUT TMP$:IF LE
N(TMP$)=0 THEN 890
830 IF TMP$()"Y" THEN 890
840 PRINT "Text to identify disk":INPU
T DSKNAM$:FULNAM$(4)="DISKNAME.TXT":CL
OSE #2:OPEN #2,8,0,FULNAM$
860 PRINT #2;"(";DSKNAM$;" ";DISKID$;"
)":CLOSE #2
888 REM Make sure that DISKID is exact
ly 6 characters
890 L=LEN(DISKID$):IF L(6 THEN FOR I=L
+1 TO 6:DISKID$(I,I)=" ":NEXT I
899 REM Read disk directory-----------
---------------------
900 FULNAM$(4)="*.*":CLOSE #1:OPEN #1,
6,0,FULNAM$
920 INPUT #1;FNAM$:IF LEN(FNAM$)(17 TH
EN 1040
930 REM Don't catalog common names
940 IF FNAM$(11,13)="SYS" OR FNAM$(3,1
0)="DISKNAME" OR FNAM$(3,9)="MINIDOS"
THEN 920
945 IF FNAM$(3,10)="AUTORUN" OR FNAM$(
3,10)="DISKNAME" THEN 920
960 BUF$(LEN(BUF$)+1)=FNAM$(3,10):BUF$
(LEN(BUF$)+1)=".":BUF$(LEN(BUF$)+1)=FN
AM$(11,17)
980 BUF$(LEN(BUF$)+1)=" ":BUF$(LEN(BUF
$)+1)=DISKID$
1000 BUF$(LEN(BUF$)+1)=" ":BUF$(LEN(BU
F$)+1)=DATE$(1,6):BUF$(LEN(BUF$)+1)="
"
1020 BUF$(LEN(BUF$)+1)=TYP$(1,5):BUF$(
LEN(BUF$)+1)="*":BUF$(LEN(BUF$)+1)=CHR
$(155):GOTO 920
1040 IF UPDATE=1 THEN 1100
1060 IF LEN(BUF$)>0.8*SIZ THEN 1500
1080 GOTO 200
1100 PRINT "Load disk containing file
":PRINT "MASTRDIR.DB; then press RETUR
N":INPUT TMP$
1110 REM Update mode to mark deletions
1120 TRAP 1400:CLOSE #4:OPEN #4,12,0,"
D:MASTRDIR.DB":FOUND=0
1140 NOTE #4,SEC,BYTE:INPUT #4;REC$:IF
 REC$(18,23)()DISKID$ THEN 1140
1160 REC$(37,37)="D":FOUND=FOUND+1
1180 POINT #4,SEC,BYTE:PRINT #4;REC$:G
OTO 1140
1400 GOSUB 2200:ON ERR GOTO 1120,1100,
1420:GOTO 2260
1420 PRINT :PRINT FOUND;" old entries
found for disk ";DISKID$:GOTO 1520
1500 PRINT :PRINT "Load disk containin
g file":PRINT "MASTRDIR.DB; then press
 RETURN":INPUT TMP$
1510 REM Append new catalog
1520 TRAP 1560:CLOSE #4:OPEN #4,9,0,"D
:MASTRDIR.DB":TRAP OFF
1540 PRINT #4;BUF$;:CLOSE #4:XIO 35,#4
,0,0,"D:MASTRDIR.DB":CLOSE #4:GOTO 160
0
1560 GOSUB 2200:ON ERR GOTO 1520,1500,
1580:GOTO 2260
1580 PRINT "Unexpected EOF on update":
END
1600 PRINT "MASTRDIR.DB written":PRINT
1610 REM What next? ------------------
--------------------
1620 PRINT "A write another copy":PRIN
T "E end program":PRINT "R read anothe
r disk"
1700 PRINT :PRINT "?";:GET #3,TMP
1720 IF TMP=82 THEN BUF$="":GOTO 540
1740 IF TMP=65 THEN 1500
1780 IF TMP=69 THEN END
1800 GOTO 1600
2200 ERR=PEEK(195)
2220 IF ERR=170 THEN ERR=2:RETURN
2240 IF ERR=167 THEN PRINT "Unlocking
MASTRDIR.DB":XIO 36,#4,0,0,"D:MASTRDIR
.DB":ERR=1:RETURN
2260 IF ERR=136 THEN ERR=3:RETURN
2280 PRINT "Error ";ERR;" at line ";PE
EK(186)+256*PEEK(187)
```

•

(see D:CHECK 2, p. 26)

```
10 DATA 276,583,954,342,18,967,226,915
,932,527,42,178,983,915,625,8483
400 DATA 798,825,817,709,142,715,591,9
57,581,25,866,689,850,581,105,9251
800 DATA 951,903,51,229,567,168,401,47
9,705,61,647,192,282,794,799,7229
980 DATA 202,734,793,107,143,873,494,8
90,469,523,438,105,361,894,267,7293
1510 DATA 720,699,353,406,944,32,570,9
45,798,557,16,146,726,409,718,8039
2240 DATA 786,719,637,2142
```

•

DATA PERFECT

FOR THE ATARI 400 AND 800 COMPUTERS

YOU MAKE THE COMPARISON

	D.P.	FILE MANAGER "800"
GENERAL INFORMATION		
Cost of Program	$99.95	
Cost of Utilities Program *(Included In Program)*	$00.00	
Cost of Reports Program *(Included In Program)*	$00.00	
Compatible With Letter Perfect (tm) Word Processing	**YES**	
Menu Driven *(Very User Friendly)*	YES	
Complete Documentation *(Manual Tabbed And Indexed)*	YES	
Single Load Program *(No Swapping Of Program Diskette)*	YES	
Machine Language *(Extremely Fast Operation)*	YES	
Can Use Single Disk Drive	YES	
Can Us Multiple Disk Drives	YES	
Ability To Design Screen Mask *(User Designs Arrangement Of Data)*	YES	
Full Keyboard Editing Available *(Delete/Insert A Character; Go To End/Beg. of Line; Fine 'n', TAB, ETC.)*	YES	
Compatible With Bit 3 80-Column Board *(40-Column and 80-Column Version Available)*	YES	
Works With Any Parallel Printer *(Supports Atari 850 Interface)*	YES	
Totals Of Numeric Field *(Return Total And Average Value/Field)*	YES	
Fail Safes Provided For Data Protection	YES	
Error Messages Displayed	YES	
Status Lines For Ease of Use *(Options Always Available For Reference)*	YES	
SEARCHES AND EDITING		
Multiple Searches Allowed On Same Record *(Search On 9 Criteria Per Record)*	YES	
Search On Two Criteria In Same Field *(Up To 4 Fields In Single Record)*	YES	
Wild Card Searches *(And/Or, Include, Character, Or Block)*	YES	
Search On Basis Of Record Number *(Search For An Individual Record)*	YES	
Search On Range Of Data Desired *(Dates, Numbers, Values, Greater Or Less Than, Equal To, etc.)*	YES	
Editing Of Records Individually	YES	
Editing Records Globally *(Verification Allowed)*	YES	
Delete Records Individually *(Verification Allowed)*	YES	
Deleting Records Globally *(Verification Allowed)*	YES	
UTILITIES SECTION		
Add Fields To Existing Data Base	YES	
Delete Fields From Existing Data Base	YES	
Reformat A Data Base *(Copy Format Of Existing Data Base)*	YES	
Make Additional Copies Of Data Base *(Create Data Base For Extended Records)*	YES	
Sort on Multiple Criteria *(Sort On Basis Of 4 Fields In A Sort)*	YES	
Sorts On Multiple Criteria *(Assending Or Descending)*	YES	
Depth Of Sort Can Be Changed *(Designate Number Of Charters Deep To Sort)*	YES	
Merge Information From Other Data Bases *(Merge Standard Text Files)*	YES	
Add Or Delete Fields From Data Base	YES	
Merge Previous Entered Data From Existing File	YES	
Back Up A Data Base *(Make A Back Up Of Current Source Data)*	YES	
Pack A Data Base *(Remove Deleted Records From Disk Storage)*	YES	

	D.P.	FILE MANAGER "800"
REPORT GENERATOR		
Design Report To User Specifications	YES	
Level Breaks Allowed At Users Option *(Up To 4 Level Breaks Per Report)*	YES	
Designate Font To Be Used In Report	YES	
Boldfacing Allowed In A Report *(With Dot Matrix Printer)*	YES	
Mathematical Formulas Allowed In Report *(Example, Field 'x' + Field 'y' = Field 'z')*	YES	
Auto Page Number Allowed In Report	YES	
Auto Date Entering Allowed In Report	YES	
Repeating Characters Allowed	YES	
Optional Level Breaks and Page Breaks When Sort Values Change	YES	
Up To 7 Lines Allowed For Header on Each Report	YES	
Up To 2 Lines Allowed For Detail Information On A Report	YES	
Variable Spacing Allowed Between Data On Items In A Report	YES	
Multiple Fields Allowed In A Report *(Number, Date, Alpha, Formula)*	YES	
Search Criterian Allowed On Report *(Same Criteria As In Editor)*	YES	
Ability To Have "Literal" Data *Printed In A Report*	YES	
Ability To Have "Conditional" Data Printed In A Report	YES	
Use A Default Date Field	YES	
Designate Default Value For Specific Fields	YES	
LABELS REPORT GENERATOR		
Mailing Labels Allowed *(Specifically Designed For Labels)*	YES	
User Designs Data Placement On Label *(One Across Label Design)*	YES	
Multiple Fields Allowed On Label *(Date, Alpha, Numeric, Formula)*	YES	
Repeating Characters Allowed	YES	
Front Designation Allowed	YES	
Print Labels On A Conditional Basis	YES	
Search Criteria Valid On Label *(Same Search Criteria As Editing)*	YES	
MATHEMATICAL ABILITIES		
Basic Math Calculation Addition, Substraction, Multiplication, Division	YES	
Built In Calculator (Automatic) *(Use In Editing, Or Adding Data)*	YES	
Find the Integer Value Of A Numeric Expression	YES	
Find The Log Base 'e' Of 'x'	YES	
Find The Log Base '10' Of 'x'	YES	
Find The Absolute Value Of 'n'	YES	
Exponentential Notation Used	YES	
Find The Square Root Of 'n'	YES	
Formulas Allowed Between Fields [Field × /+ − */) Field y = Field z] [Field × /+ − */) N = Field Y]	YES	
SPECIFICS		
Maximum Number Of Fields Per Record	32	
Maximum Number Of Formulas In A File	16	
Maximum Length Of A Field	127	
Maximum Record Length	511	
Maximum Number Of Level Breaks	4	
Records Per Diskette *(Depends On Length And Number Of Fields)*	VAR.	
Data Bases Allowed On Each Diskette *(Can Be Expanded To Additional Diskettes)*	ONE	
Form Letter Capability *(Compatible With Letter Perfect)*	YES	

LJK ENTERPRIES, INC.
P.O. BOX 10827
ST. LOUIS, MO. 63129
[314] 846-6124

TRAPPING YOUR ATARI

16K cassette or disk

by Donald B. Wilcox

It is often frustrating to be forced to restart a software program because an inadvertent error caused the program to crash. ATARI BASIC provides a special word —TRAP— that often can be used to prevent a program from ending before intended. Many errors are subject to automatic correction or compensation through a little extra effort on the part of the programmer.

If you are not yet familiar with the TRAP statement, the following example shows how to use it to detect INPUT errors. These occur when the user of a program types invalid numeric values into a numeric variable.

```
10 INPUT X
20 PRINT X
30 GOTO 10
```

In the above listing, typing a non-numeric response to the INPUT statement in line 10 (such as accidentally pressing return with no number entered) will result in an "ERROR-8 AT LINE 10" message. By adding a TRAP statement, this problem will be avoided completely.

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

In the slightly modified example above, if an input error occurs, the TRAP statement will catch the error and go back to line 10 to try the INPUT again.

This short article presents some common errors that can be prevented with a few extra lines of code. After perusal of these five examples, you should be able to understand how to make your programs less vulnerable to errors that prematurely end your program.

PROGRAM ONE - If you mistakenly create a new file using a file name that already exists, you will destroy the already existing file. No error message will warn you of the impending disaster. Program ONE will prevent this.

PROGRAM TWO - If you try to OPEN a non-existent file, you will get error message — 170 and your program will crash. This can be prevented by using Program TWO.

PROGRAM THREE - If you try to input data from a disk file beyond the end-of-file, you will get error message — 136 and your program will terminate. You may not always know beforehand where the file data ends, so an automatic end-of-file trap can be programmed easily to prevent error — 136. Program THREE will solve this problem.

PROGRAM FOUR - You forgot to turn on your printer or interface unit and get error message — 138. If you attempt to use the CONTINUE command after you turn on the correct unit, your program will continue beginning at the line number that follows the line that caused the error. Often this can create erroneous results (not always detected) because the instructions on the line that caused the error may not have been executed correctly before the error.

PROGRAM FIVE - You are reading in data with a READ statement and you do not want to use an end-of-data dummy value as a flag nor do you want to count the entries to determine when all the data has been read. Program FIVE demonstrates a simple method to prevent error #6 (out of data) from prematurely terminating your program.

Finally, for those of you who are relatively new to ATARI BASIC, there are several locations (addresses) that you may PEEK to find out which error occured and which line caused the error. Location 195 contains the error number. Locations 186 and 187 contain the line number where the error occured, low byte, high byte respectively. To display this information on your screen, use the following statements as one method.

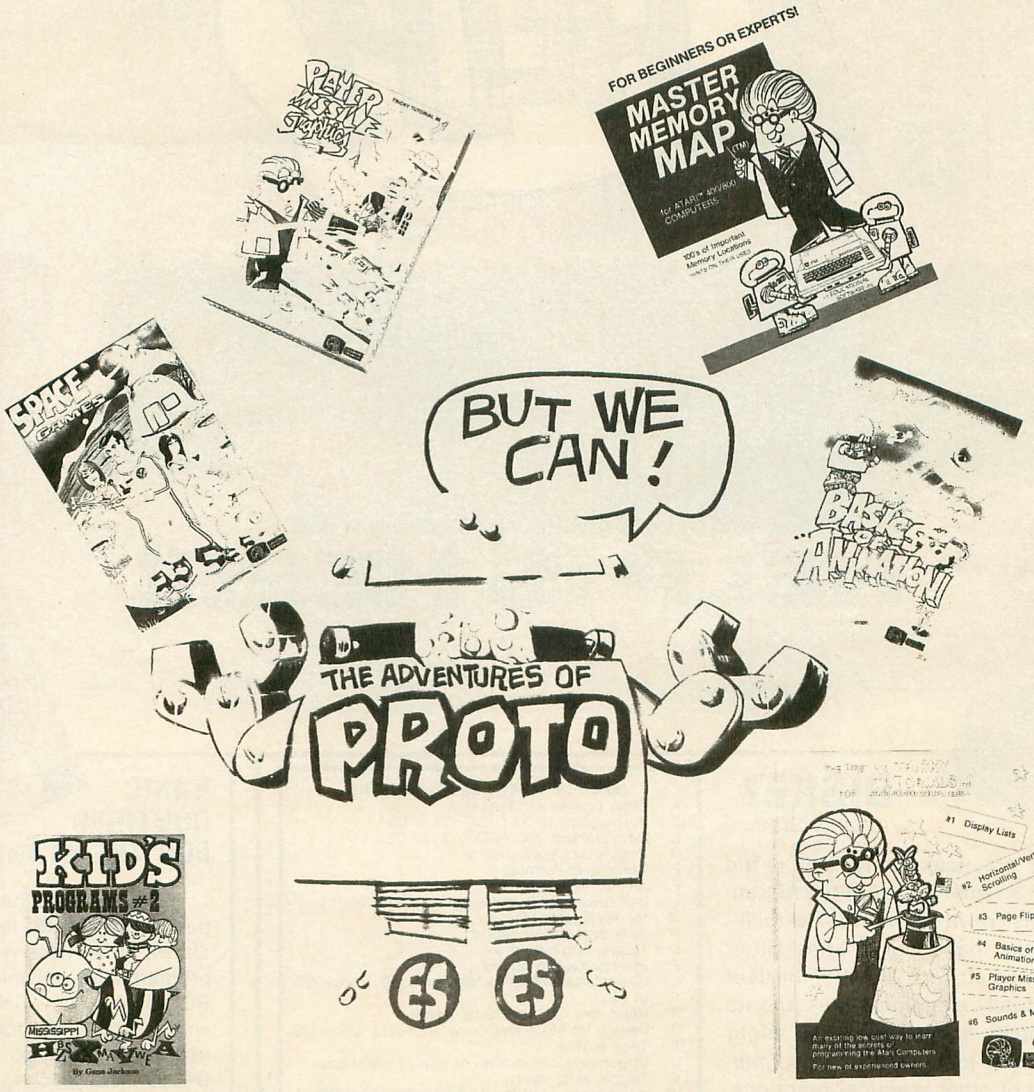
```
10 REM DISPLAY ERROR NUMBER
20 REM AND LINE NUMBER OF ERROR
30 ? PEEK(195);" AT LINE ";PEEK(186)+P
EEK(187)*256
```

Happy trapping in your future programs. □

PROGRAM 1

```
100 ? "K":CLR :REM CLEAR SCREEN AND VA
RIABLES
110 REM PREVENT ERASURE OF PROGRAM ALR
EADY STORED ON DISK
120 DIM ATRAP$(6),A$(124),NAME$(8),FIL
E$(10)
130 REM SET UP DISK SUFFIX 'D:' FOR FI
LE NAME.  IOCB IS FILE(DEVICE) NUMBER
140 FILE$="D:":IOCB=2:IN=4:GNU=8
150 REM GNU=8 IS THE OUTPUT MODE
160 SET=160:CLOSE #IOCB:IF ATRAP$="SPR
UNG" THEN PRINT " FILE NAME DID NOT PR
EVIOUSLY EXIST":GOTO 200
170 TRAP SET:PRINT "ENTER FILE NAME"
180 INPUT NAME$:FILE$(3)=NAME$:ATRAP$=
"SPRUNG":OPEN #IOCB,IN,0,FILE$
190 PRINT FILE$;" ALREADY EXISTS":? "U
SE A DIFFERENT NAME":CLOSE #IOCB:GOTO
170
200 OPEN #IOCB,GNU,0,FILE$
210 PRINT FILE$;" OPENED SUCCESSFULLY"
220 CLOSE #IOCB
```

NOT EVERYONE CAN TEACH THEIR ATARI™ NEW TRICKS...



WE MAKE USING AND LEARNING ABOUT COMPUTERS FUN!

PROGRAMMING GUIDE FOR BEGINNERS OR EXPERTS — MASTER MEMORY MAP.™ A 32 page book with hundreds of hints on how to use your computer. Over 500 memory locations! $6.95.

LEARN SOUND AND GRAPHICS with our exciting lessons called **TRICKY TUTORIALS.™** Each comes with a tape or disk full of examples, and a 12 to 64 page manual written in an easy to understand manner. **#1 DISPLAY LISTS** — Put several graphics modes on your screen at once. **#2 SCROLLING** — Move text or graphics smoothly up, down, sideways, or diagonally. **#3 PAGE FLIPPING** — Change TV screens as quickly as flipping pages in a book. **#4 BASICS OF ANIMATION** — A beginner's lesson in animation using PLOT, PRINT, and a surprise game. **#5 PLAYER MISSILE GRAPHICS** — Learn the basics of writing your own arcade games. **#6 SOUND & MUSIC** — Simple methods to play complete songs, with graphics. Includes PLAYER PIANO free! **#7 DISK UTILITIES** — 7 programs to help you use your disk drive. 32K. **#8 CHARACTER GRAPHICS** — The best editor available with examples using special characters YOU CREATE and ANIMATE. **#9 GTIA, GRAPHICS 9 to 11** — New tricks you can do with these 16 color modes. **#10 SOUND EFFECTS** — Many examples, from rainfall to laser blasts, with ample explanation. **#11 MEMORY MAP TUTORIAL** — 30 colorful examples of tricks your computer can do.

TUTORIALS 1 to 4 are $19.95 each. Numbers 5 to 11 are $29.95 each. 16K Tape or 24K disk. SPECIAL: Tutorials 1 through 6 for $119.95. SAVE $20.00!

WRITE FOR A CATALOG OR CALL FOR ORDERING INFORMATION
VISA/MC/COD: (800) 692-9520 OR (408) 476-4901

OUR GUARANTEE: Your money back if unsatisfied!

AVAILABLE FROM DEALERS WORLDWIDE.

Educational Software inc.

4565 Cherryvale Ave., Soquel, Ca. 95073

DISKEY

by Sparky Starks

Potential into practical reality. This is the core of DISKEY — a remarkable utility program that gives ATARI disk drive owners the flexibility to accomplish tasks that other utilities either ignored or only hinted at. With DISKEY, the user will be able to actually examine a disk and its directory, and repair some files that might otherwise have been lost. DISKEY also performs a multitude of other practical functions, including the following:

- ★ Automatically lists any unreadable or destroyed sectors
- ★ Sends contents of disk to printer selectively
- ★ Up to four separate drives may be addressed
- ★ Can be used to backup some of those "unbackupable" disks
- ★ Allows direct examination of any file
- ★ Over 50 separate key functions available

As an ATARI 400 or 800 owner, you have extraordinary power and versatility at your disposal. Tap into those resources effectively with DISKEY — new from Adventure International.

ATARI 400/800 32K DISK
052-0158 $49.95
(Note: Some features will require 40K)

SOME OF DISKEY KEY FUNCTIONS

A	Clear screen and filename
B	Byte compare, D1 to D2, OS to DS
C	Copy sectors, OD to DD, OS to DS
D	Toggle destination drive
E	Erase disk (format)
F	Select file sub-menu
L	Set automatic function lower limit (OS)
M	Modify Sector Map
N	New destination sector
O	Toggle originate drive
P	Print screen to printer
Q	Query (search for hex key, drive OD, sector OS to DS)
R	Read new OS, set DS to match
S	Search for ASCII key, drive OD, sector OS to DS
T	Tape to disk
U	Upper case conversion of printer lower case
V	Toggle write verify
W	Write memory buffer to sector DS, drive DD
X	Select EOR Sector Map screen print mask
Z	Zero memory buffer
+	Read upward, next sector on disk
–	Read downward
?	Directory information
!	Select directory sub-menu
cB	Byte compare, D1 to D2, whole disk
cC	Copy D1 to D2, whole disk
cD	Decimal to hex, ASCII conversion
cE	Erase disk (without new format)
cF	Modify sector forward sector chain reference
cH	Hex to decimal, ASCII conversion
cL	Locate bad sector on drive OD
cN	Modify sector file number reference
cO	Select one-drive functions sub-program
cP	Print current Disk Map
cR	RPM test drive OD
cS	Special file copy, no directory reference from source
cV	VTOC update and repair, drive OD
cY	Toggle Sure Response prompt enable
FA	File binary load address headers to printer
FD	Delete file
FF	Select filename for all file functions
FL	Lock file
FM	Show memory address load position in file
FQ	Relative Query
FR	Rename file
FS	Relative Search

BASIC ROUTINES FOR THE ATARI

by Jerry White

Finally, a self-help system that cuts through the stuffy technical jargon and allows the user to learn effective programming techniques fast! BASIC ROUTINES FOR THE ATARI has been written especially for ATARI 400 or 800 users who wish to write programs in BASIC. This package comes complete with an extensive manual and your choice of a tape or disk which contains all of the routines from the manual — which means you'll be able to actually see each of them in action on your ATARI. Some of the BASIC routines include joystick, sound, player missile strings and much more — and presented in a way that you'll quickly be able to learn and apply to your own programs.

If your programming ability lies somewhere between beginning and advanced, then look no further — BASIC ROUTINES FOR THE ATARI is the system for you.

BASIC ROUTINES book with 16K TAPE
051-0154 $24.95
BASIC ROUTINES book with 24K DISK
052-0154 $24.95

Published by Adventure INTERNATIONAL
a subsidiary of Scott Adams, Inc.
BOX 3435 • LONGWOOD, FL 32750 • (305) 830-8194

To order, see your local dealer. If he does not have the program, then call 1 (800) 327-7172 (orders only please) or write for our free catalog.

PROGRAM 2

```
100 PRINT "K":CLR :REM CLEAR SCREEN AN
D VARIABLES
110 DIM ATRAP$(6),NAME$(5),FILE$(8)
120 REM SET UP DISK SUFFIX FOR FILE NA
ME.  IOCB IF THE FILE(DEVICE) NUMBER.
 IN=4 IS THE INPUT MODE
130 FILE$="D:":IOCB=2:IN=4
140 REM WRITE ERROR IF TRAP IS SPRUNG.
  IT IS GOOD PRACTICE TO CLOSE FILES T
O PREVENT ERROR #129 IF YOU LOOP BACK
150 REM TO A PREVIOUS PART OF YOUR PRO
GRAM THAT OPENS A FILE.
160 SET=160:CLOSE #IOCB
170 IF ATRAP$="SPRUNG" THEN ? "ERROR 1
70, FILE ";FILE$;" NON-EXISTANT":FOR D
=1 TO 1000:NEXT D:GOTO 100
180 REM KEEPS MESSAGE ON SCREEN TEMPOR
ARILY BEFORE RETURNING TO BEGINNING OF
 PROGRAM
190 TRAP SET:PRINT "TYPE IN FILE NAME"
:PRINT "DO NOT INCLUDE 'D:' PREFIX":IN
PUT NAME$
200 FILE$(3)=NAME$:REM CONCATENATES FI
LE NAME ONTO DEVICE PREFIX 'D:'
210 ATRAP$="SPRUNG"
220 REM IF THE 'OPEN' STATEMENT WORKS,
 WE HAVE A VALID FILE NAME ALREADY STO
RED ON DISK READY FOR INPUT
230 OPEN #IOCB,IN,0,FILE$
240 PRINT "FILE ";FILE$;" OPENED SUCCE
SSFULLY"
250 CLOSE #IOCB
```

•

PROGRAM 3

```
100 PRINT "K":CLR :REM CLEAR SCREEN AN
D VARIABLES
110 REM CATCH END-OF-FILE ERROR
120 DIM ATRAP$(6),A$(124),NAME$(8),FIL
E$(10)
130 FILE$="D:":IOCB=2:IN=4:GNU=8
140 REM 'D:' IS FILE NAME PREFIX.  IN=
4 IS INPUT MODE.  GNU=8 IS OUTPUT MODE
.  IOCB IS DEVICE(FILE) NUMBER
150 REM FIRST WE MUST CREATE A FILE AN
D PUT SOME DATA IN IT BEFORE TRYING TO
 READ THE DATA.
160 PRINT "ENTER A FILE NAME":PRINT "D
O NOT INCLUDE THE 'D:' PREFIX"
170 INPUT NAME$:FILE$(3)=NAME$:REM CON
CATENATES PREFIX AND FILE NAME
180 OPEN #IOCB,GNU,0,FILE$
190 REM WRITE DATA ONTO FILE.
200 PRINT #IOCB;"FIRST"
210 PRINT #IOCB;"SECOND"
220 PRINT #IOCB;"LAST"
230 CLOSE #IOCB:REM IT IS GOOD PRACTIC
E TO KEEP A FILE CLOSED WHEN NOT USED
240 REM FAILURE TO PROPERLY CLOSE A FI
LE CAN CAUSE IT TO BE LOST
250 REM
260 REM READY TO READ THE FILE
270 OPEN #IOCB,IN,0,FILE$
280 SET=310:TRAP SET
290 REM READ DATA FROM FILE AND PRINT
EACH VALUE AS IT IS READ
300 INPUT #IOCB,A$:PRINT A$:GOTO 290
310 PRINT "FINISHED READING FILE SUCCE
SSFULLY":CLOSE #IOCB
320 REM DELETE LINE 280 AND YOU WILL G
ET AN ERROR MESSAGE 136 (END OF FILE)
```

•

PROGRAM 4

```
100 PRINT "K":CLR :REM CLEAR SCREEN AN
D VARIABLES
110 REM CATCH DEVICE TIMEOUT ERROR # 1
38
120 REM YOU FORGOT TO TURN ON AN INPUT
 OR OUTPUT DEVICE
130 DIM ATRAP$(6)
140 SET=140:IF ATRAP$="CAUGHT" THEN PR
INT "TURN ON I/O DEVICE"
150 TRAP SET:ATRAP$="CAUGHT"
160 LPRINT "PROGRAM RAN SUCCESSFULLY"
170 REM RUN THIS PROGRAM WITH PRINTER
TURNED ON AND OFF
180 REM CHANGE LINE 160 TO USE DISK, I
NTERFACE, OR SOME OTHET I/O DEVICE
```

•

PROGRAM 5

```
100 PRINT "K":CLR :REM CLEAR SCREEN AN
D VARIABLES
110 REM READ DATA AND TRAP OUT-OF-DATA
 ERROR #6
120 SET=140:TRAP SET:REM DELETE THIS L
INE AND ERROR #6 WILL OCCUR
130 READ N:PRINT N:GOTO 130
140 PRINT "FINISHED READING DATA"
150 DATA 20,4,156,83,12
```

•

ABOUT THE COVER...

Yes, there really was someone in that suit of armor, and that someone was none other than editor Mike DesChenes, revealed here for the first time. The suit of armor he was wearing was a replica, but the suit in the background is an original — German ceremonial armor for a young man, fashioned after combat armor, circa 1540-1550. The armor was provided by the Higgins Armory Museum. The Higgins Armory Museum houses the largest collection of medieval armor, tapestries and weaponry in the entire Western Hemisphere, and the Museum was kind enough to let us photograph our cover there. Unlike our last five covers, there were no double-exposed elements in the shot — only colored gels over the lights were used.

We invite all of our readers in the New England area to visit the Higgins Armory Museum, located at 100 Barber Avenue, Worcester MA 01606. Phone (617) 853-6015. The Museum is open Tuesday through Friday 9 a.m. to 5 p.m.; weekends and holidays 12 to 5 p.m. The Museum is located just off I-90 and West Boylston Street at the corner of Barber Avenue and Randolph Road. Please visit the Higgins Armory Museum — we guarantee you a fascinating experience.

This advertisement has no headline!

Mere words fail to convey the excitement that is truly LEGIONNAIRE.

Designed & Programmed by Chris Crawford for Avalon Hill

LEGIONNAIRE is a real-time game of combat between the Roman Legions of Juilus Caesar (you) and the Gaulish barbarian hordes (the computer). High resolution scrolling graphics and sound brings you the live action. You have up to ten legions to command, each with different strengths and weaknesses, and a choice of any two of sixteen different barbarian tribes to fight. As Caesar did two thousand years ago, you must meet the Gauls and defeat them. They outnumber you at least two to one, so you must use the terrain and the disorganization of the barbarians to counter your disadvantage in numbers. Above all, you must be able to react quickly to the changing battlefield situation, or the battle depicted above could happen to you! Caesar managed to conquer all of Gaul—can you do as well, or will the barbarian hordes defeat your legions?

LEGIONNAIRE is ready to run on your Atari® 400 or 800 with 16K cassette or 32K diskette and one joystick.

Available at finer computer and hobby stores everywhere. To order by phone, dial TOLL FREE:

1-800-638-9292

and ask for Operator A, or write: Avalon Hill Microcomputer Games, Dept. 81, 4517 Harford Road, Baltimore, MD 21214. Please add 10% for postage and handling.

®Trademark of Warner Communications

NEW

SOFTWARE GAMES	With Cassette For:					With Diskette For:				PRICE
	TRS-80 Color	TRS-80 Models I & III	APPLE II+	PET CBM 2001	ATARI 400/ 800	TRS-80 Models I & III	APPLE II+	ATARI 400/ 800	IBM P.C.	
Legionnaire					16K					35.00
								32K		40.00
V.C.	16K	16K	32K		32K					20.00
						32K	48K	40K		25.00
G.F.S. Sorceress		48K	48K		48K					30.00
						48K	48K	40K		35.00
Andromeda Conquest		16K	16K	16K	32K					18.00
						32K	48K	40K	48K	23.00
Moon Patrol					16K					25.00
Telengard		48K	48K	32K	48K					23.00
						48K	48K	48K		28.00
Draw Poker		16K	48K	8K	16K					16.00
							48K		48K	21.00
Voyager	16K	16K	32K	32K	24K					20.00
							48K	32K	48K	25.00

AH QUALITY **microcomputer games®**
A Division of the Avalon Hill Game Company
4517 Harford Road • Baltimore, MD 21214

MOVING PLAYERS IN BASIC

16K cassette or disk

by Tom Hudson

Just before issue #9 of A.N.A.L.O.G. went to press, I was handed a letter from Long Mai of Salt Lake City, Utah (see the Reader Comment section of this issue). Like many BASIC programmers, he was frustrated by BASIC's snail-like pace, and asked for a machine-language subroutine that could be used with BASIC to move player-missile graphics around on the screen.

Unfortunately, it was too late to write such an article for issue #9, but here it is, along with fully documented assembly-language code.

THE PROBLEM

Player-missile graphics are one of the most powerful graphic features of the ATARI 400/800 computer systems. Unlike traditional graphics, players and missiles can be moved around on the screen without disturbing the existing display.

In order to use players and missiles, one must first reserve a portion of memory. Once this is done, the user can begin designing and displaying the players and missiles.

The problems begin when the user wants to move a player or missile around on the screen. Horizontal movement is done easily. A POKE to the appropriate horizontal position memory location will move the desired player to any horizontal location on the screen. If the user wants to move a player or missile vertically, he or she must copy the P/M bit image to another location in memory. BASIC is too slow to do this, but it can call a machine-language subroutine to do the "dirty work."

THE PROGRAM

The BASIC program listed here will allow the user to move any player around on the screen. It calls the P/M movement subroutine, shown in the Assembly language listing.

As listed, the program will move a shape around on the screen at random. The shape of the player is stored as a series of bytes in the string "P0$". By altering the data in line 420, you can change the shape that appears on the screen. There are currently 7 bytes in line 420, but this can be changed by altering lines 130, 290 and 420.

Lines 110-180 set up the subroutine and turn on the P/M graphics. Lines 220-310 are for demonstration purposes only. You can put your program code in this section.

Line 110 - Loads the string PMMOV$ with the P/M movement subroutine.

Line 130 - Places the data that defines the graphics shape into the string P0$.

Line 140 - Tell the system where the P/M memory starts.

Line 150 - Saves the P/M base address.

Line 160 - Saves the graphics data string address.

Line 170 - Turns on P/M direct memory access.

Line 180 - Sets the color of player 0 to light blue.

Line 220 - Initialize the X and Y coordinates of the player.

Line 230-280 - Alter the X and Y coordinates to move the player.

Line 290 - This USR call moves the player to the desired X and Y location. This statement has 7 parameters inside the USR parentheses:

```
A=USR(MOVE,0,PMB,PMD,X,Y,7)
```

"MOVE" is set up in line 110. Do not change this variable. It is the address of the P/M mover subroutine.

"0" means that we want to move player zero. This value can range from 0 to 3, moving players 0 through 3.

"PMB" is the P/M base address. Do not change this value.

"PMD" is the address of the string that holds the player image data. This should be set to the address of the string you are using to hold your player shape data. If your player shape data is in a string called "PL$," you could replace "PMD" with "ADR(PL$)".

An "X" and "Y" are the horizontal and vertical coordinates when you want to place your player. X ranges from 0-255, and Y ranges from 0-127.

"7" in this case indicates that our player is 7 bytes long (see line 130 and the player image data in line 420). If your player is 10 bytes long, place a "10" here.

SUMMARY

This program should help out anyone who wants to use player-missile graphics from BASIC. If there are any questions, write me care of A.N.A.L.O.G. (please include a pre-addressed, stamped envelope). If there is a specific application you would like to see appear in a future issue, just ask. You never know — there may be hundreds of other readers who would like the same information. □

PROGRAM 1

```
10 REM ********************************
20 REM * P/M MOVER SUBROUTINE DEMO *
30 REM *                           *
40 REM *        BY TOM HUDSON      *
50 REM *                           *
60 REM *  A.N.A.L.O.G. COMPUTING   *
70 REM ********************************
80 REM
90 REM ************ SETUP ************
100 REM
110 DIM PMMOV$(100),P0$(30):MOVE=ADR(P
MMOV$):FOR X=1 TO 100:READ N:PMMOV$(X)
=CHR$(N):NEXT X:REM *READ ML DATA*
120 REM *** NOW READ SHAPE DATA ***
130 FOR X=1 TO 7:READ N:P0$(X)=CHR$(N)
:NEXT X
140 PMBASE=INT((PEEK(145)+3)/4)*4:POKE
 54279,PMBASE:REM *** SET UP P/M AREA
***
150 PMB=PMBASE*256
160 PMD=ADR(P0$):REM *** P/M DATA ADDR
ESS ***
170 POKE 559,46:POKE 53277,3:REM *** P
/M DMA ***
180 POKE 704,136:REM *** PLAYER 0 COLO
R ***
190 REM
200 REM **** YOUR PROGRAM HERE! ****
210 REM
220 X=128:Y=64
230 XI=1-INT(RND(0)*3):YI=1-INT(RND(0)
*3)
240 X=X+XI:Y=Y+YI
250 IF X<50 THEN X=50:GOTO 270
260 IF X>190 THEN X=190
270 IF Y<20 THEN Y=20:GOTO 290
280 IF Y>110 THEN Y=110
290 A=USR(MOVE,0,PMB,PMD,X,Y,7)
300 IF RND(0)>0.95 THEN 230
310 GOTO 240
320 REM
330 REM *** PM MOVER DATA ***
340 REM
350 DATA 216,104,104,104,133,213,104,2
4,105,2,133,206,104,133,205,104,133,20
4,104,133,203,104,104,133,208
360 DATA 104,104,133,209,104,104,24,10
1,209,133,207,166,213,240,16,165,205,2
4,105,128,133,205,165,206,105
370 DATA 0,133,206,202,208,240,160,0,1
62,0,196,209,144,19,196,207,176,15,132
,212,138,168,177,203,164
380 DATA 212,145,205,232,169,0,240,4,1
69,0,145,205,200,192,128,208,224,166,2
13,165,208,157,0,208,96
390 REM
400 REM *** PLAYER IMAGE DATA ***
410 REM
420 DATA 255,129,129,231,129,129,255
```

(see D:CHECK 2, p. 26)

```
10 DATA 532,930,996,64,0,483,544,265,9
09,74,765,328,743,901,536,8070
160 DATA 729,778,445,101,552,79,854,96
8,479,920,983,921,954,424,374,9561
310 DATA 704,84,580,90,639,732,435,188
,105,191,83,56,3887
```

ASSEMBLY LANGUAGE LISTING

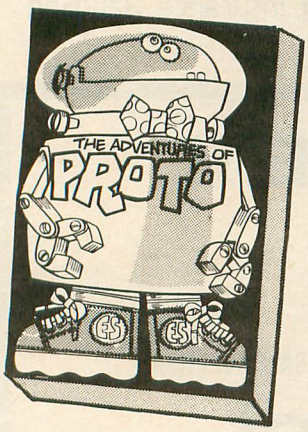
```
;
;PAGE ZERO USAGE
;

PMSTR   =   $CB         ;P/M BASIC STRING
PLADR   =   $CD         ;PLAYER ADDRESS
PMEND   =   $CF         ;PLAYER IMAGE END
XPOS    =   $D0         ;X POSITION
YPOS    =   $D1         ;Y POSITION
HOLD    =   $D4         ;HOLD AREA
PLNUM   =   $D5         ;PLAYER # TO MOVE

;
;OPERATING SYSTEM EQUATES
;

HPOSP0  =   $D000       ;HORIZ. POSITION

;
;PROGRAM STARTS HERE!
;

        ORG $6000       ;ANY ADDRESS

START   CLD             ;CLEAR DECIMAL MODE
        PLA             ;DISCARD
        PLA             ;DISCARD # HI
        PLA             ;PULL PLAYER # LO
        STA PLNUM       ;AND SAVE IT!
        PLA             ;PULL P/M BASE HI
        CLC             ;ADD OFFSET TO GET
        ADC #2          ;PLAYER MEMORY ADDR
        STA PLADR+1     ;AND SAVE!
        PLA             ;PULL P/M BASE LO
        STA PLADR       ;AND SAVE!
        PLA             ;PULL STRING HI
        STA PMSTR+1     ;AND SAVE!
        PLA             ;PULL STRING LO
        STA PMSTR       ;AND SAVE!
        PLA             ;DISCARD X HI
        PLA             ;PULL X LO
        STA XPOS        ;AND SAVE IT!
        PLA             ;DISCARD Y HI
        PLA             ;PULL Y LO
        STA YPOS        ;AND SAVE IT!
        PLA             ;DISCARD LENGTH HI
        PLA             ;PULL LENGTH LO
        CLC             ;ADD Y POSITION
        ADC YPOS        ;TO GET END
        STA PMEND       ;AND SAVE IT!
        LDX PLNUM       ;GET PLAYER#
        BEQ ENDCAL      ;NO INDEX NEEDED!
PLCALC  LDA PLADR       ;ADD 128 TO
        CLC             ;PLAYER
        ADC #128        ;ADDRESS
        STA PLADR       ;TO
        LDA PLADR+1     ;POINT TO
        ADC #0          ;NEXT
        STA PLADR+1     ;PLAYER.
        DEX             ;ANOTHER ADJUSTMENT?
        BNE PLCALC      ;YES!
ENDCAL  LDY #0          ;ZERO P/M COUNT
        LDX #0          ;ZERO STRING COUNT
COPYLP  CPY YPOS        ;COPYING DATA YET?
        BCC ZERO        ;NO!
        CPY PMEND       ;FINISHED COPYING?
        BCS ZERO        ;YES!
        STY HOLD        ;SAVE Y REG
        TXA             ;MOVE X REG...
        TAY             ;TO Y REGISTER
        LDA (PMSTR),Y   ;GET P/M BYTE
        LDY HOLD        ;GET P/M OFFSET
        STA (PLADR),Y   ;CHANGE PLAYER!
        INX             ;NEXT STRING BYTE.
        LDA #0          ;FORCE BRANCH
        BEQ NEXT        ;TO NEXT BYTE!
ZERO    LDA #0          ;ZERO OUT...
        STA (PLADR),Y   ;PLAYER BYTE!
NEXT    INY             ;NEXT P/M BYTE
        CPY #128        ;DONE W/COPY?
        BNE COPYLP      ;NOT DONE YET!
        LDX PLNUM       ;GET PLAYER #
        LDA XPOS        ;NOW JUST SET
        STA HPOSP0,X    ;X LOCATION!
        RTS             ;FINIS!

        .END
```

AN ADVANCED ARCADE GAME

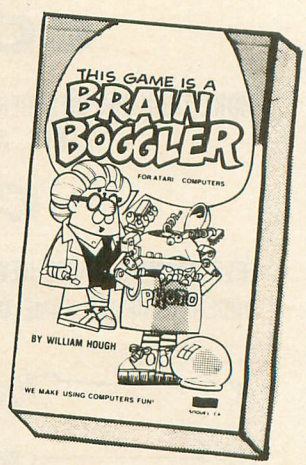
Diggerbonk! contains the following ingredients: Orange Whirlers, Pulsing Greenies, Twinklers, Bombs, Fog, Purple Gurples, Yellow Blinkers, Aqua Chasers (watch out), and of course the PANIC BUTTON.

ONLY $29.95

For those of you who always wanted a pet snake, this game is for you. What do you feed a guest like this? An ample supply of insects, of course, but be aware that snakes often wind up biting themselves or getting electrocuted on their cage walls if not properly trained. Difficulty levels for all ages. $24.95.



Prototype the Robot needs the help of your child, 4 or older. His busy day includes catching marshmallows being dropped by friendly Aliens, Coloring pictures, and Playing tunes on his piano. $24.95



Diggerbonk! is the first arcade style game with a continuously scrolling maze that never repeats. You must guide your Digger upward before it goes off the bottom of your screen. There are, however, a few problems you must BONK! along the way (see ingredients). To add to the complication, you need to BONK! the creatures in a specific order. Playable by all ages, but be prepared to end up with a NEGATIVE SCORE.

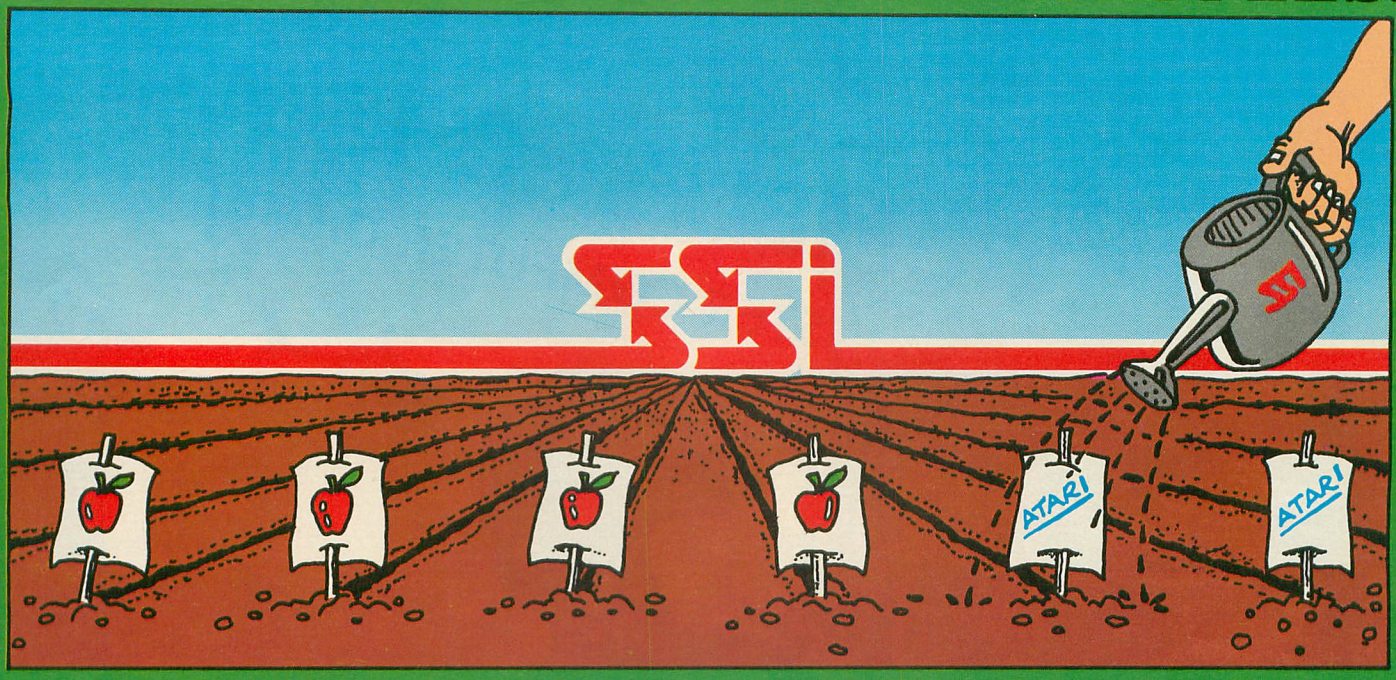
ESI
PROGRAM EXCHANGE
EDUCATIONAL SOFTWARE inc.

AVAILABLE FROM DEALERS WORLDWIDE.

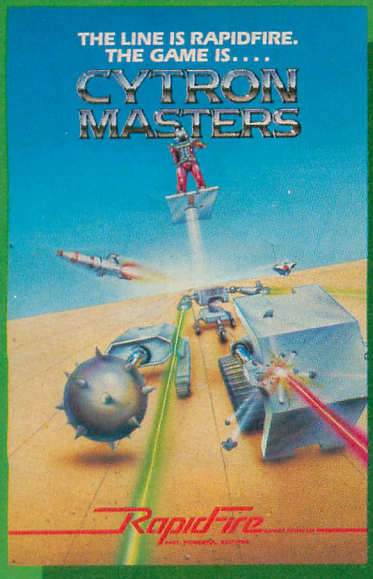
WRITE FOR A CATALOG OR CALL FOR ORDERING INFORMATION
VISA/MC/COD: (800) 692-9520 OR (408) 476-4901
4565 Cherryvale Ave., Soquel, Ca. 95073

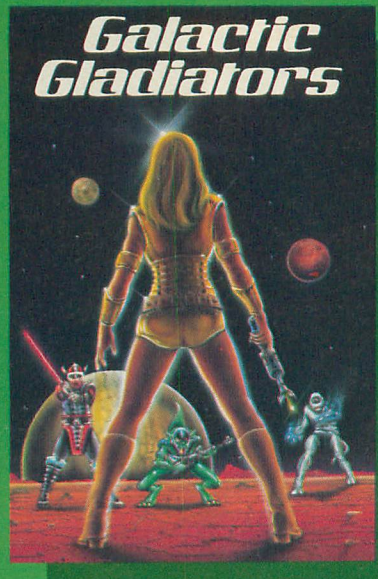
Do you like to challenge your mental powers? Try to solve this color matching puzzle in less than 11 moves. Play it against the computer or a human. Easy you say? SURE $16.95

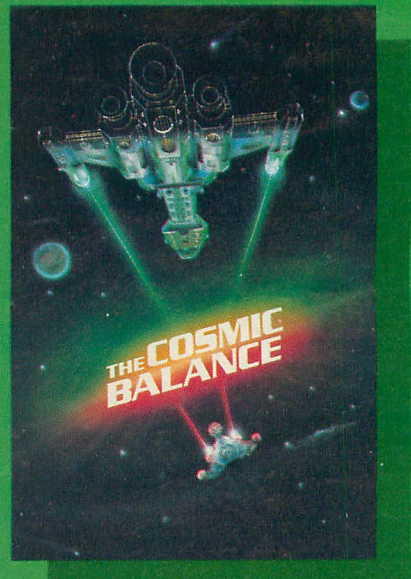
AT SSI, WE GROW MORE THAN APPLES.



INTRODUCING SOME NEW FRUITS OF OUR LABOR...FOR THE ATARI®







At SSI, we cultivated our fine reputation in the computer gaming world by producing some of the best Apple® games around. But to paraphrase an old saying, "Man does not live by Apples alone."

So we bent our backs to the task of converting some of our Apple crops to the ATARI® 400/800. The three games you see above are the new fruits of our labor.

As part of our exciting *RapidFire* series, they contain all the ingredients needed to make the perfect strategy simulations for your Atari. Rooted in popular science-fiction and fantasy themes, they are challenging and sophisticated – yet fast and full of fun!

Best of all, they're ripe for the picking at your local computer/game store today!

■ **CYTRON MASTERS**™ puts you in charge of a small army of *Cybernetic Electronic Devices*. Your forces consist of laser-blasting shooter units, kamikaze-like mine cytrons, mobile bunker cytrons, guided missiles and anti-missiles. Use these mindless but deadly machines to crush your hapless foes, and you will someday become a...*Cytron Master*! On 48K disc for $39.95; 32K cassette for $34.95.

■ **GALACTIC GLADIATORS**™ takes you to a remote corner of our vast universe to participate in a wild and crazy cosmic shootout. We're talking about four-armed Froglodytes with phasor rifles, Viking-like Wodanites wielding laser swords, and ugly Mutants whose only socially redeeming feature is their Death Touch. And these are the *nice* folks! On 48K disc for $39.95.

®ATARI is a registered trademark of Atari Inc.

■ **THE COSMIC BALANCE**™ is a tactical space game that not only lets you wage magnificent starship battles, it gives you the chance to *design and build* your ships from the ground up! With a host of variable parameters to choose from, you can equip your fleet with ships optimally designed to suit your style of space warfare. On 48K disk for $39.95.

Coming soon – **COSMIC BALANCE II** – the strategic-level adjunct to *The Cosmic Balance*.

If there are no convenient stores near you, VISA and M/C holders can order direct by calling *800-227-1617, x335 (toll free)*. In California, call 800-772-3545, x335.

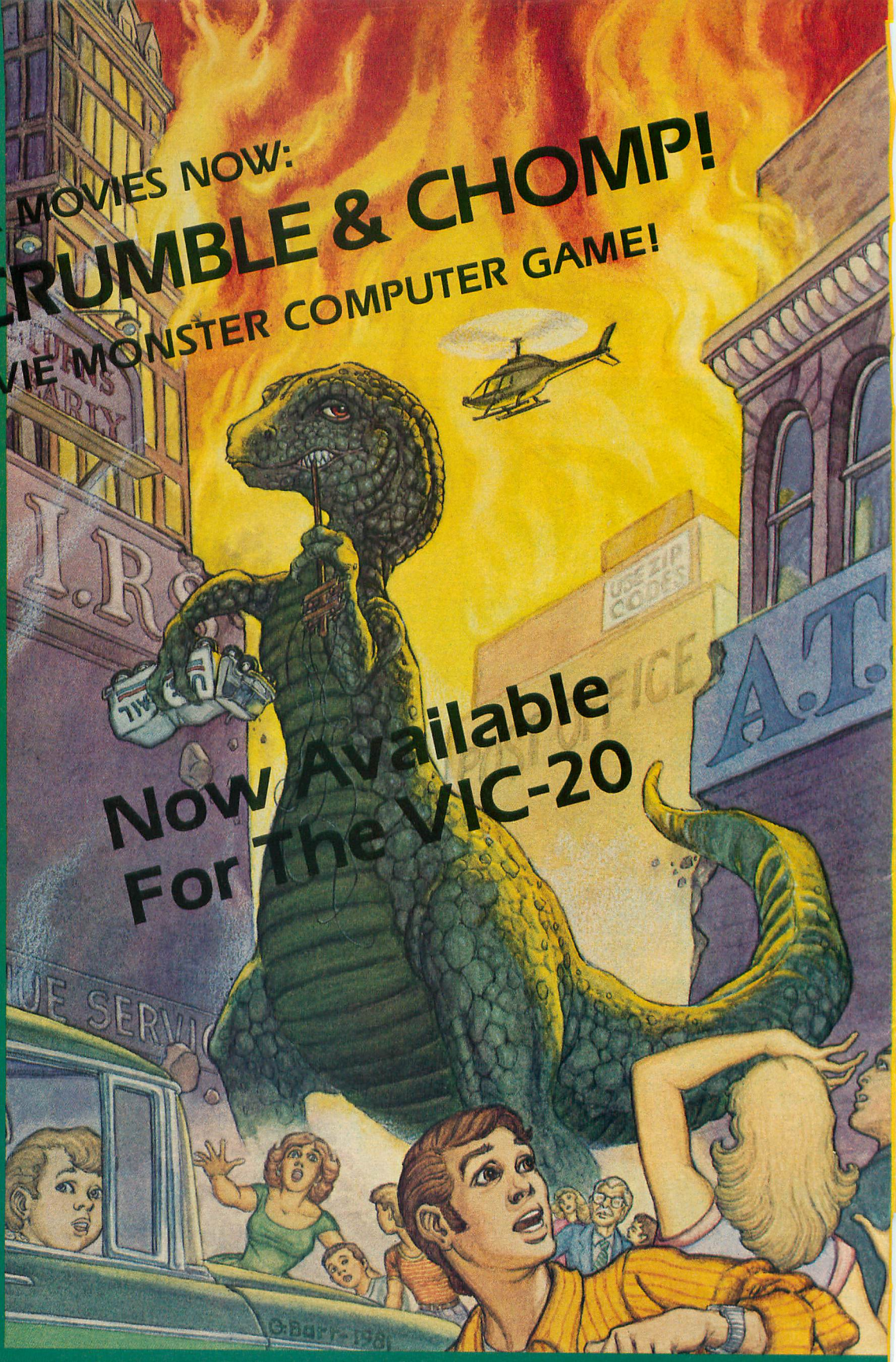
To order by mail, send your check to: *Strategic Simulations Inc*, 465 Fairchild Drive, Suite 108, Mountain View, CA 94043. California residents, add 6½% sales tax.

WRITE FOR A FREE COLOR CATALOG OF ALL OUR ATARI GAMES TODAY!

FIRST: MONSTER MOVIES NOW:

CRUSH, CRUMBLE & CHOMP!

THE GREAT MOVIE MONSTER COMPUTER GAME!



And guess who stars as the movie monster. You! As any of six different monsters. More if you have the disk version.

You can terrorize and destroy four of the world's largest and most densely populated cities in over 100 possible scenarios. From Tokyo to the Golden Gate, you are the deadliest creature in the air, on the land, or in the sea.

You can be the deadly amphibian who simultaneously smashes street cars, lunches on helpless humans and radiates a ray of death.

If you were a giant winged creature, think of the aerial attacks you could make on the terrified but tasty tidbits beneath you.

But as in all the best monster movies, you're up against everything the human race can throw at you—even nuclear warheads and a strange concoction developed by a team of mad scientists.

For only $29.95 you get 6 stupendous monsters, each with its own monstrous summary card, 4 teeming metropoli displayed in graphic detail on your computer display and mapped in the accompanying 48-page illustrated book, the awesome sounds of monsterly mayhem, and spine-tingling, real-time, edge-of-your-seat excitement.

GET CRUSH, CRUMBLE & CHOMP
now at your local dealer for your APPLE, ATARI, or TRS-80 . . **before it's too late.**

COMPUTER GAMES THINKERS PLAY

EDYX

The Halls of the Leprechaun King

16K cassette 24K disk

by Keith Evans and Ted Adkinson

Alas! The Leprechaun King has awakened from his long slumber, and he has taken all of the world's gold. Every nation is bankrupt. The world's only chance is Smiley, the famous gold miner. With his dexterity and wit Smiley just might be able to recapture all of the gold, pick up the magic key, and put the gold in a sanctuary. But unless he's careful, the Leprechaun King will give him the Midas touch, turning him into a 24-carat gold tombstone.

The halls of the Leprechaun King is a maze-type game which runs on an ATARI 400 or 800 with a minimum of 16K (Cassette based) or 24K (Disk based) and one joystick. When the game begins take some time to notice where everything is positioned. Smiley is in the upper middle of the screen and the Leprechaun King is in the upper right hand corner. Throughout the maze there are pots of gold. To collect one, just touch it. If you look in the lower right corner, you will see the key surrounded by walls. Collect about half of the gold and the key will move to the center of the maze. After Smiley gets the key and all of the gold, he goes to the sanctuary chamber at the far lower right corner directly to the left of the cross. Push the trigger button and a section of the wall will disappear. This is the entrance to the sanctuary where Smiley has to store the gold. Deposit gold by simply touching the cross.

Some other important parts of this game are gold tombstones. When Smiley loses a life, a tombstone appears as a resting place for all of the gold he was carrying. A new Smiley has to touch the tombstone to collect the gold that the old Smiley was carrying.

In this game, you start with three lives. The game is over when you use them all up. To see how many lives you have left, look in the upper right or left hand corner of the screen where vertical bars indicate lives remaining (including the one currently in use.)

An expert player might get to the third maze and find it is totally different. Two clues about this maze three: the key appears in the lower middle of the screen, and the section of disappearing wall lies directly below the cross. □

Here is the documentation of the program.

Line #	Description
1-10	Variable Initialization, title
120-372	Character set redefinition
395-507	Maze drawing, placing of the gold
510-624	Joystick reading, movement of Smiley
630-999	The Leprechaun's logic
1000-1120	Maze and character set data
1150-1154	Men left indicator
1500-1510	"Midas Touch" sound effects
2000-2020	Counts bags of gold taken, places key in the maze if enough has been taken
2500	Draws tombstone, checks men left
2510-2570	Erases Smiley's trail
2575	Start's game over when all men are used up
2610-2700	Puts the gold Smiley was carrying in a tombstone when he is killed
3000-3050	Subroutine to flash maze
4000-4350	Actually moves monster
5000	Plays "Oh, when the saints...", clears screen
6000-6007	Displays score at end of game
6010	Clears screen
7000-8030	Data for "Oh, when the saints..."
9000-9130	Subroutine to play "Oh, when the saints..."
9150-9260	Plays "Good night, ladies..."
9270-9290	Data for "Good night, ladies..."
9300	Sound effects of gold being cashed in
10000-10020	Color rotation subroutine

```
1 CLR :X=10:Y=1:MX=17:MY=2:X1=10:Y1=1
5 GRAPHICS 2+16:? #6;" ":? #6;" "
6 ? #6;"  THE HALLS OF THE":? #6;"   L
EPRECHAN KING":? #6;" "
7 ? #6;"        created":? #6;" "
8 ? #6;"          by":? #6;" "
9 ? #6;"     keith and ted ":? #6;" ":?
 #6;"     PLEASE WAIT "
10 FOR ZZZ=1 TO 20:GOSUB 10000:NEXT ZZ
Z
120 POKE 106,PEEK(106)-2
130 GRAPHICS 1+16
150 A=PEEK(106)*256
```

```
190 SET=PEEK(106)
200 POKE 756,SET
220 FOR C=0 TO 7
230 POKE A+C,0
240 NEXT C
250 FOR C=8 TO 63
260 READ CHAR
270 POKE A+C,CHAR
280 NEXT C
369 FOR C=64 TO 71:POKE A+C,146:NEXT C
370 FOR C=72 TO 79:POKE A+C,144:NEXT C
371 FOR C=80 TO 87:POKE A+C,128:NEXT C
372 FOR C=88 TO 95:READ CHAR:POKE A+C,
CHAR:NEXT C
395 IF TIM)=1 AND TIM(3 THEN RESTORE 1
040
396 IF TIM)=3 THEN RESTORE 7000
397 TIM=TIM+1
398 MM=2:IF TIM=1 OR TIM=5 THEN MM=1
400 READ GR1,GR2,GR3,GR4
410 IF GR1=-1 THEN GOTO 440
420 COLOR 35:PLOT GR1,GR2:DRAWTO GR3,G
R4
430 GOTO 400
440 READ G1,G2
450 IF G1=-1 THEN 500
460 COLOR 130:PLOT G1,G2
470 GOTO 440
500 IF TIM(4 THEN COLOR 35:PLOT 3,2:PL
OT 7,3:PLOT 6,3:PLOT 1,16:COLOR 32:PLO
T 12,14
502 BAGS=0:DBAGS=0:GOLD=0:KEY=0:IF TIM
(4 THEN COLOR 37:PLOT 18,22
503 IF TIM(4 THEN RESTORE 1120
504 IF TIM)=4 THEN RESTORE 7090:LOCATE
 10,11,ZZ:IF ZZ=32 THEN COLOR 37:PLOT
10,11
506 X=10:Y=1:READ RMX:READ RMY:MX=RMX:
MY=RMY:X1=10:Y1=1
507 READ SDO,SDO1,SD,SD1,SC,SC1,K,E,AX
,AY,NB
510 X1=X:Y1=Y
515 POKE 711,251
516 POKE 77,0
520 IF STICK(0)=15 THEN GOTO 580
530 J=STICK(0)
540 IF J=11 THEN X=X-1
550 IF J=7 THEN X=X+1
560 IF J=14 THEN Y=Y-1
570 IF J=13 THEN Y=Y+1
580 LOCATE X,Y,I:IF I=35 THEN X=X1:Y=Y
1
590 IF I=1?? THEN GOSUB 2000
595 IF I=38 THEN GOLD=GOLD+DGOLD:BAGS=
DBAGS:FOR ZZ=-30 TO 30:SOUND 0,ABS(ZZ)
,10,8:NEXT ZZ:SOUND 0,0,0,0
600 IF I=1 THEN GOSUB 1500:GOTO 2500
605 IF I=37 THEN KEY=1:ZZZ=60:FOR ZZ=6
0 TO 40 STEP -1:SOUND 0,ZZ,10,8:SOUND
1,ZZZ,10,8:ZZZ=ZZZ-1:NEXT ZZ
606 SOUND 0,0,0,0:SOUND 1,0,0,0
615 IF J(>15 THEN COLOR 32:PLOT X1,Y1
620 COLOR 36:PLOT X,Y
622 IF X=SDO AND Y=SDO1 AND KEY=1 AND
STRIG(0)=0 THEN COLOR 32:PLOT SD,SD1
623 IF X=SC AND Y=SC1 THEN PGOLD=PGOLD
+GOLD:COLOR 39:PLOT SC,SC1:X=AX:X1=X:Y
=AY:Y1=Y:GOLD=0:GOSUB 9300
624 IF BAGS(=NB AND I=39 THEN 5000
630 MM=MM*-1
640 IF MM=1 THEN 510
650 LOCATE MX-1,MY,D1
660 LOCATE MX,MY-1,D2
670 LOCATE MX+1,MY,D3
680 LOCATE MX,MY+1,D4
690 IF X(>MX AND Y(>MY THEN 750
700 IF X=MX AND MY)Y THEN FD=2:FD1=0
710 IF X=MX AND MY(Y THEN FD=4:FD1=0
720 IF Y=MY AND MX)X THEN FD=1:FD1=0
730 IF Y=MY AND MX(X THEN FD=3:FD1=0
740 GOTO 790
750 IF MX(X THEN FD=3
760 IF MX)X THEN FD=1
770 IF MY(Y THEN FD1=4
780 IF MY)Y THEN FD1=2
790 REM
795 IF FD1(>0 THEN 900
800 IF FD=4 AND D4(>35 THEN RD=4:GOTO
1150
810 IF FD=3 AND D3(>35 THEN RD=3:GOTO
1150
820 IF FD=2 AND D2(>35 THEN RD=2:GOTO
1150
830 IF FD=1 AND D1(>35 THEN RD=1:GOTO
1150
840 RD=INT(RND(0)*4)+1
850 IF RD=1 AND D1=35 THEN 840
860 IF RD=2 AND D2=35 THEN 840
870 IF RD=3 AND D3=35 THEN 840
880 IF RD=4 AND D4=35 THEN 840
890 GOTO 1150
900 WAYS=0:IF FD=1 AND D1(>35 THEN WAY
S=WAYS+1:W1=1
902 IF FD=2 AND D2(>35 THEN WAYS=WAYS+
1:W2=1
904 IF FD=3 AND D3(>35 THEN WAYS=WAYS+
1:W3=1
906 IF FD=4 AND D4(>35 THEN WAYS=WAYS+
1:W4=1
908 IF FD1=1 AND D1(>35 THEN WAYS=WAYS
+1:W11=1
910 IF FD1=2 AND D2(>35 THEN WAYS=WAYS
+1:W22=1
912 IF FD1=3 AND D3(>35 THEN WAYS=WAYS
+1:W33=1
914 IF FD1=4 AND D4(>35 THEN WAYS=WAYS
+1:W44=1
916 IF WAYS=2 THEN 4000
918 IF W1=1 THEN RD=1
920 IF W2=1 THEN RD=2
922 IF W3=1 THEN RD=3
924 IF W4=1 THEN RD=4
925 GOTO 4070
926 GOTO 1150
999 GOTO 510
1000 DATA 170,84,124,170,146,254,40,10
8
1010 DATA 126,60,66,223,209,219,66,60
1020 DATA 170,85,170,85,170,85,170,85
1030 DATA 60,126,219,255,189,195,126,6
0
1035 DATA 0,0,7,253,85,87,0,0
1037 DATA 28,54,119,65,119,119,119,127
1038 DATA 24,24,126,126,24,24,24,24
1039 DATA 31,35,69,249,137,138,140,248
1040 DATA 13,13,14,13,2,14,4,14,5,15,4
,15,5,16,8,16,15,15,16,15,13,16,14,16,
2,18,5,18,7,18,9,18,15,18,17,18
1041 DATA 1,0,18,0
1050 DATA 2,19,3,19,7,19,9,19,11,19,13
,19,5,20,7,20,16,20,18,20,2,21,3,21,5,
21,7,21,9,21,14,21,2,22,3,22
1060 DATA 1,1,1,5,18,1,18,7,9,1,9,4,16
,6,16,8,18,12,18,16,16,14,16,17,16,20,
16,22,13,10,13,11,13,17,13,18
1070 DATA 9,9,9,10,8,13,8,14,3,16,3,17
,0,0,0,23,0,23,19,23,19,23,19,0,3,1,9,
1,11,1,16,1,11,2,16,2,11,4,16,4
1080 DATA 4,6,9,6,3,3,5,3,6,4,7,4,3,5,
4,5,11,5,12,5,14,6,16,6,11,7,12,7,2,8,
6,8,8,8,9,8,11,8,14,8,5,9,6,9
1090 DATA 11,9,13,9,16,9,17,9,1,10,3,1
0,6,10,7,10,15,10,17,10,6,11,7,11,9,11
,11,11,2,12,3,12,17,12,18,12,5,13,6,13
1095 DATA 10,13,16,17,11,13,11,17,-1,0
,0,0
1100 DATA 4,2,5,5,13,7,4,9,8,9,12,10,1
8,11,15,12,3,13,9,13,5,14,13,14,12,15,
4,16,15,17,6,18,4,21,12,22,15,20
1110 DATA 2,6,-1,0
1120 DATA 17,2,15,22,16,22,18,22,9,12,
17,22,-19
1150 IF LI=0 THEN COLOR 8:PLOT 19,0:PL
OT 0,0
1151 IF LI=-1 THEN COLOR 9:PLOT 19,0:P
LOT 0,0
1152 IF LI=-2 THEN COLOR 10:PLOT 19,0:
PLOT 0,0
1154 GOTO 4110
1500 COUNT=800:FOR ZZ=20 TO 0 STEP -1:
SOUND 0,COUNT,10,ZZ:SOUND 1,COUNT+(ZZ*
99),10,ZZ:COUNT=COUNT-10:NEXT ZZ
1510 SOUND 0,0,0,0:SOUND 1,0,0,0:RETUR
N
2000 BAGS=BAGS-1:GOLD=GOLD+INT(RND(0)*
100)+1:DBAGS=DBAGS-1
```

```
2005 FOR ZZ=20 TO 0 STEP -1:SOUND 0,20
,10,ZZ:NEXT ZZ:SOUND 0,0,0,0
2010 IF DBAG5=-10 OR BAG5=-10 THEN COL
OR 37:PLOT K,E:COLOR 39:PLOT 5C,5C1
2020 RETURN
2500 COLOR 38:PLOT X,Y:REM :LI=LI-1:IF
 LI=-3 THEN GOSUB 9150:GOSUB 6000:GOTO
 2570
2510 LOCATE X,Y,ZZ:IF ZZ=36 THEN COLOR
 32:PLOT X,Y
2520 LOCATE X+1,Y,ZZ:IF ZZ=36 THEN COL
OR 32:PLOT X+1,Y
2530 LOCATE X-1,Y,ZZ:IF ZZ=36 THEN COL
OR 32:PLOT X-1,Y
2540 LOCATE X,Y-1,ZZ:IF ZZ=36 THEN COL
OR 32:PLOT X,Y-1
2550 LOCATE X,Y+1,ZZ:IF ZZ=36 THEN COL
OR 32:PLOT X,Y+1
2555 LI=LI-1:IF LI=-3 THEN GOSUB 9150:
GOSUB 6000:GOTO 2570
2560 COLOR 38:PLOT X,Y
2570 X=10:Y=1:X1=X:Y1=Y:MX=17:MY=2:OMX
=MX:OMY=MY
2572 D=32
2575 IF LI=-3 THEN LI=0:GOTO 395
2610 FOR FN=0 TO 500:NEXT FN
2617 DGOLD=GOLD:GOLD=0:X=10:Y=1:X1=10:
Y1=1
2620 MX=RMX:MY=RMY
2630 D=32
2700 GOTO 503
3000 FOR COUNT=0 TO 5
3010 SETCOLOR 0,8,8
3015 FOR ZZ=1 TO 50:NEXT ZZ
3020 SETCOLOR 0,2,8
3025 FOR ZZ=1 TO 50:NEXT ZZ
3030 NEXT COUNT
3040 SETCOLOR 0,2,8
3050 RETURN
4000 RW=INT(RND(0)*2)+1
4010 IF RW=1 THEN 1110
4020 IF W1=1 THEN RD=1
4030 IF W2=1 THEN RD=2
4040 IF W3=1 THEN RD=3
4050 IF W4=1 THEN RD=4
4060 GOTO 1150
4070 IF W11=1 THEN RD=1
4080 IF W22=1 THEN RD=2
4090 IF W33=1 THEN RD=3
4100 IF W44=1 THEN RD=4
4110 IF RD=0 THEN 4300
4120 IF RD=1 THEN MX=MX-1
4130 IF RD=2 THEN MY=MY-1
4140 IF RD=3 THEN MX=MX+1
4150 IF RD=4 THEN MY=MY+1
4155 LOCATE OMX,OMY,ZZ:IF ZZ=36 OR ZZ=
39 THEN 4162
4160 COLOR D:PLOT OMX,OMY
4162 D=32
4165 LOCATE MX,MY,D:IF D=36 THEN GOSUB
 1500:GOTO 2500
4170 COLOR 1:PLOT MX,MY
4175 OMX=MX:OMY=MY
4180 FD=0:FD1=0:RD=0:D1=0:D2=0:D3=0:D4
=0:WAYS=0:RD=0
4190 W1=0:W2=0:W3=0:W4=0:W11=0:W22=0:W
33=0:W44=0
4200 GOTO 510
4300 RD=INT(RND(0)*4)+1
4310 IF RD=1 AND D1=35 THEN 4300
4320 IF RD=2 AND D2=35 THEN 4300
4330 IF RD=3 AND D3=35 THEN 4300
4340 IF RD=4 AND D4=35 THEN 4300
4350 GOTO 4120
5000 GOSUB 3000:GOSUB 9000:GOSUB 6000:
TIM=TIM+1:GOTO 395
6000 COLOR 32:C1=0:C2=0:IF LI<>-3 THEN
 GOTO 6005
6001 IF LI=-3 THEN GOSUB 6010:POKE 756
,224:POSITION 0,5:? #6;"    SCORE= ";P
GOLD
6002 POSITION 4,10:? #6;"push trigger"
:IF LI=-3 THEN TIM=0
6003 SETCOLOR 1,12,10:IF STRIG(0)=0 TH
EN 6005
6004 FOR ZZ=1 TO 50:NEXT ZZ:SETCOLOR 1
,0,0:FOR ZZ=1 TO 50:NEXT ZZ:GOTO 6003
6005 RESTORE 1040:IF LI=-3 THEN PGOLD=
0
6007 COLOR 32:GOSUB 6010:POKE 756,SET:
RETURN
6010 FOR C1=0 TO 23:PLOT 0,C1:DRAWTO 1
9,C1:NEXT C1:RETURN
7000 DATA 0,0,19,0,19,0,19,23,19,23,0,
23,0,23,0,0,3,3,5,3,5,2,5,2,9,1,11,1,1
4,3,16,3,14,2,14,2
7010 DATA 9,4,11,6,9,6,11,4,16,5,14,5,
14,6,14,6,9,10,11,10,11,10,11,12,11,12
,9,12,9,12,9,10,3,5,5,5,5,6,5,6
7020 DATA 3,9,3,10,5,9,5,10,14,9,14,10
,16,9,16,10,3,12,3,13,5,12,5,13,14,12,
14,13,16,12,16,13
7030 DATA 10,15,10,17,9,16,11,16,3,17,
5,17,14,17,16,17,3,19,5,19,14,19,16,19
,8,20,9,20
7040 DATA 11,20,12,20,8,22,9,22,11,22,
12,22,2,22,2,23,17,22,17,23,12,21,12,2
1,8,21,8,21,3,19,3,20
7050 DATA 3,16,3,17,16,16,16,17,16,19,
16,20,2,10,3,10,6,10,5,10,2,12,3,12,6,
12,5,12,13,10,14,10
7060 DATA 16,10,17,10,13,12,14,12,17,1
2,17,12,-1,-1
7070 DATA 4,2,15,2,4,6,15,6,10,4,10,6,
9,5,11,5,4,9,15,9,2,11,4,11,6,11,13,11
,15,11,17,11,4,13,15,13
7080 DATA 9,15,11,15,9,17,11,17,4,16,1
5,16,4,20,15,20,9,21,11,21,4,2,-1
7090 DATA 10,21,10,13,10,12,10,11,10,2
2,10,12,-28
8000 DATA 121,6,96,6,91,6,81,1,0,8,121
,8,96,8,91,8,81,1
8010 DATA 0,8,121,8,96,8,91,8,81,2,96,
2,121,2,96,2,108,1
8020 DATA 0,8,96,8,96,8,108,8,121,2,12
1,6,96,2,81,4,81,4,91,2
8030 DATA 0,8,91,8,96,8,91,8,81,2,96,2
,108,4,108,4,121,1,-1
9000 RESTORE 8000
9010 READ PITCH
9020 IF PITCH=-1 THEN 9130
9040 READ DURATION:DURATION=INT(50/DUR
ATION)
9050 SOUND 0,PITCH,10,8
9060 IF PITCH=0 THEN 9080
9070 SOUND 1,PITCH+1,10,8
9080 FOR ZZ=1 TO DURATION:NEXT ZZ
9090 SOUND 0,0,0,0
9100 SOUND 1,0,0,0
9110 FOR ZZ=1 TO 5:NEXT ZZ
9120 GOTO 9010
9130 RETURN
9150 RESTORE 9270
9160 READ DURATION:IF DURATION=-1 THEN
 RETURN
9170 DURATION=INT(DURATION*10)
9180 READ PITCH:IF PITCH=0 THEN 9200
9190 PITCH=PITCH*3
9200 SOUND 0,PITCH,10,8
9210 SOUND 1,PITCH+1,10,8
9220 FOR ZZ=1 TO DURATION:NEXT ZZ
9230 SOUND 0,0,0,0
9240 SOUND 1,0,0,0
9250 FOR ZZ=1 TO 3:NEXT ZZ
9260 GOTO 9160
9270 DATA 2,47,2,60,1,81,3,60,2,47,2,6
0,1,53,3,53,2,47,2,60,1,45,2,45,1,45
9280 DATA 1,47,1,47,1,53,1,53,3,60,1,0
,1.5,47,.5,53,1,60,1,53,1,47,1,47,2,47
,1,53,1,53,2,53
9290 DATA 1,47,1,40,2,40,1.5,47,.5,53,
1,60,1,53,1,47,1,47,2,47,1,53,1,53,1,4
7,1,53,3,60,1,0,-1
9300 FOR ZZZ=1 TO 3:FOR ZZ=20 TO 0 STE
P -1:SOUND 0,20,10,ZZ:NEXT ZZ:SOUND 0,
0,0,0:NEXT ZZZ:RETURN
10000 FOR Z=1 TO 3
10010 A=PEEK(708)
10020 POKE 708,PEEK(711):POKE 711,PEEK
(710):POKE 710,PEEK(709):POKE 709,A:NE
XT Z:FOR B=1 TO 10:NEXT B:RETURN
```

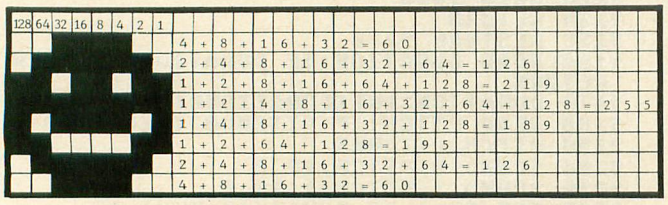
•

(see D:CHECK 2, p. 26)

```
1 DATA 0,703,82,669,687,337,397,37,199
,539,211,426,288,786,730,6091
250 DATA 162,99,303,742,713,712,721,64
2,282,323,121,875,275,455,697,7122
430 DATA 704,833,696,201,728,445,337,5
1,429,826,926,151,238,959,36,7560
530 DATA 918,74,785,93,91,205,828,681,
484,731,983,17,973,483,857,8203
624 DATA 488,689,493,829,812,831,814,1
82,910,911,917,918,746,924,929,11393
770 DATA 167,170,113,918,228,224,220,2
16,977,846,853,860,867,983,660,8302
902 DATA 660,667,674,27,30,40,50,918,8
10,807,811,815,974,970,746,8999
1000 DATA 226,165,214,287,97,68,763,80
,750,137,418,548,616,647,412,5428
1095 DATA 418,873,132,916,490,600,859,
724,251,119,657,327,491,783,339,7979
2510 DATA 724,239,248,210,201,494,202,
783,213,871,731,517,774,208,903,7318
3000 DATA 810,677,667,660,668,195,662,
788,842,933,0,5,10,15,719,7651
4070 DATA 706,715,724,726,908,549,557,
551,559,311,753,204,808,251,772,9094
4180 DATA 625,95,887,819,607,611,615,6
19,730,1,991,985,398,561,836,9380
6005 DATA 105,951,595,618,605,393,695,
974,457,283,942,188,257,974,783,8820
8020 DATA 596,86,199,110,118,997,893,4
00,342,698,223,218,588,743,801,7012
9150 DATA 226,485,338,695,558,894,342,
698,223,225,593,761,514,393,665,7610
9300 DATA 852,309,60,626,1847
```

•

For those interested, here are some of the techniques used in this program. First is "redefined character sets", which when carefully laid out can simulate a high resolution graphics screen, but requiring much less memory. They are fairly easy to design. Each character can be one of four different colors. Step one is to design some characters. Here's Smiley as an example:



Make an 8 by 8 grid; mark the blocks to be filled in, then add up the corresponding numbers to determine its POKE value.

Following is a program which defines a space, and a Smiley character and then prints out a picture of Smiley on the screen. The number used after the COLOR statement in line 100 is explained later.

```
10 GRAPHICS 2+16:REM START OUT WITH A
GRAPHICS STATEMENT
20 POKE 106,PEEK(106)-2:REM SET ASIDE
2 PAGES OF MEMORY FOR THE CHARACTER SE
T
30 CHBASE=PEEK(106)*256:REM THIS IS WH
ERE THE CHARACTER SET WILL BE POKED IN
TO MEMORY
40 SET=PEEK(106):REM THIS IS WHERE THE
 CHARACTERS WILL GO IN TERMS OF PAGES
OF MEMORY
50 READ VALUE:IF VALUE=-1 THEN 95:REM
READ IN PART OF A CHARACTER
60 POKE CHBASE+C,VALUE:REM PUT THE NUM
BER IN MEMORY
70 C=C+1:GOTO 50
75 REM DATA FOR SPACE
80 DATA 0,0,0,0,0,0,0,0
85 REM DATA FOR SMILEY
90 DATA 60,126,219,255,189,195,126,60,
-1
95 POKE 756,SET:REM TELL THE COMPUTER
WHERE THE NEW CHARACTER SET IS LOCATED
100 COLOR 1:PLOT 5,5:REM PUTS SMILEY O
N SCREEN AT 5,5
110 GOTO 110:REM ENDLESS LOOP FOR DISP
LAY PURPOSES
```

•

To determine the number for the COLOR statement in line 100: First, Smiley is to be green. Color register number 1 normally contains green so it is used. Smiley has been defined in the program above as the second character in the redefined set. (The space was the first.)

With these pieces of information I looked up the number in a chart, like the following one:

COLOR REGISTER 0 = 32, 33 through 95
COLOR REGISTER 1 = 0, 1 through 124, (125*), 126, 127
COLOR REGISTER 2 = 160, 161 through 223
COLOR REGISTER 3 = 128, 129 through 154, (155*), 156 through 255
* 155 selects the same thing as 32. 125 has no effect.

Smiley's color is set by color register 1 so look in the second row. Since he is the second character use the 2nd number in the 2nd row, which is 1. As another example, if Smiley were to be controlled by color register 2 the correct number would be 161. Try 161 in the example program above and see what happens.

Before you get too carried away, remember that the example program will not allow text to be displayed on the screen. To switch back to text only POKE 756, 224.

If you are really interested in redefining a complete character set there are several software packages out which make it easier.

Another section of the Halls of the Leprechaun King which is interesting is its color rotation subroutine (10000-10020). Adding this to a program's title makes it very colorful. Here is how it works. Memory locations 708-711 contain the numbers which determine the colors which will be displayed from each color register. The subroutine rotates the colors from one register to another so that everything on the screen is flashes through each color. Try it in one of your programs.

Good Luck! And keep on coding! □

"...faithfully captures the look, spirit and play of arcade 'Space Invaders'".

-John Anderson,
Creative Computing

"All are excellent versions of the arcade games with super graphics and sound."

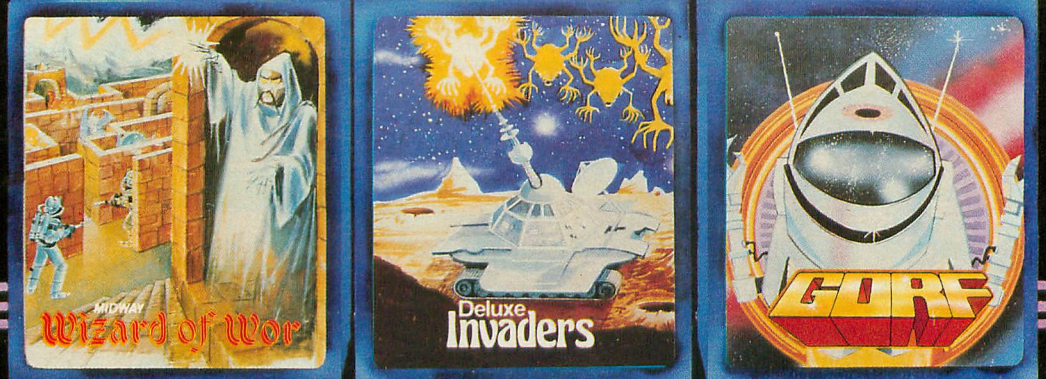
-Mark Benioff
A.N.A.L.O.G.

"The graphics display, sounds and game logic are so close to the original, that you might find yourself looking for the coin slot on your computer."

-Gary and Marcia Rose

"'Deluxe Invaders' is by far the best Space Invaders program ever released for a personal computer."

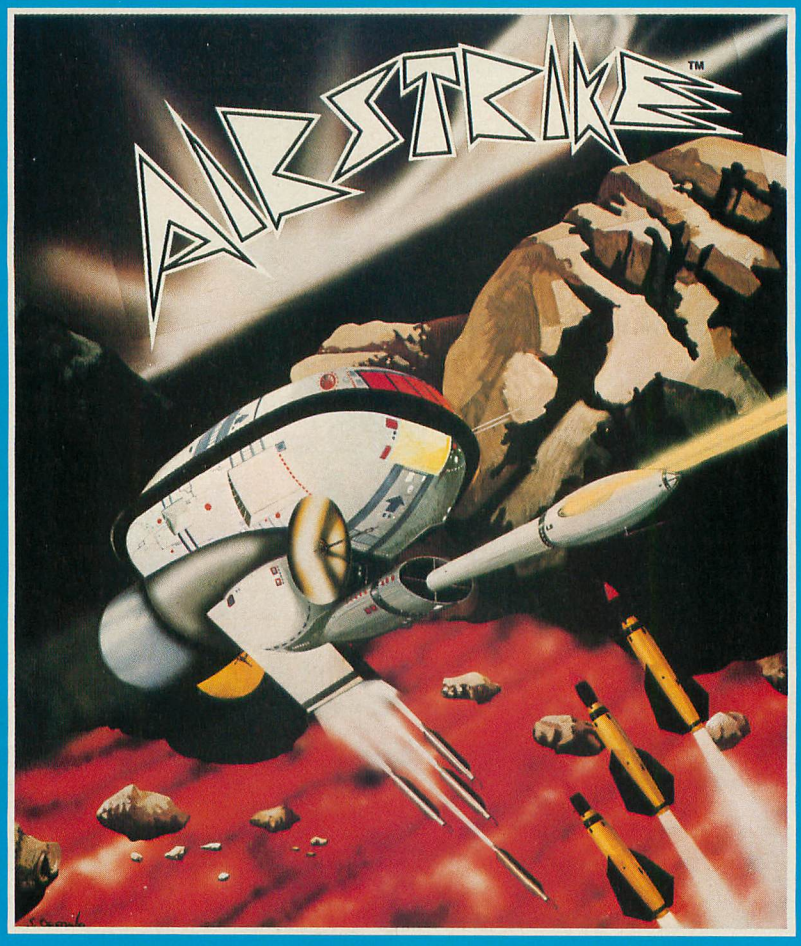
-Leigh Goldstein,
Electronic Games



Roklan Software

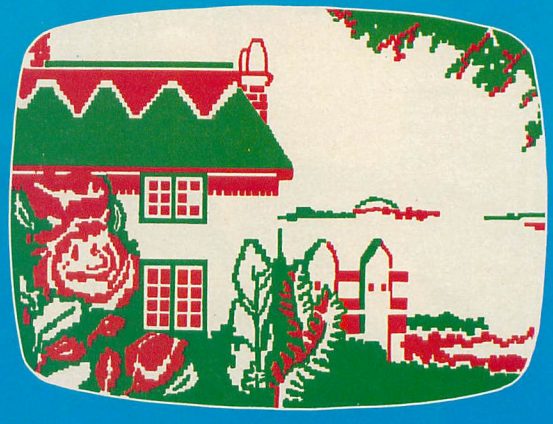
We are Serious About Our Games!

Very, very, difficult!



The definitive, super-fast, multiple skill, shoot-out game for Atari® 400/800™ with superb arcade-type realism.

Retail price for 16K cassette or disk: $39.95
One or two player game.
Coming soon: Venus Voyager, TimeWarp, and more programs by fine English software designers and authors.



ENGLISH SOFTWARE™

The English Software Company
P.O. BOX 3185 • REDONDO BEACH, CALIFORNIA 90277
(213) 372-3440
Direct orders welcome.

A LISP TUTORIAL

by Ken Litkowski

LISP is an old language, dating to the dark ages of computers (pre 1960), still hardly standardized, yet still making a contribution to the evolution of new languages. Its influence will continue to be felt in the years to come. And now it is emerging from the hallowed halls of academe and made available to us lesser mortals. It is a language or research; its availability on personal computers will allow anyone so inclined to participate in the future.

LISP is primarily a symbol manipulation language used today in many areas of the ever-expanding field of artificial intelligence. Programs in LISP can do calculus problems (on a level equivalent to college freshmen), prove mathematical theorems, solve geometric analogy problems, provide natural language interfaces to data base systems for limited domains such as moon rocks and inventory systems, and have been used for word processing, symbolic mathematics, and writing operating systems, utility programs, compilers, and interpreters for personal computers. These applications have been developed on large computers, but there is no reason why LISP's capabilities cannot be harnessed on a personal computer. (See the review of a LISP implementation for the ATARI in A.N.A.L.O.G. #8, particularly noting its limitations, which effect the speed of flexibility of LISP programs.) In this tutorial, I will attempt to convey the power, beauty, and sophistication of this language, while trying to demystify the aura which surrounds artificial intelligence.

The Basics

LISP is essentially a functional language, meaning that its capabilities are implemented through functions (comparable to the functions in FORTRAN and analogous to the subroutines in BASIC). A function in LISP is always enclosed in parentheses, with the function name given first, followed by its arguments (or values to be given to the function, if any). For example, (+2 5) will return the value 7. This prefix notation is important, since it ensures that the system always knows where to look for a function name. Other functions can also be used as arguments, nested to any depth. Listing 1 shows several examples of mathematical functions. Arguments for the more complex examples are discernible by balancing the parentheses.

As is evident from the examples in Listing 1, parentheses proliferate in LISP. This brings us to another main characteristic of LISP, namely, that it is a list processing language. The fundamental entities in LISP are called **atoms** (roughly corresponding to veriable names in most other languages). Atoms may be symbolic, such as +, SQRT, x, or 3x@H#, or numeric, such as 4 or 5.2374. Some symbolic atoms are given special meaning when they are used as function names (recognized as such either by the system or through user definition). Other symbolic atoms may be given values or properties. Atoms may be grouped together into **lists**, which can then be grouped into higher-level lists, and so on. Lists are always enclosed in parentheses. The functions in Listing 1 are nothing more than lists, some containing sublists, and all of them distinguished in that their first elements are symbolic atoms recognized as function names which cause a computation to be performed.

LISTING 1.

```
(+ 3.14 1.27)                ;User input
4.41                         ;LISP response
(* 4.13 3)                   ;User input
12.39                        ;LISP response
(/ 327 200)                  ;User input
1.635                        ;LISP response
(* (+ 3 4 ) (SUB 13 5))     ;User input
56                           ;LISP response
(SQRT 1.4641)                ;User input
1.21                         ;LISP response
```

Atoms and lists collectively are called symbolic expressions, or s-expressions. Their manipulation is the essence of LISP. As mentioned above, symbolic atoms may be given values; these values do not have to be numbers; they can be other symbolic atoms, lists, and even lists which are also functions. This makes LISP a symbolic language in addition to being a functional and list processing language.

EVAL and QUOTE

The ability to give atoms values which are other atoms, lists, or functions is what gives LISP its power. Understanding how this is done is therefore of primary importance. There is a simple function called SETQ which gives a symbolic atom its value. Thus, we can write (SETQ X 3); this is equivalent to the BASIC or FORTRAN assignment statement X=3. We can also write (SETQ X 'Y) or (SETQ X '(A B C)). These give X the value Y or (A B C), respectively, but they do so in a peculiar manner. First note that these values were preceded by a quote

mark. This quote mark inhibited what is known in LISP as evaluation.

Whenever LISP encounters an atom or list, it attempts to evaluate it. That is, it will substitute the value of the atom or the list for the atom or list itself. In the case of the Y above, LISP would substitute the value of Y and make that value the value of X, if we had not inhibited evaluation with the quote mark or with the equivalent QUOTE function. In the case of the list (A B C), LISP would have attempted to determine its value by assuming that it is a function with name A and arguments B and C. Not finding a function with such a name would have caused an error. The quote mark inhibits such evaluation. In both cases, the QUOTE function returns the literal expression which follows it. This enables X to be given the literal values intended.

In the examples of Listing 1, where a function was given as an argument to another function, the absence of a quote mark permitted the evaluation of the function. The value of the function thus became the value of the first function's argument. Sometimes, however, it is necessary to use the opposite of the QUOTE function and let a symbolic atom go through two (or more) stages of evaluation. This is accomplished with the EVAL function. Listing 2 shows an example of this, where the atom A is given the value B and the atom B is given the value C. When A is entered, LISP returns its value B; similarly, B returns the value C. But, typing (EVAL A) returns the value C. In creating the listings for this article, I set a variable to the lines marked "User input" and then EVALuated that variable to get the LISP response. In most of the listings, this resulted in the evaluation of a function.

LISTING 2.

```
(SETQ A (QUOTE B))      ;User input
B                       ;LISP response
(SETQ B (QUOTE C))      ;User input
C                       ;LISP response
A                       ;User input
B                       ;LISP response
B                       ;User input
C                       ;LISP response
(EVAL A)                ;User input
C                       ;LISP response
```

List Processing Functions

Since LISP is a list processing language, it has special functions for manipulating them. The most basic functions are CAR (for Contents of Address Register) and CDR (for Contents of Decrement Register), where both acronyms were taken from the structure of the IBM 7090. CAR returns as its value the first s-expression of the list, while CDR returns the list that remains after the first element is removed. Listing 3 contains some examples of these functions; note again that the QUOTE function was used to inhibit evaluation.

LISTING 3.

```
(CAR (QUOTE (A B C)))           ;User input
A                               ;LISP response
(CDR (QUOTE (A B C)))           ;User input
(B C)                           ;LISP response
(CAR (CDR (QUOTE (A B C))))     ;User input
B                               ;LISP response
(CDR (CDR (QUOTE (A B C))))     ;User input
(C)                             ;LISP response
(CAR (QUOTE ((A B) C)))         ;User input
(A B)                           ;LISP response
```

Three other basic functions are APPEND, LIST, and CONS. APPEND merges all the elements of each of its argument lists into one list, while LIST simply forms its arguments into a single list. CONS takes its first argument, any s-expression, and makes it the first element of the list which is its second argument. Listing 4 shows several examples of their use; in these cases, X has been given a value before use by the demonstrated function; no quote mark has been used in order to show what happens when an atom is evaluated prior to its use by a function. Several other list processing functions are usually available in any implementation of LISP.

LISTING 4.

```
(SETQ X (QUOTE (A B)))  ;User input
(A B)                   ;LISP response
(APPEND X X)            ;User input
(A B A B)               ;LISP response
(LIST X X)              ;User input
((A B) (A B))           ;LISP response
(CONS X X)              ;User input
((A B) A B)             ;LISP response
```

Lists may have any degree of complexity; by giving some lists a certain degree of regularity, they can be used in special ways by using system or user defined functions. Listing 5 shows one type of list I have created for analyzing the semantic structure of dictionary definitions. I have developed special functions to access particular parts of such lists when I wish to perform specific analyses. This list is known as a property list, in this case associated with the atom IF. An atom may have any number of properties, each of which in turn may have values.

LISTING 5.

```
(PROPERTY LIST FOR THE DEFINITION OF "IF")
((CODE (11))
 (TOKEN
   (IF)
   (if))
```

```
(#DEFS (10))
(DEFS
  ((1 in the event that))
  ((2 in case))
  ((3 allowing, conceding, or granting that ))
  ((4 SUPPOSING))
  ((5 so long as))
  ((6 on condition that))
  ((7 WHETHER))
  ((8 USAGENOTE --used to introduce an
     exclamation expressing a wish ))
  ((9 even though))
  ((10 although perhaps))
))
```

Predicate Functions

LISP is a logical language in addition to being a functional, symbolic, and list processing language. LISP has two special atoms, T and NIL, roughly corresponding to 'true' and 'false', respectively. If one were to enter an atom, thus requesting its value, and it had none, the system would respond NIL. If it had a value, that value would be returned. LISP has several functions which ask questions which demand an answer of T or NIL. Among these are ATOM (which asks whether its argument is an atom), EQUAL (which asks whether its two arguments are equal in value), NULL (which asks whether its argument is the null set), MEMBER (which asks whether its first argument, an s-expression, is an element of the second argument, a list), and the logical connectives AND, OR and NOT (which act in the usual way). Several other predicate functions are usually available, and others are easily created.

Defining Functions

Each LISP implementation has a special function for defining new functions. In the system which I use, this function is called DEFINEQ. The arguments of this function are the function name, the parameters of the function being defined, and the body of the function which articulates what the function is to do when it is called. The body of a function is much easier to comprehend for anyone with programming experience. Usually, the body of a function will contain a series of s-expressions combined in the form desired. After the function is defined, it can be used by itself or as part of another function. When used, the function always returns a value (which may be just about anything).

One important type of s-expression which is frequently used in functions is the COND function, which makes use of the predicate functions. COND can have any number of arguments, each of which is a conditional expression called a clause. In each clause, the first s-expression is a predicate function; if this function has the value T (for true), then any expressions which follow are executed (or evaluated, to be a purist). The last such expression is returned as the value of COND. LISP examines each clause of a COND in turn, until it finds one whose first expression evaluates to T (actually, to anything that is nonNIL), and then evaluates everything else in the clause. Listing 6 is a function like CONS, except that it will add an item to a list only if it is not already a member of the list. The first clause of the COND asks whether the item is already in the list and, if so, returns the list without the item being added. If the item is not on the list, COND will bypass the first clause, going to the second. Since we have made the first element of the second clause T, we have guaranteed that the consequents of this clause will always be executed if the first clause is not successful. In this case, the item not on the list will be added. The two examples in the listing show what happens to the list L when using this function.

LISTING 6.

```
(DEFINEQ UNIQUECONS
  (LAMBDA (ATM LST)
    (COND ((MEMBER ATM LST)
           LST)
          (T (CONS ATM LST))))
)

(SETQ L (QUOTE (A B)))    ;User input
(A B)                     ;LISP response
(UNIQUECONS (QUOTE D) L)  ;User input
(D A B)                   ;LISP response
(UNIQUECONS (QUOTE A) L)  ;User input
(A B)                     ;LISP response
```

Conceivably, a function can be written in only one line, but typically several steps are performed. This requires the use of the function PROG which can have an indefinite number of arguments, each of which is an s-expression. Each argument is evaluated in turn and the last such argument is the value of the function. The first argument of PROG is a list of the variables to be used in the remainder of the arguments; when this function is entered, all such variables are initially given the value NIL. When one of the arguments in PROG is a symbolic atom, it is construed as a label which marks a place in the s-expressions to which a transfer can be made. This is done using the GO function. Listing 7 is a function to compute the factorial of the number N. This function also shows another example of how the COND function can be used. In this example, COND has only one clause; as long as the first expression is not T, the second expression (the function RETURN, used to exit and return a value from the PROG function) will not be evaluated.

LISTING 7.

```
(DEFINEQ FACTORIAL-1
  (LAMBDA (N)
    (PROG (I J)
      (SETQ I N)
      (SETQ J 1)
      (SETQ J 1)
      LOOP
      (COND ((EQ I 0)
```

```
            (RETURN J)))
        (SETQ J (* J I))
        (SETQ I (SUB I 1))
        (GO LOOP)))
)

(FACTORIAL-1 6)          ;User input
720                      ;LISP response
```

The factorial function can also be defined recursively, since LISP is also a recursive language, meaning that essential aspects of the language can be defined in terms of themselves. Thus, an s-expression can be defined as either an atom or as a left parenthesis followed by a sequence of s-expressions separated by blanks and followed by a right parenthesis. To define a function recursively means to use the function as part of the body of the function itself. Such a function is self-referential. Listing 8 is the factorial function written recursively. Note that every use of this function terminates when N equals 0, and returns the number 1, the second expression of the first clause of the COND function.

LISTING 8.

```
(DEFINEQ FACTORIAL-2
  (LAMBDA (N)
    (COND ((EQ N 0)
           1)
          (T (* N (FACTORIAL-2 (SUB N 1)))))))
)

(FACTORIAL-2 6)          ;User input
720                      ;LISP response
```

Functions with Function Arguments

An important capability in LISP is the ability to use functions as arguments of other functions. For example, in developing a parser for analyzing English sentences, one first defines a series of functions known as an interpreter to handle the analysis. These functions in effect constitute an entire new programming language, defined by the user and then used to write the actual parsing programs. In LISP the ability to create such special programming languages arises from functions which can take function arguments. EVAL and QUOTE are two such functions; APPLY (or APPLY* in my system) is another such function.

APPLY takes two arguments, a function name and a list; the list contains the arguments necessary for the given function. APPLY then applies the function to the list and returns the value as if the function had been executed directly with its list of arguments. The significance of this function is that it allows "computed" function calls. At first glance, the value of this function may seem obscure, but it provides an ability to write programs which can write programs and then execute them.

One way APPLY can be used is in what called "mapping functions", with which a function is applied iteratively to a list of arguments. Listing 9 contains a definition of the function MAPCAR, which applies its function argument to the CAR of a list. As can be seen, this function is also written recursively. It builds a list, one element at a time (using the CONS function), starting at the last element. This is done by recursive calls to MAPCAR until its second argument is the empty list (the first clause of the COND function). The function is primed to perform the CONSing operation for each element of the list, but makes sure it has reached the end of the list before it actually begins to form the list which will be the output. The second part of Listing 9 shows an example of this function's use; in this case, the first argument is the function ATOM (which takes a single argument and asks if it is an atom or a list, returning T if it is an atom). The second argument of MAPCAR is the list of elements we wish to test. The value returned by this example is a list showing which elements of the list are atoms and which are not.

LISTING 9.

```
(DEFINEQ MAPCAR
  (LAMBDA (FN X)
    (COND ((EQ X)
           NIL)
          (T (CONS (APPLY* FN (CAR X))
          (MAPCAR FN
                  (CDR X))))))
)

(MAPCAR (QUOTE ATOM) (QUOTE (A B (A B) C (D E))));User i
nput
(T T NIL T NIL)                                  ;LISP r
esponse
```

Pattern Matching

Using the material described thus far, it is now possible to present an example of a very powerful LISP function. Listing 10 contains a function which will determine if a list contains a pattern of a specified form. Despite its apparent simplicity, it can be used in quite imaginative ways to search for patterns in an input stream. I will describe one such way below after I have explained the function and one example of its use.

LISTING 10.

```
(DEFINEQ MATCH
  (LAMBDA (P D)
    (COND ((AND (EQ P)
                (EQ D))
           T)
          ((OR (EQ P)
               (EQ D))
           NIL)
          ((OR (EQ (CAR P) (QUOTE ))))
               (EQ (CAR P) (CAR D)))
           (MATCH (CDR P) (CDR D)))
```

```
          ((AND (EQ (ATOMCAR (CAR P)) (QUOTE ,)))
              (MATCH (CDR P) (CDR D)))
           (SET (ATOMCDR (CAR P)) (CAR D)) T)
          ((EQ (CAR P) (QUOTE +))
           (COND ((MATCH (CDR P) (CDR D))
                  T)
                 (T (MATCH P (CDR D)))))
          ((EQ (ATOMCAR (CAR P)) (QUOTE +))
           (COND ((MATCH (CDR P) (CDR D))
                  (SET (ATOMCDR (CAR P)) (LIST (CAR D)))
T)
                 ((MATCH P (CDR D))
                  (SET (ATOMCDR (CAR P)) (CONS (CAR D) (E
VAL (ATOMCDR (CAR P)))))
 T)))))
)
```

The arguments of the function, P and D, are both generally assumed to be lists, the first argument defining the pattern we wish to test for and the second argument the input we wish to test. The function consists of one condition, containing several clauses, and returns T if the pattern has been matched and NIL if the pattern has not been matched. The function is written recursively, so that it calls itself many times; the final call returns a value from one of the first two clauses in the condition statement. The expression (EQ P) asks if P is the empty set; if so, its value is T. The test in the first clause asks whether the lists P and D are both empty, i.e., have been exhausted at the same time, thus indicating a successful match, causing T to be returned. If they are not both empty, but one is, the test in the second clause will be T and cause NIL to be returned, since there is not total agreement between the pattern and the input being tested.

There are two tests in the third clause (indicated by the OR), the second of which asks if the first elements of both lists are the same. The fist test asks if the first element of the pattern is the symbol , which is a privileged special atom which can match any atom. In other words, if the pattern has a , it does not matter what the input has; it will always yield a successful match. If either of these two conditions is met, the function says OK for the first two elements and asks if the rest of the two lists match (hence the call (MATCH (CDR P) (CDR D))). The fifth clause of the condition involves another privileged symbol +, which allows the pattern to match an arbitrary number of atoms in the input. It does this as follows: If the first element of the pattern is +, another COND statement is posed, in which one of two tests can be successful in order to return an overall value of T. Either the remainders of P and D match or P matches the remainder of D. The second possibility is kind of tricky. Notice that we keep the list P, which we know begins with the special symbol + (since that was the test that got us into this situation); by keeping the same list, when the call (MATCH P (CDR D)) is made, we will end up at this same test on the next pass through the function. In effect, we have ignored the first element of the input in matching against the pattern. This will be made clearer in the example below.

In the fourth and sixth clauses of the condition, we are again testing for the presence of the special symbols + and , but with a twist. In these cases, we are testing to see if the symbols are actually part of the atoms. For example, we could have the symbol +L as part of the pattern. The function ATOMCAR unpacks the symbol into the list (+L) and returns the + as its CAR. If the test of an atom shows that it has one of these special symbols as its leading character, the remainder of the clause then sets the value of the following atom to the element or elements in the input which matches the special symbols. This allows the unspecified part of the input to be used as the value of a variable, which can be used in any desired manner. The example will demonstrate this.

LISTING 11.

```
(DEFINEQ DOCTOR
  (LAMBDA NIL
    (PROG (L MOTHER S)
      (POKE 128 0)
      (PRINT (QUOTE (SPEAK UP)))
      LOOP
      (SETQ S (READ))
      (COND ((ATOM S)
             (SETQ S (LIST S))))
      (COND ((MATCH (QUOTE (I AM WORRIED +L)) S)
             (PRINT (APPEND (QUOTE (HOW LONG HAVE YOU BE
EN WORRIED)) L)))
            ((MATCH (QUOTE (+ MOTHER +)) S)
             (SETQ MOTHER T) (PRINT (QUOTE (TELL ME MORE
 ABOUT YOUR FAMILY))))
            ((MATCH (QUOTE (+ COMPUTERS +)) S)
             (PRINT (QUOTE (DO MACHINES FRIGHTEN YOU))))
            ((OR (MATCH (QUOTE (NO)) S)
                 (MATCH (QUOTE (YES)) S))
             (PRINT (QUOTE (PLEASE DO NOT BE SO SHORT WI
TH ME))))
            (MOTHER (SETQ MOTHER NIL) (PRINT (QUOTE (EAR
LIER YOU SPOKE OF YOUR MOTHER))))
            (T (PRINT (QUOTE (I AM SORRY OUR TIME IS UP)
)) (RETURN (QUOTE GOODBYE))))
      (GO LOOP)))
)
```

The example using the matching function is shown in Listing 11, which is a much simplified version of the notorious ELIZA program written by Joseph Weizenbaum in the early 1960s. It is notorious because it simulates conversation between a computer and a human that can be very beguiling. It was so beguiling to Dr. Weizenbaum's secretary that she asked him to leave because she felt she was having an intimate conversation with a psychologist. This incident, stemming from a simple program, set him against many of the initiatives of artificial intelligence. (See his book, *Computer Thought and Human Reason.*)

The program in Listing 11 begins by asking the human to initiate the conversation and sets this input to the variable S. The main condition statement of the function DOCTOR then attempts

to match key phrases against the input and then prints output based on the particular match. The second and third clauses of the condition look for instances of the words MOTHER and COMPUTERS, using the privileged symbol + to ignore any of the surrounding input. Not that when MOTHER is found in the input stream, the consequent part of the condition clause sets the atom MOTHER to T, so that if the rest of the conversation becomes repetitive, the response returns to this earlier reference in the fifth clause of the condition. (A value for MOTHER of T will activate the fifth clause.)

The first clause of the condition makes use of the facility to set the value of a variable to part of the input stream. If the input begins with the phrase "I AM WORRIED", one can expect that the following part of the input will begin with the word "about" and then contain the object of the worry. The program is designed to catch this regularity by setting the variable L to the phrase beginning with "about" and using it in responding to the human, thus giving the illusion of intelligence. Finally, the last clause of the condition, having exhausted its repertoire, finishes its conversation. Since any number of clauses may be added to a COND expression, the sample program can be extended to cover a wide range of apparent coversational complexity.

Extensions

The simplicity with which the pattern matching function was written should give some idea of the power of LISP. With such a function alone, it is possible to write simple programs like DOCTOR to accomplish such things as theorem proving, solving algebra word problems, differentiating complex mathematical functions, accessing a data base with a relatively free form input, developing chess playing programs, and examining data (e.g., astronomical data) for patterns. The power in LISP comes from being able to write ever more complex functions in terms of simpler functions, so that the user is operating on a high level with all the details hidden at a very deep level within the machine. In effect, LISP allows one to create a high level language to handle particular problem domains. A user can operate on the problem domain without being concerned with the details.

My particular interest lies in determining the semantic relationships between the different meanings of words, with the hope of eventually incorporating semantic properties in English language parsers. LISP enables me to conceptualize the problems at a higher level. My first problem is to analyze the regularities of dictionary definitions. To do this, I must develop a parser which will handle the peculiarities of dictionary definitions. I can build such a parser by identifying patterns at the lowest level, such as nouns, adjectives, and verbs. By ascertaining the existence of patterns of particular parts of speech, I can build more and more complex parsers which will look for particular types of noun or verb phrases. With a pattern matcher, I can first determine if a particular definition fits an existing pattern, and, if not, hypothesize a new pattern, which I can easily add to the set of patterns for which I test.

When I wish to add a pattern to an existing parser, I have to built program statements which can be inserted into an existing program. Here again, LISP comes with a ready-made capability. A program is nothing more than a list, so to alter the program it is only necessary to alter the list. This is simplified in LISP since a program can be treated as a list. In fact, to print the functions accompanying this article, their definitions were given as arguments to another function which printed them out in a pretty form, so that the plethora of parentheses would not be confusing. (This is know as prettyprinting.)

It is therefore possible in LISP to create a program based on another program. I can use a pattern matching program to look for particular patterns. Using the COND expression, I can then build a list which consists of program-like words. Using the EVAL function, such a list can be transformed into a program and executed. This is the power of LISP. □

Bibliography

LISP, P.H. Winston and B.K.P. Horn, Addison-Wesley Publishing Co., Reading, Mass., 1981.

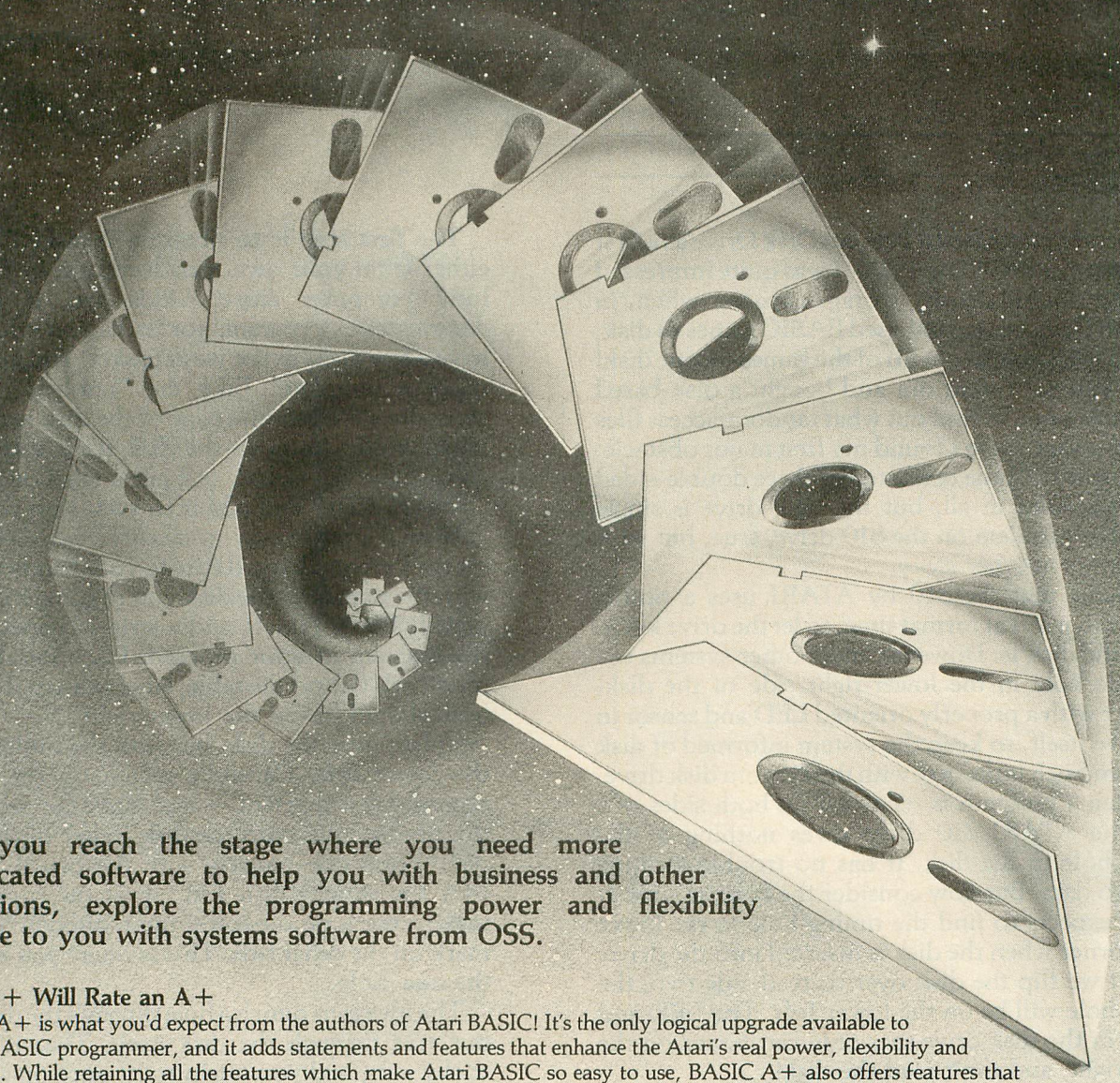
The Programmer's Introduction to LISP, W.D. Maurer, American Elsevier Inc., New York, 1972.

The Little LISPer, D.P. Friedman, Science Research Associates, Inc., 1974.

Inter-LISP for the Atari Computer, Datasoft Inc., Northridge, Cal., 1981.

```
10 REM GRAPHICS 10 GTIA DEMO
20 REM
30 GRAPHICS 10
40 REM CHANGE DATA TO CHANGE COLORS
50 FOR CN=0 TO 7:READ CV:POKE 705+CN,C
V:NEXT CN:DATA 6,12,23,42,53,62,73,84
60 C=0:SETCOLOR 4,C,0
70 FOR X=0 TO 39
80 FOR Y=0 TO 95
90 XW=39-X:YW=95-Y:DIST=INT(SQR(XW*XW+
YW*YW))
100 COLOR 1+8*(DIST/8-INT(DIST/8))
110 PLOT X,Y
120 PLOT 79-X,Y
130 PLOT X,191-Y
140 PLOT 79-X,191-Y
150 NEXT Y
160 NEXT X
170 REM ROTATE COLOR REGISTERS
180 CHOLD=PEEK(705)
190 X=705
200 POKE X,PEEK(X+1)
210 X=X+1:IF X<712 THEN 200
220 POKE 712,CHOLD
230 GOTO 180
```

EXPLORE A NEW DIMENSION IN SOFTWARE



When you reach the stage where you need more sophisticated software to help you with business and other applications, explore the programming power and flexibility available to you with systems software from OSS.

BASIC A+ Will Rate an A+

BASIC A+ is what you'd expect from the authors of Atari BASIC! It's the only logical upgrade available to the Atari BASIC programmer, and it adds statements and features that enhance the Atari's real power, flexibility and ease of use. While retaining all the features which make Atari BASIC so easy to use, BASIC A+ also offers features that place it at the forefront of modern interpretive languages.

BASIC A+ is designed to support any business programmer or Atari user. Its enhancements include structured programming, more powerful input/output, helpful program development and debugging aids, and several business-oriented features, including a very comprehensive PRINT USING command. And, exclusively for the Atari computer, there is an amazing array of PLAYER/MISSILE GRAPHICS commands and functions.

No other BASIC for Atari can match BASIC A+ when it comes to features, compatibility, and ease of use...$80.00

A Strong Software Family

Other major systems software products from OSS include:

MAC/65	the finest and fastest complete 6502 macro assembler/editor package you can buy....$80.00
C/65	the first native mode "small c" compiler for Atari and Apple computers....$80.00
TINY C	for structured programming, an easy-to-use interpreter, a learning tool....$99.95
BUG/65	a powerful, self-relocatable debugger. FREE with MAC/65....$34.95

And More...

OS/A+, the first and finest operating system for BOTH Atari and Apple II computers, is NOW included FREE as a part of every OSS systems software package. OS/A+ features a keyboard-driven, easy-to-use command processor, several simple resident commands, and logical and readable requests for even the most sophisticated utility commands. Versions of OS/A+ for some higher capacity drives are available at extra cost.

NOTE: Unless otherwise noted, all OSS products require 48K and at least one disk drive.

ASK YOUR DEALER, or call or write for our brochure.

OSS Optimized Systems Software, Inc. 10379 Lansdale Avenue • Cupertino • California • 95014 • (408) 446-3099

Using the PERCOM Drive with Double-Sided Disks

by Kevin Lever

I recently purchased a Percom Disk Drive as a first disk drive for my ATARI 800. I was quite impressed with the double density storage capacity when, in transferring my cassette-based BASIC games to disk, I found I was able to put **all** of the games on one disk! So, of course, I went out and bought a disk-based adventure game to find out what random-access files were all about. Here I found my first major obstacle: The adventure game consisted of three double-sided disks, six sides in all, but the disk drive is single sided. No problem on the 810 drive, true, but with Percom it's another story.

It seems that the 810 by ATARI uses a timing sector, recorded at format time, to let the drive know where the disk is. However, most other systems use the little hole in the lower-right side of the disk, together with a properly oriented LED and sensor in the drive itself, to keep the system informed of disk position. Such is the case with the Percom disk drive. So, when a program is recorded on both sides of a disk, the ATARI 810 drive cares nothing of the timing hole in the disk. It has no trouble locating side-two data. But now consider the Percom unit: It always expects to find the timing hole in the lower right corner when the disk is inserted into the drive. Now, if we flip the disk over to read side two, the timing hole will be on the lower **left**. The LED and sensor in the disk drive sees only cardboard on the lower right, and can't read the disk!

An industry-standard drive equipped to read either side of a disk should have **two** sensors, one positioned to read the timing hole at the lower right, and the other located at the lower left. The user flips a toggle switch on the front panel to inform the drive which side of the disk it will be reading. The Percom single-sided drive is not so equipped. So what do we do with commercial software recorded on both sides of a diskette? We make an extra hole in the disk jacket! Now, either way the disk is inserted, the sensor will be able to locate **one** of the timing holes.

The procedure is very simple, but care must be exercised to avoid damaging the diskette or getting fingerprints on the magnetic surface. If this happens, you might as well throw that disk away. *(Not so fast. See Charles Bachand's "Burp" program in Issue No. 9.)* However, if you are careful and methodical, you should have no problems. As a precautionary step, first wash your hands and then find a clean, uncluttered work surface.

The first step is to obtain a "crashed" diskette, either from your own misadventures or from your local computer store. Odds are, if the store demonstrates programs for its customers, they will have a few disks in the wastebasket. You are going to make a template. Take the "crashed" disk and carefully slit open one edge of the disk jacket with a sharp knife. Remove the disk itself and throw it away. Save the jacket, and put a label on it reading "TEMPLATE" and add it to your library.

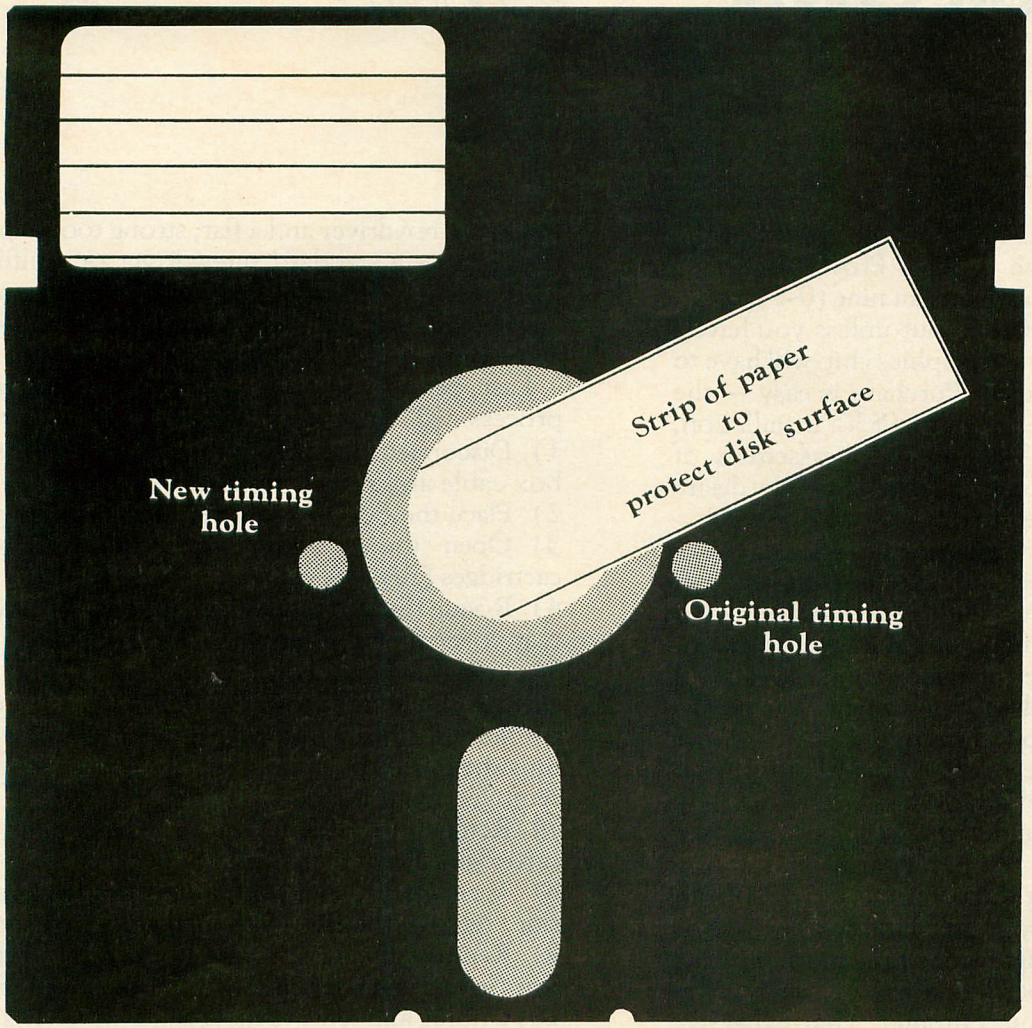
Now it's fairly easy to modify your disks for use on the Percom drive. Retire to your handy work area with the template, the disk you're going to modify, a pencil, a hole punch, and a strip of paper. Refer to the diagram as your proceed. Place the disk to be modified, flat on the table, label side up. The timing hole should be on the lower right. Now place the template over the disk, but with the timing hole on the lower **left**. Carefully match up the edges — accuracy is important — and mark the perimeter of the timing hole onto the disk jacket of the subject disk. Press **very gently** with the pencil. Now flip over the subject disk and repeat the procedure to make a mark on the lower right, directly behind the mark on the other side. This is where you will punch the new hole.

The idea is to punch a hole through the disk jacket, but **not** through the disk itself. That is the only tricky part, and you might try it once on a disk you don't care too much about. You are going to have a insert one part of the hand punch between the disk jacket and the disk itself, once on each side. I recommend slipping a strip of paper inside the disk jacket to protect the disk surface. Again, refer to the diagram. (You might also make sure your punch isn't magnetized!) If you damage the disk surface or warp the disk, it will be ruined, so don't blame me if you fail to heed this warning. Now slip the punch inside the disk jacket and punch a hole where you made the mark. Again, punch the jacket **only**. Repeat the procedure on the other side. You can now read both sides of the disk!

The procedure I have described will enable you to use commercial software which is recorded on two sides of a disk. It will also enable you to use both sides of your own disks. It will almost definitely void the warranty on your commercial software, so check with the retailer and be advised. When writing to both sides of your own disks, remember that side

two was not certified, so you're on your own. I have had no problems at all.

I guess there is some advantage to owning an 810 drive. But for me, the capacity to use double density far outweighs the few minutes it takes to do the modification. Good luck! □



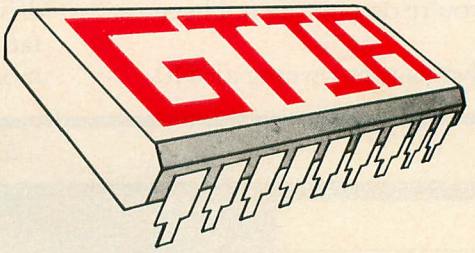
ATARI 810 is a trademark of ATARI, INC.

Percom RFD is a trademark of Percom Data Company, Inc.

ATTENTION PROGRAMMERS!

A.N.A.L.O.G. Computing is interested in programs, articles, and software review submissions dealing with the ATARI 400 and 800 home computers. If you feel that you can write as well as you can program, then submit those articles and reviews that have been floating around in your head, awaiting publication. This is your opportunity to share your knowledge with the growing family of ATARI computer owners. A.N.A.L.O.G.'s rate of pay is comparable to many other computer magazines. All submissions for publication must be typed, upper and lower case with double spacing. Program listings should be provided in printed form, and on cassette or disk. By submitting articles to A.N.A.L.O.G. Computing, authors acknowledge that such materials, upon acceptance for publication, become the exclusive property of A.N.A.L.O.G. If not accepted for publication, the articles and/or programs will remain the property of the author. If submissions are to be returned, please supply a self-addressed, stamped envelope. All submissions of any kind must be accompanied by the author's full address and telephone number. Send programs to: Editor, A.N.A.L.O.G. Computing, P.O. Box 23, Worcester, MA 01603.

INSTALLING YOUR OWN GTIA CHIP



by Richard Herring

By now everyone has heard of the glories of the new GTIA chip for the ATARI. Providing twelve graphics modes (0-11) rather than nine (0-8), it will allow some dramatic effects. But unless you have a fairly new ATARI, the new graphics chip will have to be purchased and installed. Purchase is easy — the chips are now available for $25 to $30. Installation, although not difficult, will require disassembly of your computer. If you have the nerve (and the desire to save a service charge) here's how to do it.

First, let's take an imaginary tour of your 800's innards. They're housed in a two-piece plastic case. Nothing is attached to the case bottom. We'll eventually take everything out of the case top except the keyboard. The case top has a removable ribbed top cover. The cartridge door, which you use to access BASIC, is the front third of this cover. Under the rear portion of the cover is the memory bank (10K ROM & 8 to 48K RAM).

Lying horizontally under the keyboard and the memory board is the mother board. This is the largest circuit board in the computer. It runs from front to back and is about half as wide as the 800's case. Attached to the right side of the mother board is the power supply board, one side of which is the black side panel of your computer. That panel has the on/off switch, power in jack, etc.

The last board in your 800, and the one you'll be plugging the GTIA into in a few minutes, is the personality board. It plugs vertically into the mother board and stands behind the memory board. Among the several chips it holds are three 40 pin chips which appear quite similar. They are the 6502 CPU, in socket A303; Antic, in A302; and CTIA, in A301.

Before you start doing anything inside your computer, make sure you have a good working environment. You need a clean work area at least 5 to 6 times the size of your 800. You should avoid static charges by working in an uncarpeted area, not wearing clothes that create static, not walking around during the installation process and grounding yourself before you begin.

You should read through these steps completely before you begin. Do not handle the pins of chips or the connectors of boards unnecessarily since the oil on your skin does not help make good connections. The only tools you will need are a medium size Phillips screwdriver and a flat, strong tool to pry out the chip — a standard screwdriver or nailfile will work. Make sure that any metal tools you use are not magnetized. You will remove a total of eight 5/8 inch and twelve 3/8 inch Phillips screws.

Last, before you do anything remember that this process will void your warranty.

1) Disconnect the power supply cable, TV switch box cable and peripheral cable.
2) Place the 800 in your cleared working area.
3) Open the cartridge door and remove any cartridges (BASIC, etc.).
4) Rotate the two black clamps, at the left and right rear corners of the cartridge slots, outward.
5) Lift the front edge of the ribbed top cover slightly and slide it toward you. Place it aside.
6) Turn the black clamps in as far as possible. They must be in this position when the circuit boards are removed from the 800 case top.
7) Remove the 10K ROM cartridge and all RAM cartridges. Place them aside.
8) Turn the 800 over and, supporting the keyboard side, remove the five (5/8 inch) recessed screws.
9) Remove the plastic case bottom by lifting the rear first so that the front will clear the joystick jacks.
10) Unplug and remove the speaker which lies under the front left corner of the 800.
11) You see a metal bottom over the mother board. The power supply board is uncovered along the side. Remove the (5/8 inch) screw from the power supply board. The screw lies approximately under the START key.

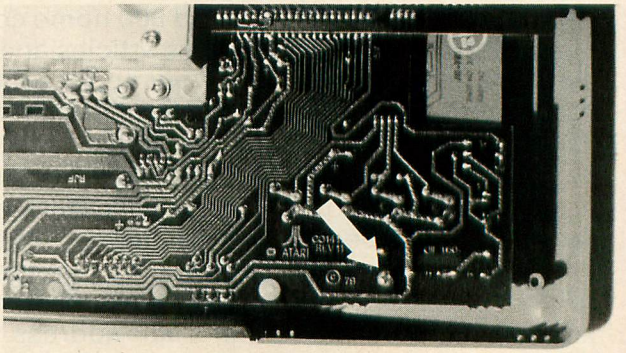


PHOTO 1

12) Remove two (5/8 inch) screws from the outer lip of the metal case — one on the left, one on the right. Do not remove the nine screws which hold the metal bottom yet.

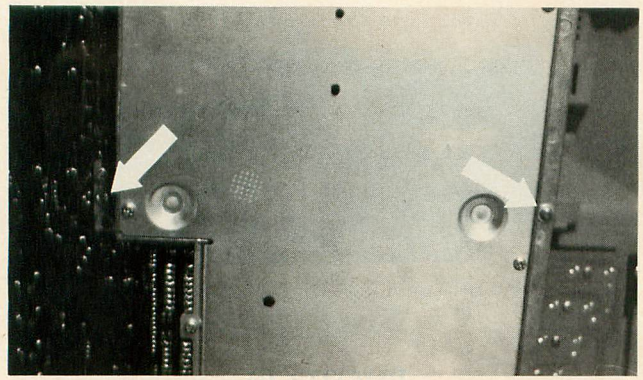


PHOTO 2

13) The 800 should still be upside down. Move it so the keyboard is facing you and 12 inches in from the edge of your table. Slowly lift the metal case (covering the mother board and attached to the power supply board on the left) and flip it over toward you. NOTE the six inch ribbon cable which attaches the mother board to the case top roughly between the second and third joystick controller jacks. Do not bend it. It is stuck in place with padded tape which can pull loose.
14) If the mother board and its metal case will not come out check the 2 black clamps which held the ribbed top cover over the memory bank.
15) Set the metal case down on its bottom cover.
16) Unplug the ribbon cable from the mother board.
17) Place the 800's case top (with the keyboard and ribbon cable) aside.
18) Follow the cable from the TV switch box to the point where it plugs (RCA) into the power supply board. Unplug it from socket J203.

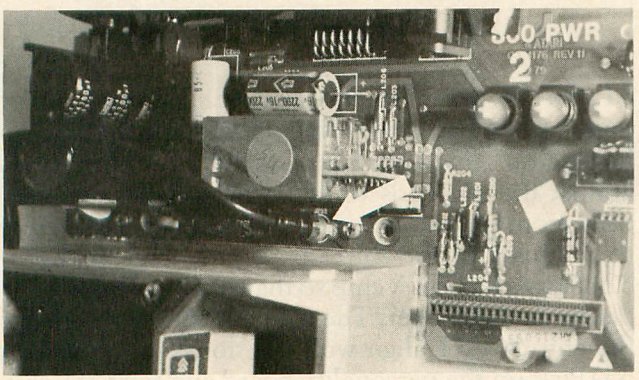


PHOTO 3

19) Unplug the rust colored connector (at J202 on the power supply board) near the fourth joystick jack.

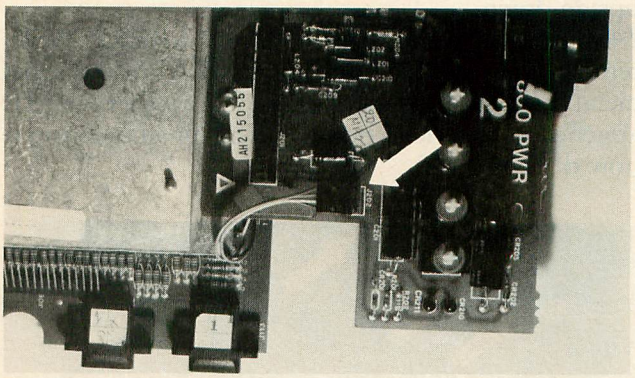


PHOTO 4

20) Supporting the power supply board, remove three (3/8 inch) screws which attach it to the metal case.

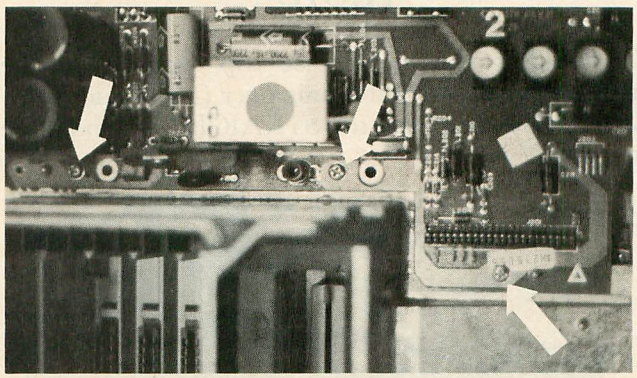


PHOTO 5

21) NOTE the power supply board is still attached to the mother board by a 22 pin connector at socket J201. Find this connection near the fourth joystick jack. Gently and evenly lift the power supply board being careful not to bend any of the pins. Pressure will be needed only at the 22 pin connector.

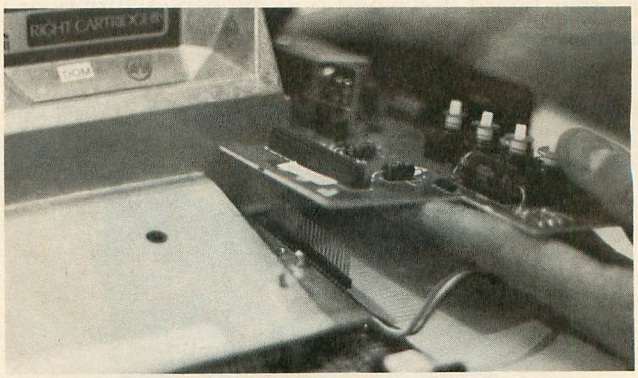


PHOTO 6

22) Place the power supply board aside.
23) Turn the metal case (covering the mother board)

upside down.
24) Supporting the side with the joystick jacks, remove the nine (3/8 inch) screws from the sheet metal bottom of the metal case. The mother board is attached to the metal bottom. The metal case top is now disconnected.

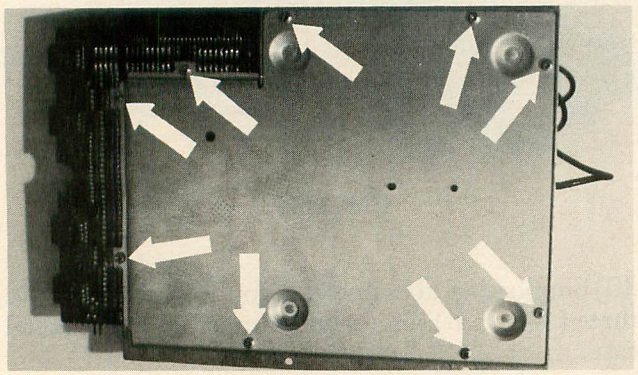


PHOTO 7

25) Holding the metal case top securely to the mother board, turn the unit over (right side up).
26) Lift the metal case top STRAIGHT UP and place it aside.

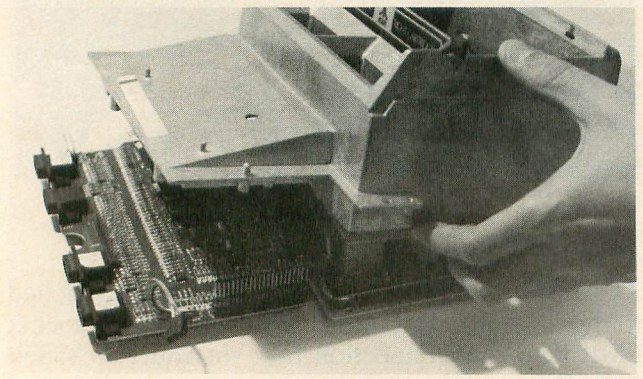


PHOTO 8

27) The personality board is now accessible standing behind the memory board. Carefully, hold the mother board down and pull the personality board straight up and out of its socket.

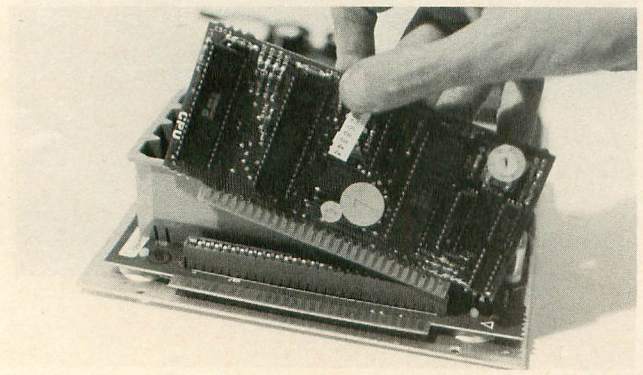


PHOTO 9

28) Lay the personality board flat with the chips up. Locate the CTIA chip in socket A301. It is the middle of the three large chips.

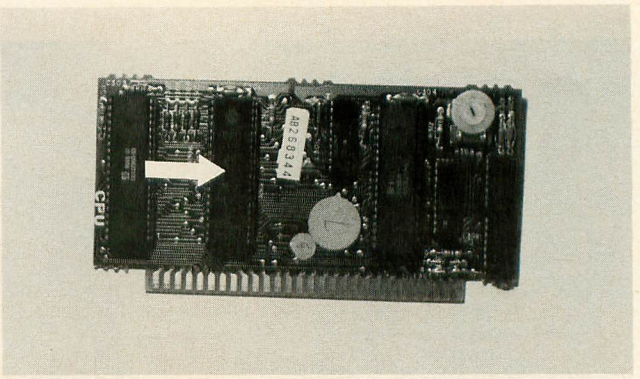


PHOTO 10

29) Carefully remove the CTIA chip. You can pry it from the ends with a strong flat tool — a standard screwdriver or nailfile will work. Alternate prying each and only a little so the chip comes straight out.
30) Note that the lower end of socket A301 (toward the personality board's gold connectors) has a round notch. This notch MUST align with a similar round notch in the end of the GTIA chip when it is installed.

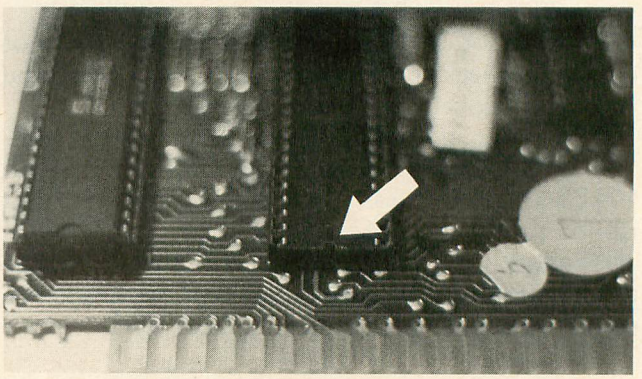


PHOTO 11

31) Set the new chip in its socket. The two rows of pins may be flared too wide. If so, place the chip on its side on a hard surface. Carefully rotate it down against the pin ends to bend them closer together. Seen from the end, the pins should be perpendicular to the body of the chip.
32) Align the GTIA chip so that all pins are correctly placed in the socket. The round notch in the end of the chip MUST align with the notch in the socket.
33) Pick up the personality board and push the chip straight in. You may need a soft clean cloth to put against the bottom of the board to protect it (and your fingers). When the chip is all the way in (it may snap into place!) it MUST be seated as close to its socket as the other chips are to theirs. Compare to make sure the GTIA is fully seated.

34) Plug the personality board back into the mother board. The chips face the rear of the computer (away from the memory bank). You may need to rock it slightly from end to end to make sure it is in all the way.

(SEE PHOTO 9)

35) Place the metal case top back over the personality board and on the mother board.

(SEE PHOTO 8)

36) Holding the mother board and its metal case top securely together, turn them upside down.
37) Supporting the side with the joystick jacks, reinstall the nine (3/8 inch) screws.

(SEE PHOTO 7)

38) Turn the mother board over (right side up).
39) Reposition the power supply board. Note the two alignment pins on the lip of the metal cover. Making sure all pins on the 22 pin connector at socket J201 are aligned, push it gently, evenly back together.

(SEE PHOTO 6)

40) Reinstall three (3/8 inch) screws which hold the power supply board to the lip of the metal case. There are two holes toward the back of the board. Do not put a screw in the rear hole.

(SEE PHOTO 5)

41) Replug the RCA plug (from the TV switch box cable) to the power supply board at socket J203.

(SEE PHOTO 3)

42) Replug the rust colored connector at socket J202 (near the fourth joystick jack). The red wire goes toward the joystick jack, the orange wire toward the rear of the 800.

(SEE PHOTO 4)

43) Position the mother board right-side up, with the joystick jacks away from you. Position the plastic computer case top upside down, with the keyboard side near the joystick jacks.
44) Making sure all pins are aligned, replug the ribbon cable.
45) Make sure the two black clamps which hold the ribbed top cover are turned in as far as possible (locked position).
46) Turn the mother board assembly over into the plastic case top. Be careful not to damage the ribbon cable and to align the contact switches in the four yellow keys (START to RESET).
47) Reinstall the (5/8 inch) screw which holds the power supply board to the top of the 800's case just below the START switch.

(SEE PHOTO 1)

48) Reinstall two (5/8 inch) screws which hold the lip of the metal case to the 800's plastic case top. These screws go on the right and left side holes nearest the center. The rear holes are for the screws in the plastic case bottom.

(SEE PHOTO 2)

49) Replace the speaker in its hole and plug it in. The number on the plug goes toward the 800's bottom.
50) Replace the plastic case bottom. Align the front first so the joystick jacks fit in their slots. Watch, as you lower the rear of the case bottom, that the speaker remains positioned properly. When the case bottom is in position, check that the TV switch box wires goes through the hole in the rear of the case.
51) Supporting the front (keyboard) side, replace five (5/8 inch) screws into the plastic case bottom.
52) Turn your 800 right-side up and reinsert the 10K ROM cartridge and 8K or 16K RAM cartridges. (If your boards do not have covers, be sure the chips face the rear of the computer.)
53) Turn the black clamps out and replace the ribbed top cover. Turn the clamps in to lock the cover in place.
54) Reinstall BASIC (or other cartridge) and close the cartridge door.
55) Reconnect the cable to the TV switch box, the power cable and the peripheral cable.

You are now ready to try graphics modes 9, 10 and 11. If you have any trouble, check first that all external connections are good, that the channel 2-3 switch is correctly set and that your television is properly tuned. If you still have problems, check that ROM and RAM cartridges are properly seated. If all else fails, walk through the installation process again to make sure that all internal connections are good and that the GTIA chip is properly seated.

Although the GTIA is downward compatible (all software designed for the CTIA will still run) you may have a few nice surprises. Check the new gold color of the mazes in Jawbreaker or Mouskattack for examples. □

If you are unable to obtain a GTIA chip from your local dealer or repair shop, you may order them directly from A.N.A.L.O.G. at $25.00 each. To order send check or money order to:

GTIA
P.O. Box 23
Worcester, MA 01603

SCOTT ADAMS' ADVENTURES 1-12

Adventure International
A Division of Scott Adams, Inc.
Box 3435
Longwood, FL 32750
24K Tape $19.95

by Brad Griffin

The twelve original Scott Adams' Adventures are a collection of superb and entertaining text adventures. The style of writing is the same throughout, filled with clever puns and exceptional puzzles. With the change in scenarios, each adventure maintains its uniqueness, much like a collection of Jack London stories. Though the difficulty varies, the quality is always high. If one enjoys any of the adventures, the others will not be a disappointment. Each of the twelve adventures will be briefly reviewed.

#1 ADVENTURELAND

A journey through a strange land filled with dangers, ranging from a fire-breathing dragon to deadly chiggers. Deadly chiggers? There is a way to avoid the peril of infection from their bites, but can you find it in time? Clues abound in this adventure that challenges you to find thirteen *TREASURES* and store them in the correct location. Considered a moderate level adventure in difficulty, fitting the pieces of this puzzle together will not be accomplished overnight. The game-save feature (as with the other eleven) comes in handy when you are just about to try a potentially dangerous move. After several hours of trial and error, you begin to think like Scott Adams, — perversely. You find your way into an elaborate maze and, without too much difficulty, discover the treasures that it hides. You seem to be catching on to this game fairly easily. Then, (uh-oh), you cannot get out of the maze! You should have saved the game before you entered it. No wonder it seemed so easy; it was a trap. You will be much more careful the next time. Come on ADVENTURELAND, this time the challenge will be met.

#2 PIRATE ADVENTURE

The easiest of the twelve adventures, this is an ideal introduction to the text adventure. The liberal use of hints enables the first time adventurer to proceed without too much frustration. By the end, you are ready for greater challenges. If you are stoic, or masochistic, the hints need not be requested. Starting in a London flat, a magic excursion takes you to far away places in search of Long John Silver's treasures. There are no mazes, but danger exists just ahead. Alligators, deadly mamba snakes, a mongoose, and a parrot are but a few of the obstacles that block your way. "Aye matey. Ye must use your 'ead if me treasures Ye 'opes to find. Yo-Ho-Ho and a bot'le of..."

#3 MISSION IMPOSSIBLE

"Good morning Mr. Phelps. Your mission (should you decide to accept it) is to prevent this automated nuclear reactor from being destroyed by a saboteur's TIME BOMB!" Attention all honorary IMF members. This adventure is for you. There are no tricks involved here; no magic either. Just a clear head and a keen eye are required to solve this one. Everything you need is in a manila envelope. Or is it? A strong heart is mandatory as the tension mounts. With each move, the reactor comes one step closer to oblivion. Unlike many of the other adventures, the solution here is arrived at using logic and common sense. Sounds simple, huh? Click... Did you just push the wrong button?

#4 VOODOO CASTLE

Written by Alexis Adams, this adventure is eerily authentic. Count Cristo has been cursed. You must remove the curse and foil the worshippers of the dead. West African artifacts and modern-day laboratory chemicals paradoxically weave their magic in your attempt to reverse the spell. No mazes here, but magic is everywhere to help and to hinder your undertaking. A medium named Maegen may be helpful. Maegen? Maegen Adams? Written by Alexis Adams? For Scott Adams? Is this the Adams Family? No, it couldn't be. That was Addams. Walking through this castle with its dusty corners, mysteriously slamming windows, and animal heads makes you wonder if it is not more than a coincidence. Be careful, doors may close behind you and you will have a devilish time getting free. "Double, bubble...Toil and Trouble..."

#5 THE COUNT

You awaken in a strange bed. There is a heaviness in the air. Exploring the adjacent rooms, you find a watch (keep close track of the time), a clove of garlic (Huh?), Nodoz pills, ...what is all this? A coat of arms...a closer look...it is the family crest of Dracula! A surly mob outside makes you soon realize that you must destroy the evil Count Dracula. Where is he? Further searching reveals a bathroom... go ahead (tsk,tsk). Talk about your realism (excuse me for a minute). Yawn. Tired? Take a nap; you will feel much better. Hmmmm. Didn't sleep that well? You sure look pale, and what are those marks on your neck, as if I didn't know. Time is of the essence (so is the garlic). Find the vampire and destroy him, but you do not have all day...or night. Better play this adventure during the daylight hours, if you are the nervous type. You cannot afford to bat an eye, or is that supposed to be "eye a bat?"

#6 STRANGE ODYSSEY

This outer space adventure places you at the outer

edge of the galaxy. Your goal is to gather a fantastic collection of treasures and return to Earth. SF nuts will thoroughly enjoy the challenge. Just getting out of the space ship is quite an undertaking, and that is only the beginning of an exciting expedition; an expedition that takes you through a Jovian mining colony to an intergalactic zoo with bizarre inhabitants. The hazards of a methane snow storm may not deter you, but do not get too close to the centurion slime trees. Persistence is rewarded in this adventure. Clever solutions again, but with the proper mindset, you will solve this puzzle in just a few hours. However, hours at the edge of the galaxy may really be days here on Earth. Blast off!!

#7 MYSTERY FUN HOUSE

The idea of being trapped in a fun house is usually not terrifying, but it is here. First, you have to get in, and you have no money. Do not give up; you will find some. This adventure does not match the others in excitement or challenge. Mazes, the time factor, and buttons to be pushed are much the same. If this were one's first encounter with these adventures, it might be interesting. It offers the typical dilemmas expected, and the solutions are predictable. The best reason to play MYSTERY FUN HOUSE is to complete the set. Even Jack London slipped once in a while.

#8 PYRAMID OF DOOM

Lost in the desert, you see a pyramid. Entry is forbidden, and a curse will fall upon you if you defile the ancient resting place of the pharoahs. A collection of *TREASURES* await you within the stone edifice. Discovering the location of all of them is quite difficult. The obstacles preventing you from reaching your final goal are formidable. Several hours (to days) will be necessary to find them all. While you are away from the adventure physically, your mind will constantly return, trying to figure out how to get past the Giant Oyster, or how to dispose of the dreaded Purple Worm. PYRAMID OF DOOM is one of the best text adventures written. The combination of easily-found treasures and seemingly impossible clues to others gives it a mixture that keeps the adventurer coming back until it is finished. Some magic is involved, but no mazes here. It must be magic if one dies of dengue fever without being bitten by the mosquito, *Aedes aegypti*, which transmits this viral disease. Well, other than that, it is very realistic and entertaining.

#9 GHOST TOWN

The search for thirteen treasures in a deserted ghost town is going to be a long one. The most clever of all the Scott Adams' Adventures, GHOST TOWN requires all of your brain power to solve. One may go for days without progress (it often helps to put it away for a time, in order to let new thoughts ferment). How long has it been since you used Morse Code? Do you have an old Boy Scout Handbook close by? Finally, you can get that (expletive deleted) Purple Worm. Remember the way to make gunpowder (a noble gesture)? A special bonus scoring system is offered as a part of this adventure, but it is really of little consequence to the true adventurer. Completion of this adventure is satisfying enough. "Smile when ya' say that, pardn'r."

#10 & 11 SAVAGE ISLAND — PART I & II

A challenge for the expert adventurer, this two-part adventure offers everything you could hope to find in this or any other world. This surrealistic journey begins on a small island and takes you to undreamed-of places in search of a secret. You must survive Hurricane Alexis, volcanoes, a Tyrannosaurus, and many, many more dangers, just to discover the password enabling you to play PART II. You must be ready for anything as your journey continues. If you are not ready for anything as your journey continues. If you are not ready, your soul will never rest easy. Mazes, dangers, and puns are all here in a mammoth adventure that will not be finished without investing a great deal of time. It is well worthwhile. Where else can you be a part of psychotransfiguration?

#12 GOLDEN VOYAGE

The final adventure in the series has you searching for the secret to make an aging king young. You only have three days to accomplish your mission, and you must learn how to sail a ship to the correct location. Though a bit of a letdown after SAVAGE ISLAND, all the elements of a good adventure are present. If you have completed the other eleven adventures, this one is not too difficult. A word of warning: keep your eye on the Cyclops. He has his on you! □

Fill 'Er Up

16K cassette 24K disk

by Tom Hudson

When looking over the reader survey cards sent in from **A.N.A.L.O.G. #9**, one quickly notices a common request: more assembly-language game programs. In an effort to satisfy those avid video-gamers out there, I have written "Fill 'Er Up," a public-domain assembly-language game.

PROGRAM LISTINGS

This article contains two program listings. Listing #1 is a BASIC program which, when run, will build the machine-language game in memory and execute it. Listing #2 is the assembly-language source code for "Fill 'Er Up!," for those who are interested in assembly-language programming.

To play the game, type listing #1 into your computer. I realize that those DATA statements aren't fun to type in, but they are a necessary evil. This game differs from previous **A.N.A.L.O.G.** games in that this data is listed in hexadecimal (base 16). If I had listed it in decimal, "Fill 'Er Up!" would have required 24K memory on cassette. If you want to play the game, you have to pay the piper...

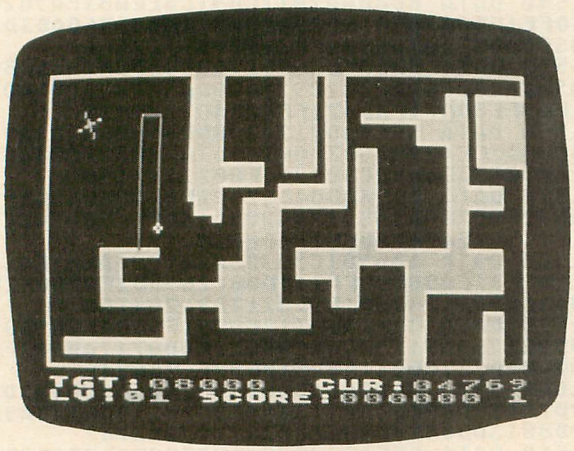
After typing the BASIC program into your computer, SAVE it. When the program is RUN, it will transfer control to the "Fill 'Er Up!" machine code, which will wipe out the BASIC program. If this happens, you'll have to re-type the BASIC program. The program will warn you before it blows itself away.

After SAVEing the BASIC program, RUN it. The program will READ the data and check it to make sure it was typed in correctly. Two types of error messages may be displayed. A BAD DATA error means that the line indicated was mistyped. A MISSING LINE message indicates that you left a line out completely. It takes roughly 2 minutes for the program to check the DATA.

If the program is typed in correctly, it will warn you to SAVE it before it starts the game. Type "YES" to this message to continue.

GAME DESCRIPTION

You have been assigned to build a series of water reservoirs in uncharted territory. Unfortunately, an electrified starfish (don't boggle; read on) is patrolling the area. Using your joystick, you must maneuver yourself around on the screen, building walls to hold the water, while avoiding the starfish.



You start out on the white border surrounding the planned reservoir area. You may move around on these white walls by moving your joystick in the desired direction. You can build a reservoir wall by moving into the black "uncharted" area while pressing your joystick button. The walls you make can be any length, and must be terminated at a white wall. When you finish a wall by hitting a white wall, the area you have enclosed will fill with water. Do NOT run into the wall you are building or you will be destroyed. If the starfish hits you or any part of the wall you are building before you complete it, you will be destroyed. On levels 1,2,4,7,12 and 13 you wil be safe from attack when standing on a white wall, but on other levels the starfish can destroy you on contact at any time!

At the bottom of the screen are several information displays. "TGT" indicates the TARGET area you must fill with water before you complete the level. "CUR" indicates the CURRENT area you have filled. Once CUR reaches TGT, you have completed the level and are awarded points. SCORE indicates the number of points you have gained. At the end of each level, the computer will give you 2 points for each unit over the target you have filled. If the TARGET amount is 8000 and you fill 9000 units, you receive 2000 points. "Fill 'Er Up" may be paused at any time by pressing the space bar.

This game contains 16 levels of difficulty. The level number is shown in the lower left corner of the screen.

You have 3 lives, shown in the lower right corner of the screen. Good luck! □

```
1 REM *** FILL 'ER UP! ***
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
20 DIM PROG$(3240),DAT$(91),HEX(22):FO
R X=0 TO 22:READ N:HEX(X)=N:NEXT X:LIN
E=990:PNTR=1:TRAP 60
25 LINE=LINE+10:? "LINE:";LINE:READ DA
T$:IF LEN(DAT$)<>90 THEN 110
28 DATLIN=PEEK(183)+PEEK(184)*256:IF D
ATLIN<>LINE THEN ? "LINE ";LINE;" MISS
ING!":END
30 FOR X=1 TO 89 STEP 2:D1=ASC(DAT$(X,
X))-48:D2=ASC(DAT$(X+1,X+1))-48:BYTE=H
EX(D1)*16+HEX(D2)
40 PROG$(PNTR)=CHR$(BYTE):PNTR=PNTR+1:
TOTAL=TOTAL+BYTE:NEXT X:READ CHKSUM:IF
 TOTAL=CHKSUM THEN 25
50 GOTO 110
60 IF PEEK(195)<>6 THEN 110
70 ? "{CLR}WARNING: MAKE SURE PROGRAM IS S
AVED!":? :? "READY TO RUN FILL 'ER UP"
;:DIM YN$(3):INPUT YN$
80 IF YN$="YES" THEN A=USR(ADR(PROG$),
ADR(PROG$)):END
90 END
110 ? "BAD DATA: LINE ";LINE:END
1000 DATA 686885816885804900858249148
83A000B1809182A5801869018580A581690085
81A5821869018582A5836900,4894
1010 DATA 8583C920D0DEA582C989D0D82065
E4A9118D6F02A9018D2C208D442020E614A940
8DE71FA9808DE81FA9D0A204,10469
1020 DATA 9D241F9D2F1FCA10F7A2059D401F
CA10FAA9008D442085D48D46208D1ED08D2F02
8D0ED48DA81F8D08D2A2059D,15237
1030 DATA 9D1FCA10FA8DA61FA9038DAC1F09
908D471FA90A8DC402A9248DC502A9948DC602
A9C48DC702A9008DC802A976,20370
1040 DATA 8DC302A9348DC002A9BB8D3002A9
1E8D3102A0BEA21DA906205CE4A9108D07D4A9
2E8D2F02A9038D1DD0A9408D,25144
1050 DATA 0ED44C4D15A900A27F9D80119D00
129D80129D00139D8013CAD0EE60A5CE0A85CB
A90085CC06CB26CC06CBA5CB,30257
1060 DATA 85CF26CCA5CC85D006CB26CC06CB
26CCA5CB1865CF85CBA5CC65D085CCA9001865
CB85CBA93065CC85CCA5CD29,36605
1070 DATA 03AAA5CD4A4A1865CB85CBA5CC69
0085CC60A20086CDA20086CE20FD14A6CEA900
A02791CB8810FBE8E056D0EB,42651
1080 DATA A9038D2620AE2620BD122085CDBD
162085CEBD1A208D2720BD1E208D2820BD2220
8D292020FD14BDFE1FA00011,46785
1090 DATA CB91CBA5CD186D272085CDA5CE18
6D282085CECE2920D0DFCE262010BBA9508505
A95485D6ADA61F1869018DA9,52357
1100 DATA 1FA9008DA41F8DA51F8DAA1FA9FF
8DA31F20E719AD7A2009908D371FAD79200990
8D381FAEA61FBD5C1F8DA91F,57057
1110 DATA BD6C1F8DAA1FBD7C1F8DFD1FA904
8DA31F20E719A9008D2C20AA9D89209D8921CA
D0F78D50208D4F20ADA71FD0,62242
1120 DATA FBA9FD8D00D2A9FE8D02D2A9FF8D
04D2A9A38D01D28D03D28D05D2A900854DA5D4
F022AEA61FBD8C1FD017A5D5,68585
1130 DATA 85CDA5D685CE20FD14A000BD0A20
31CBDDFE1FF0034C7118A5D2F0064C3A1A4C18
16A90485D2AD78028D4820AA,73680
1140 DATA BD5120187D512085D7BD6120187D
612085D805D7F0DCA5D51865D78D2D20C99FB0
D085CD38FD51208D2A20A5D6,79251
1150 DATA 1865D88D2E20C95580BB85CE38FD
61208D2B2020FD14A000BD0A2031CB8D4D208E
4E20AD2A2085CDAD2B2085CE,84075
1160 DATA 20FD14A000BD0A2031CB48AD8402
D00668D01E4C041768DDFE1FD015AD4D20AE4E
20DDFE1FD00AAD2D2085D5AD,88959
1170 DATA 2E2085D64C1816AD4F20D0278D50
20AD48208D8920A9018D4F208DA81FA5D58D2F
208D31208D3320A5D68D3020,93283
1180 DATA 8D32208D3420AD4D20AE4E20DD02
20D0034C7118AE5020AD4820DD8920F00CEE50
20E89D8920A9009D8921FE89,97976
1190 DATA 21A9038D2920A5D585CDA5D685CE
20FD14A000B1CB3D0E201D022091CBCE2920F0
19AC5020BE8920BD51201865,102806
1200 DATA CD85CDBD61201865CE85CE4C6517
A5CD85D5CD33209006BD33204CA917CD3120B0
038D3120A5CE85D6CD342090,108021
```

```
1210 DATA 068D34204CC017CD3220B0038D32
20AE4E20AD4D20DDFE1FF0034C1816A9008D4F
2020AC1AADA41F8DA91FADA5,112367
1220 DATA 1F8DAA1FA90F8DA31F20E719A901
8D4920205019AEA61FADA41F38FD5C1F8DA91F
ADA51FFD6C1F8DAA1F10034C,116810
1230 DATA 0316ADA61FC90FF003EEA61F0EA9
1F2EAA1FA9FF8DA31F20E719A205A000B97920
187D9D1FC90A300C38E90A9D,121336
1240 DATA 9D1FFE9C1F4C43189D9D1FC8CA10
E2A205BD9D1F09109D401FCA10F5A9018D4420
8D2C2020E614A9408DE71FA9,126120
1250 DATA 808DE81FA9008D44204C4D15A900
8D01D28D03D28D05D2A9018D4620A90F8D4720
A90585D3AD47208D01D2AD0A,130637
1260 DATA D2291F8D00D2AD0AD229F00D4720
8DC5028DC302A5D3D0E0CE47201 0D7CEAC1FAD
AC1F09908D471FC990D025A9,136026
1270 DATA 488D181FA91F8D191FAD1FD02901
D0F9AD1FD02901F0F9A9208D181FA91F8D191F
4C3914A9018D2C20AD0AD229,140313
1280 DATA FEC99FB0F785CDAD0AD2297EC955
B0F785CE20FD14A000BD0A2031CBDDFE1FD0DB
20E614A5CD85D5A5CE85D6A9,147062
1290 DATA 008D4920ADA81FF01C205019AD2F
2085CDAD302085CE20FD14A000BD0E2031CB1D
FE1F91CBA9248DC502A9008D,151736
1300 DATA 46208D1ED085D44C0316AD2F208D
3520AD30208D3620A9008D3720AE3720BD8920
8D4A20BD89218D4B20A9018D,155802
1310 DATA 3820A9038D4C20AD352085CDAD36
2085CE20FD14A000AD4920D010BD0E2031CB91
CB4CA819A9008D4F2060BD0E,160296
1320 DATA 2031CB1DFE1F91CBCE4C20F01AAE
4A20AD3520187D51208D3520AD3620187D6120
8D36204C7A19EE3820AD3820,164422
1330 DATA CD4B20F002B0034C7519EE3720AD
3720CD5020F002B0B44C6119A204A9009D7920
CA10FAA204ADAA1FDD7F20F0,169344
1340 DATA 04B0109008ADA91FDD8420B006CA
10E94C261AADA91F38FD84208DA91FADAA1FFD
7F208DAA1FFE79204CF319A2,174451
1350 DATA 04ACA31F300CBD792009D099201F
C8CA10F460A5D1F0034C1816ADFD1F85D1ADE7
1F38E90D8DEA1FADE81F38E9,179820
1360 DATA 2C8DE91FAD0AD2C9F09008AD0AD2
29074C6A1AADEC1FAA8DEB1FADE91F187DED1F
85CDADEA1F187DF51F85CE20,185347
1370 DATA FD14A000BD0A2031CBF007A90F8D
4120D0CCA5CD18692C8DE81FA5CE18690D8DE7
1FADEB1F8DEC1F4C1816A901,190346
1380 DATA 8D4420A9008D4020ADE81F38E92C
8D3920ADE71F38E90D8D3A20AE4020AD392018
7D71208D392085CDAD3A2018,194641
1390 DATA 7D75208D3A2085CE20FD14A000B1
CB3D0A20DDFE1FF00DDD0220D0D1A9008D3F20
4C271BAD40208D3F2020061C,198982
1400 DATA 20B01BDDFE1FD00620E71B4CFF1A
DD0220D00620E71B4C6D1B20FA1B4C081BA900
8D43202006 1C20B01BDD0220,202940
1410 DATA D00620E71B4C271BAD4320186901
8D4320C903F00620FA1B4C2F1BAD40208D3F20
20061C20B01BDDFE1FD00620,206695
1420 DATA E71B4CFF1A20FA1B4C591B20121C
A9008D432020B01BDDFE1FD00620E71B4C6D1B
AD4320186901 8D4320C904F0,210842
1430 DATA 0620FA1B4C751B20CB1BDD0220D0
0920521CA9008D44206020FA1B20B01B4C991B
AE3F20AD3920187D71208D3B,214584
1440 DATA 2085CDAD3A20187D75208D3C2085
CEA5CDC99FB011A5CEC955B00B20FD14A000B1
CB3D0A2060A900A20060AD3F,219561
1450 DATA 208D4020AD3B208D3920AD3C208D
3A2060AD3F2018690129038D3F2060AD3F2038
E90129038D3F2060AD392085,223019
1460 DATA CDCD332090068D33204C2A1CCD31
20B0038D3120AD3A2085CECD342090068D3420
4C421CCD3220B0038D322020,226876
1470 DATA FD14A000BD0E2031CB1D022091CB
60A9008D03D28D05D2AD342038ED32208D4220
AD312038E9018D31208D3D20,231053
1480 DATA AD32208D3E2038E9018D3220AD33
201869018D3320AD342018690 18D3420A9008D
AB1FA9008D452020081DC902,234473
1490 DATA D0F9EE452020081DC902F0F62901
D0E6AD4520C901F005209C1DF0DAAD3D2085CD
AD3E2085CE20FD14A000B1CB,239958
1500 DATA 1D062091CBEEAB1F20081DC900F0
E02901D0B6A9018D4520208 1DC900F00A2901
D0A6EE45204CE21CAD4520C9,244471
1510 DATA 01D0034C931C209C1DDD0A20F0B4
4C931CAD3D201869018D3D20CD3320D050ADA4
1F186DAB1F8DA41FADA51F69,248804
1520 DATA 008DA51FA9008DAB1FAD31208D3D
20A9008D4520A9868D01D2AD42208D00D2F003
CE4220AD3E201869018D3E20,253008
1530 DATA CD3420F00DAD3D20CD3120D00868
684C931C686860AD3D2085CDAD3E2085CE20FD
14A000BD0A2031CBDD0220D0,257702
1540 DATA 0DBD0A2011CB91CBEEAB1FA90260
DDFE1FD003A90160C900D00160A90360AD3D20
85CDAD3E2038E901CD3220F0,262666
1550 DATA 0D85CE20FD14A000BD0A2031CB60
A900A20060ADFC02C921D00DA9FF8DFC02ADA7
1F49FF8DA71FADA71FF0034C,267918
1560 DATA 5FE4AD4120300D09A08D07D2A980
8D06D2CE4120A5D3F002C6D3AD4420F0034C5F
E4A90085D4AD0CD02908F002,273196
1570 DATA E6D4AD04D02902F002E6D48D1ED0
A5D2F002C6D2A5D1F002C6D1ADE51FF006CEE5
1F4C3E1EA9018DE51FADE61F,279495
1580 DATA 186901C907D002A9008DE61FACE6
1FAEE71FA9009DFF119D0812B9AD1F9D0012B9
B41F9D0112B9BB1F9D0212B9,284165
1590 DATA C21F9D0312B9C91F9D0412B9D01F
9D0512B9D71F9D0612B9DE1F9D0712ADE81F8D
00D0AD2C20D031A5D518692F,288845
1600 DATA 8D03D0A5D6186910AAA9009D7D13
9D7E139D82139D8313A9409D7F139D8113A9A0
9D8013AD4620D003EEC3024C,293747
1610 DATA 5FE47070704D00300D0D0D0D0D0D
0D0D0D0D0D0D0D0D0D0D0D0D0D0D0D0D0D0D0D
0D0D0D0D0D0D0D0D0D0D0D0D0D,295012
1620 DATA 0D0D0D0D0D0D0D0D0D0D0D0D0D0D
0D0D0D0D0D0D0D0D0D0D0D0D0D0D0D0D0D0D0D
0D0D0D0D0D0D0D0D0D0D0D0D0D,295597
1630 DATA 0D0D0D2046201F46341F41BB1E34
27341A0000000000000002335321A0000000000
2C361A000000033232F32251A,296939
1640 DATA 00000000000000000000000000027
212D2500002F362532000000000004010E028F8
D41004F8E0D4E044A870D41F,299604
1650 DATA 272E232A3027292A2E302E2F2F30
30404040303030202020202010101010100000
0100010100010101010000001,300310
1660 DATA 0101000000000000000000000000
0000000008140201008040242432010080 4C2
2424131008C82418181C1FF8,301660
1670 DATA 3818181838F81F1C182424C80810
132442C2040810204381020408102040000000
0000000000010100FFFFFF00,303935
1680 DATA 0100010100001FFFFFF0440100401
80200802C0300C03C0300C033FCFF3FC009E9E
0000005454 0100FF00000100,306979
1690 DATA FF9F559F55000000000000000000
0000000000000000000000000000000000000000
0000000000000000000000000,307722
1700 DATA 00000000000000000000001000000
FF0000000000000000000000000000000000001
FF000001 00FFFF0001000000,308746
1710 DATA 0000000000000003270 10A64E810
0000000000000000000000000000000000000000
0000000000000000000000000,309147
```

•

(see D:CHECK 2, p. 26)

```
1 DATA 23,955,92,427,745,192,706,445,4
96,94,229,259,150,587,331,5731
1020 DATA 494,554,427,296,789,628,347,
594,792,797,637,422,363,402,567,8109
1170 DATA 290,309,133,133,331,611,509,
408,221,397,339,747,344,149,294,5215
1320 DATA 85,256,474,378,896,521,202,2
95,122,168,204,58,362,981,960,5962
1470 DATA 938,873,363,75,335,219,140,2
99,489,89,576,361,363,130,289,5539
1620 DATA 463,372,423,86,20,366,693,89
3,961,810,5087
```

•

Assembly Listing

```
;
;FILL 'ER UP!
;
;BY TOM HUDSON
;A.N.A.L.O.G. COMPUTING #10
;

;
;ALPHABETIC CONSTANTS
;
CA      =   'A'-$20
CB      =   'B'-$20
CC      =   'C'-$20
CD      =   'D'-$20
CE      =   'E'-$20
CF      =   'F'-$20
CG      =   'G'-$20
CH      =   'H'-$20
CI      =   'I'-$20
CJ      =   'J'-$20
CK      =   'K'-$20
CL      =   'L'-$20
CM      =   'M'-$20
CN      =   'N'-$20
CO      =   'O'-$20
CP      =   'P'-$20
CQ      =   'Q'-$20
CR      =   'R'-$20
CS      =   'S'-$20
CT      =   'T'-$20
CU      =   'U'-$20
CV      =   'V'-$20
CW      =   'W'-$20
CX      =   'X'-$20
CY      =   'Y'-$20
CZ      =   'Z'-$20
COOL    =   ';'-$20
;
;PAGE ZERO ITEMS
;
LO      =   $CB
HI      =   $CC
PLOTX   =   $CD
PLOTY   =   $CE
LOHLD   =   $CF
HIHLD   =   $D0
SMTIM   =   $D1
MOVTIM  =   $D2
TIMER   =   $D3
DEADFG  =   $D4
PX      =   $D5
PY      =   $D6
XI      =   $D7
YI      =   $D8
;
;MISCELLANEOUS MEMORY USAGE
;
PMAREA  =   $1000
MISSLS  =   PMAREA+384
PL0     =   PMAREA+512
PL1     =   PMAREA+640
PL2     =   PMAREA+768
PL3     =   PMAREA+896
DISP    =   $3000
;
;SYSTEM EQUATES
;
KEY     =   $2FC
CONSOL  =   $D01F
PMBASE  =   $D407
CHBASE  =   $02F4
RANDOM  =   $D20A
SETVBV  =   $E45C
XITVBV  =   $E45F
COLBK   =   $2C8
COLPF0  =   $2C4
COLPF1  =   $2C5
COLPF2  =   $2C6
COLPF3  =   $2C7
AUDC1   =   $D201
AUDC2   =   $D203
AUDC3   =   $D205
AUDC4   =   $D207
AUDF1   =   $D200
AUDF2   =   $D202
AUDF3   =   $D204
AUDF4   =   $D206
AUDCTL  =   $D208
PRIOR   =   $026F
ATTRACT =   $4D
DMACTL  =   $22F
DLISTL  =   $230
GRACTL  =   $D01D
NMIEN   =   $D40E
PCOLR0  =   $D012
COLPM0  =   $2C0
COLPM1  =   $2C1
COLPM2  =   $2C2
COLPM3  =   $2C3
HPOSP0  =   $D000
HPOSP1  =   $D001
HPOSP2  =   $D002
HPOSP3  =   $D003
HPOSM0  =   $D004
HITCLR  =   $D01E
P0PF    =   $D004
P1PF    =   $D005
P2PF    =   $D006
P3PF    =   $D007
P0PL    =   $D00C
P3PL    =   $D00F
STICK   =   $278
STRIG   =   $284

        ORG $6000

;ASSEMBLER WILL
;PUT IT HERE

        LOC $1400       ;PROGRAM START

;
;THIS CODE, WHEN CALLED BY BASIC, WILL
;MOVE THE 'FILL 'ER UP!' CODE TO ITS
;PROPER LOCATION ($1400) AND EXECUTE IT.
;
PROG    PLA             ;DISCARD
        PLA             ;PULL THE
        STA $81         ;ADDRESS OF
        PLA             ;THE HOLDING
        STA $80         ;STRING.
        LDA #$00        ;SET UP
        STA $82         ;DESTINATION
        LDA #$14        ;ADDRESS ON
        STA $83         ;PAGE ZERO.
        LDY #0
COPYLP  LDA ($80),Y     ;COPY THE BLOCK
        STA ($82),Y     ;OF MEMORY.
        LDA $80
        CLC
        ADC #1
        STA $80
        LDA $81
        ADC #0
        STA $81
        LDA $82
        CLC
        ADC #1
        STA $82
        LDA $83
        ADC #0
        STA $83
        CMP #DIR/256    ;AT END YET?
        BNE COPYLP      ;NO!
        LDA $82         ;WELL, MAYBE...
        CMP #DIR&255    ;AT END?
        BNE COPYLP      ;NOPE!
;
;MAIN PROGRAM STARTS HERE
;
START   JSR $E465       ;INIT SOUNDS
        LDA #$11        ;P/M PRIORITY
        STA PRIOR
        LDA #1          ;DON'T SHOW
        STA SHOOFF      ;PLAYER OR STAR
        STA FILLON      ;WE STILL MUST
        JSR PMCLR       ;CLEAR P/M AREA
        LDA #64         ;AND SET UP THE
        STA STRHGT      ;STAR'S HEIGHT
        LDA #128        ;AND
        STA STRHOR      ;HORIZONTAL POSITION
        LDA #$D0        ;NOW LET'S
        LDX #4          ;ZERO OUT
ZSCLP   STA SCOLIN+4,X  ;THE SCORE
        STA SCOLIN+15,X ;AREAS!
        DEX
        BPL ZSCLP
        LDX #5
ZSCLP2  STA SCOLN2+12,X
        DEX
        BPL ZSCLP2
        LDA #0          ;THESE ITEMS
        STA FILLON      ;MUST BE SET
        STA DEADFG      ;TO ZERO ON
        STA NOCCHG      ;STARTUP OR
        STA HITCLR      ;ELSE WE'LL
        STA DMACTL      ;WIND UP WITH
        STA NMIEN       ;NASTY THINGS
        STA HASDRN      ;HAPPENING!
        STA AUDCTL
        LDX #5          ;LET'S ZERO
CMSLP   STA SCORE,X     ;OUT THE SCORE
        DEX             ;COUNTER...
        BPL CMSLP
        STA LEVEL       ;AND LEVEL #!
        LDA #3          ;WE START WITH
        STA LIVES       ;3 LIVES
        ORA #$90        ;AND PUT THEM IN
        STA SCOLN2+19   ;THE SCORE LINE
        LDA #$0A        ;NEXT WE SET UP
        STA COLPF0      ;THE COLORS WE
        LDA #$24        ;WANT TO USE.
        STA COLPF1
        LDA #$94
        STA COLPF2
        LDA #$C4
        STA COLPF3
        LDA #0
        STA COLBK
        LDA #$76
        STA COLPM3
        LDA #$34
        STA COLPM0
        LDA #DLIST&255  ;WE'D BETTER TELL
        STA DLISTL      ;THE COMPUTER WHERE
        LDA #DLIST/256  ;OUR DISPLAY LIST
        STA DLISTL+1    ;IS LOCATED!
        LDY #INTRPT&255 ;TELL WHERE THE
        LDX #INTRPT/256 ;VERTICAL BLANK
        LDA #6          ;INTERRUPT IS
        JSR SETVBV      ;AND SET IT!
        LDA #PMAREA/256 ;HERE'S OUR P/M
        STA PMBASE      ;GRAPHICS AREA!
        LDA #$2E        ;TURN ON THE
        STA DMACTL      ;DMA CONTROL
        LDA #$3         ;AND
        STA GRACTL      ;GRAPHICS CONTROL!
        LDA #$40        ;ENABLE VBI
        STA NMIEN
        JMP CLRDSP
PMCLR   LDA #0          ;CLEAR OUT
        LDX #127        ;THE P/M AREA:
PMICLR  STA MISSLS,X    ;MISSILES,
        STA PL0,X       ;PLAYER 0,
        STA PL1,X       ;PLAYER 1,
        STA PL2,X       ;PLAYER 2,
        STA PL3,X       ;AND PLAYER 3!
```

```
        DEX
        BNE PMICLR      ;LOOP UNTIL DONE
RETURN  RTS             ;WE'RE DONE!
;
;PLOT ADDRESS CALCULATOR
;
;MULTIPLY PLOTY BY 40, THEN CALCULATE ADDRESS
;OF THE SCREEN MEMORY TO BE ALTERED.
;
PLOTCL  LDA PLOTY
        ASL A
        STA LO
        LDA #0
        STA HI          ;*2
        ASL LO
        ROL HI          ;*4
        ASL LO
        LDA LO
        STA LOHLD
        ROL HI          ;*8
        LDA HI
        STA HIHLD
        ASL LO
        ROL HI          ;*16
        ASL LO
        ROL HI          ;*32
        LDA LO
        CLC
        ADC LOHLD
        STA LO
        LDA HI
        ADC HIHLD
        STA HI          ;+*8=*40
        LDA #DISP&255
        CLC
        ADC LO
        STA LO
        LDA #DISP/256
        ADC HI
        STA HI          ;+DISPLAY START
        LDA PLOTX       ;MASK X POSITION
        AND #3
        TAX
        LDA PLOTX
        LSR A
        LSR A
        CLC
        ADC LO
        STA LO
        LDA HI
        ADC #0          ;LO & HI NOW HOLD
        STA HI          ;THE ADDRESS!
        RTS             ;EXIT!
;
;CLEAR THE DISPLAY MEMORY
;
CLRDSP  LDX #0          ;THIS ROUTINE WILL
        STX PLOTX       ;CLEAR THE SCREEN RAM.
        LDX #0          ;IT GETS THE ADDRESS
DLOOP2  STX PLOTY       ;OF THE BEGINNING OF
        JSR PLOTCL      ;EACH GR.7 LINE
        LDX PLOTY       ;THEN ZEROES OUT
        LDA #$00        ;EACH OF THE
        LDY #39         ;40 BYTES (0-39)
DLOOP3  STA (LO),Y      ;IN THE LINE.
        DEY
        BPL DLOOP3
        INX
        CPX #86
        BNE DLOOP2
;
;DRAW THE COLOR 1 BORDER
;
        LDA #3          ;THIS ROUTINE
        STA BORNUM      ;DRAWS THE 4 LINES
BORDER  LDX BORNUM      ;THAT MAKE UP THE
        LDA BXSTRT,X    ;WHITE GR.7 BORDER
        STA PLOTX       ;ON THE SCREEN.
        LDA BYSTRT,X
        STA PLOTY
        LDA BXINC,X
        STA BDINCX
        LDA BYINC,X
        STA BDINCY
        LDA BORCNT,X
        STA BDCNT
DRAWLN  JSR PLOTCL
        LDA COLOR1,X
        LDY #0
        ORA (LO),Y
        STA (LO),Y
        LDA PLOTX
        CLC
        ADC BDINCX
        STA PLOTX
        LDA PLOTY
        CLC
        ADC BDINCY
        STA PLOTY
        DEC BDCNT
        BNE DRAWLN
        DEC BORNUM
        BPL BORDER
;
;THIS SECTION STARTS OFF EACH LEVEL
;
        LDA #80         ;POSITION THE
        STA PX          ;PLAYER
        LDA #84
        STA PY
        LDA LEVEL       ;INCREMENT THE
        CLC             ;LEVEL NUMBER
        ADC #1
        STA LOWK
        LDA #0          ;ZERO OUT
        STA CURLO       ;CURRENT TALLY
        STA CURHI       ;WORK AREA
        STA HIWK
        LDA #$FF        ;TELL DECIMAL CONVERTER
        STA SLLOC       ;NOT TO PLACE RESULT
        JSR CNVDEC      ;CONVERT LEVEL #
        LDA DECIMAL+1   ;GET DECIMAL LEVEL #
        ORA #$90        ;ADD COLOR
        STA SCOLN2+3    ;PUT IN SCORE LINE
        LDA DECIMAL     ;SAME FOR 2ND
        ORA #$90        ;LEVEL #
        STA SCOLN2+4    ;DIGIT
        LDX LEVEL       ;GET THIS LEVEL'S
        LDA TGTLO,X     ;PARAMETERS
        STA LOWK
        LDA TGTHI,X
        STA HIWK
        LDA STARSP,X
        STA STRSPD
        LDA #4
        STA SLLOC
        JSR CNVDEC      ;SHOW TARGET AMOUNT
;
;CLEAR OUT THE TRACKING TABLE THAT
;REMEMBERS WHERE THE PLAYER MOVED
;
CLRTRK  LDA #0
        STA SHOOFF
        TAX
CLRTLP  STA DIR,X       ;CLEAR DIRECTION
        STA LGTH,X      ;AND LENGTH ENTRIES
        DEX
        BNE CLRTLP
        STA MOVIX       ;CLEAR MOVEMENT INDEX
        STA DRAWFG      ;AND DRAW FLAG
GETSTK  LDA PAUSE       ;GAME PAUSED?
        BNE GETSTK      ;YES, LOOP AND WAIT.
        LDA #$FD        ;DO 'WARBLE' SOUND
        STA AUDF1       ;USING SOUND
        LDA #$FE        ;CHANNELS 1-3
        STA AUDF2
        LDA #$FF
        STA AUDF3
        LDA #$A3
        STA AUDC1
        STA AUDC2
        STA AUDC3
        LDA #0          ;NO ATTRACT MODE!
        STA ATTRACT
        LDA DEADFG      ;DID STAR HIT US?
        BEQ ALIVE       ;NO!
        LDX LEVEL       ;IT HIT US--
        LDA KILLFG,X    ;UNCONDITIONAL KILL?
        BNE JCRSH       ;YES! WE'RE DEAD!!!
        LDA PX          ;NO, IF WE'RE ON A
        STA PLOTX       ;WHITE LINE (COLOR 1)
        LDA PY          ;THEN WE'RE ALIVE!
        STA PLOTY
        JSR PLOTCL
```

```
        LDY #0
        LDA BITSON,X
        AND (LO),Y
        CMP COLOR1,X    ;ON COLOR 1?
        BEQ ALIVE       ;YES (WHEW!)
JCRSH   JMP CRASH       ;GO KILL PLAYER.
ALIVE   LDA MOVTIM      ;PLAYER MOVING?
        BEQ GOTSTK      ;YES--GET STICK.
        JMP MOVSTR      ;NO, MOVE STAR.
JGSTK   JMP GETSTK      ;GO GET STICK
GOTSTK  LDA #4          ;SET UP THE
        STA MOVTIM      ;MOVEMENT TIMER
        LDA STICK       ;GET THE STICK
        STA STKHLD      ;AND SAVE IT
        TAX             ;THEN LOOK UP
        LDA XD,X        ;X DIRECTION
        CLC
        ADC XD,X
        STA XI          ;AND
        LDA YD,X        ;Y DIRECTION
        CLC
        ADC YD,X
        STA YI
        ORA XI          ;ANY MOVEMENT?
        BEQ JGSTK       ;NO, TRY AGAIN.
        LDA PX          ;INCREMENT
        CLC             ;PLAYER X
        ADC XI          ;POSITION AND
        STA CKX         ;HOLD IT...
        CMP #159        ;OFFSCREEN?
        BCS JGSTK       ;YES!
        STA PLOTX       ;NO, SAVE IT
        SEC
        SBC XD,X
        STA PXWC
        LDA PY          ;INCREMENT
        CLC             ;PLAYER Y
        ADC YI          ;POSITION AND
        STA CKY         ;HOLD IT...
        CMP #85         ;OFFSCREEN?
        BCS JGSTK       ;YES!
        STA PLOTY       ;NO, SAVE IT
        SEC
        SBC YD,X
        STA PYWC
        JSR PLOTCL      ;LOCATE NEW PLAYER
        LDY #0          ;POSITION.
        LDA BITSON,X
        AND (LO),Y
        STA CKV         ;SAVE THE 'LOCATE'.
        STX CKVX
        LDA PXWC        ;CHECK THE
        STA PLOTX       ;POSITION NEXT
        LDA PYWC        ;TO THE ONE WE'RE
        STA PLOTY       ;NOW IN...
        JSR PLOTCL
        LDY #0
        LDA BITSON,X
        AND (LO),Y
        PHA             ;AND SAVE IT!
        LDA STRIG       ;TRIGGER PRESSED?
        BNE NOTDRN      ;NO!
        PLA             ;OK TO DRAW?
        BNE JGS         ;NO!!
        JMP DRAWIN      ;YES, GO DRAW.
NOTDRN  PLA             ;NOT DRAWING--ARE WE
        CMP COLOR1,X    ;ON COLOR 1?
        BNE JGS         ;NO, TRY AGAIN
        LDA CKV         ;ARE WE MOVING
        LDX CKVX        ;ONTO ANOTHER
        CMP COLOR1,X    ;COLOR 1?
        BNE JGS         ;NO! TRY AGAIN.
        LDA CKX         ;ALL'S WELL...
        STA PX          ;UPDATE PX
        LDA CKY         ;AND
        STA PY          ;PY,
JGS     JMP GETSTK      ;GET STICK.
;
;THIS ROUTINE HANDLES THE DRAW FUNCTION.
;
DRAWIN  LDA DRAWFG      ;ALREADY DRAWING?
        BNE DRAWOK      ;YES!
        STA MOVIX       ;NO, THIS IS THE
        LDA STKHLD      ;FIRST TIME--SET UP
        STA DIR         ;INITIAL DRAWING
        LDA #1          ;VARIABLES.
        STA DRAWFG
        STA HASDRN
        LDA PX
        STA INIX
        STA MINX
        STA MAXX
        LDA PY
        STA INIY
        STA MINY
        STA MAXY
DRAWOK  LDA CKV         ;DID WE
        LDX CKVX        ;RUN INTO ANOTHER
        CMP COLOR2,X    ;COLOR 2?
        BNE NOCRSH      ;NO, WE'RE OK.
        JMP CRASH       ;CRRAAASSSHHH!
NOCRSH  LDX MOVIX       ;UPDATE THE
        LDA STKHLD      ;TRACKING
        CMP DIR,X       ;TABLES WITH
        BEQ SAMDIR      ;DIRECTION
        INC MOVIX       ;INFORMATION.
        INX
        STA DIR,X
        LDA #0
        STA LGTH,X
SAMDIR  INC LGTH,X
        LDA #3
        STA BDCNT
        LDA PX          ;NOW PLOT THE
        STA PLOTX       ;LINE WE'RE
        LDA PY          ;DRAWING...
        STA PLOTY
CCLOOP  JSR PLOTCL
        LDY #0
        LDA (LO),Y
        AND BITOFF,X
        ORA COLOR2,X    ;IN COLOR 2.
        STA (LO),Y
        DEC BDCNT
        BEQ CKCOLR
        LDY MOVIX
        LDX DIR,Y
        LDA XD,X
        CLC
        ADC PLOTX
        STA PLOTX
        LDA YD,X
        CLC
        ADC PLOTY
        STA PLOTY
        JMP CCLOOP
CKCOLR  LDA PLOTX       ;UPDATE X POS.
        STA PX
        CMP MAXX        ;CHECK MINIMUM
        BCC TMINX       ;AND MAXIMUM
        STA MAXX        ;X & Y VALUES
        JMP CHKYMM      ;AND UPDATE IF
TMINX   CMP MINX        ;NECESSARY
        BCS CHKYMM
        STA MINX
CHKYMM  LDA PLOTY
        STA PY
        CMP MAXY
        BCC TMINY
        STA MAXY
        JMP ENDMM
TMINY   CMP MINY
        BCS ENDMM
        STA MINY
ENDMM   LDX CKVX        ;DID WE DRAW
        LDA CKV         ;INTO
        CMP COLOR1,X    ;COLOR 1?
        BEQ ENDLIN      ;YES! END OF LINE!
        JMP GETSTK      ;NO, GO GET STICK.
ENDLIN  LDA #0          ;WE AREN'T
        STA DRAWFG      ;DRAWING ANYMORE
        JSR SEARCH      ;SEARCH AND FILL!!
        LDA CURLO       ;GET CURRENT VALUE
        STA LOWK
        LDA CURHI
        STA HIWK
        LDA #15         ;PUT AT 15TH
        STA SLLOC       ;POS. IN SCOLIN
        JSR CNVDEC      ;CONVERT TO DECIMAL
        LDA #1          ;NOW REDRAW THE
        STA RDRCOL      ;PLAYER'S PATH IN
        JSR REDRAW      ;COLOR 1 (WHITE).
        LDX LEVEL       ;CHECK TO SEE
        LDA CURLO       ;IF WE'VE HIT
```

```
        SEC             ;THE TARGET.
        SBC TGTLO,X
        STA LOWK
        LDA CURHI
        SBC TGTHI,X
        STA HIWK        ;HIT TARGET?
        BPL NEWLVL      ;YES--NEW LEVEL!
        JMP CLRTRK      ;NO, GO CLEAR TRACK
NEWLVL  LDA LEVEL       ;IF LEVEL < 15
        CMP #15         ;THEN
        BEQ NOLINC      ;INCREMENT
        INC LEVEL       ;LEVEL
;
;INCREASE SCORE HERE
;
NOLINC  ASL LOWK        ;SCORE INC =
        ROL HIWK        ;TGT-CUR * 2
        LDA #$FF        ;DON'T PLACE
        STA SLLOC       ;THE RESULT!
        JSR CNVDEC      ;CONVERT TO DECIMAL
        LDX #5          ;AND ADD TO SCORE
        LDY #0
SCOLP   LDA DECIMAL,Y
        CLC
        ADC SCORE,X
        CMP #10
        BMI NOCARY
        SEC
        SBC #10
        STA SCORE,X
        INC SCORE-1,X
        JMP NXSPOS
NOCARY  STA SCORE,X
NXSPOS  INY
        DEX
        BPL SCOLP
        LDX #5          ;NOW PLACE THE
SHSLP   LDA SCORE,X     ;SCORE IN
        ORA #$10        ;SCORE LINE #2
        STA SCOLN2+12,X
        DEX
        BPL SHSLP
        LDA #1          ;STOP VBI FOR
        STA FILLON      ;A MOMENT
        STA SHOOFF
        JSR PMCLR       ;CLEAR P/M AREA
        LDA #64         ;INITIALIZE
        STA STRHGT      ;THE
        LDA #128        ;STAR
        STA STRHOR      ;POSITION
        LDA #0          ;VBI ON AGAIN
        STA FILLON
        JMP CLRDSP      ;GO CLEAR DISPLAY!
;
;THIS SECTION HANDLES PLAYER'S DEATH
;
CRASH   LDA #0          ;NO WARBLE SOUND
        STA AUDC1
        STA AUDC2
        STA AUDC3
        LDA #1          ;NO PLAYER COLOR
        STA NOCCHG      ;CHANGE IN VBI
        LDA #15         ;SET BRIGHTNESS OF
        STA DEDBRT      ;PLAYER DEATH.
TIMRST  LDA #5          ;SET DEATH TIMER
        STA TIMER       ;TO 5 JIFFIES.
DEADCC  LDA DEDBRT      ;MOVE BRIGHTNESS
        STA AUDC1       ;TO DEATH SOUND VOLUME
        LDA RANDOM      ;GET RANDOM
        AND #$1F        ;DEATH SOUND
        STA AUDF1       ;FREQUENCY
        LDA RANDOM      ;GET RANDOM
        AND #$F0        ;DEATH COLOR
        ORA DEDBRT      ;ADD BRITE
        STA COLPF1      ;PUT IN LINE COLOR
        STA COLPM3      ;AND PLAYER COLOR
        LDA TIMER       ;TIMER DONE YET?
        BNE DEADCC      ;NO, GO CHANGE COLOR.
        DEC DEDBRT      ;DECREMENT BRIGHTNESS
        BPL TIMRST      ;IF MORE, GO DO IT.
        DEC LIVES       ;1 LESS LIFE
        LDA LIVES       ;GET # LIVES
        ORA #$90        ;ADD COLOR
        STA SCOLN2+19   ;AND DISPLAY!
        CMP #$90        ;ZERO LIVES?
        BNE NOTDED      ;NO!
        LDA #GOMSG&255  ;WE'RE COMPLETELY
        STA SCDL        ;DEAD, SHOW
        LDA #GOMSG/256  ;'GAME OVER'
        STA SCDL+1      ;MESSAGE
CKSTRT  LDA CONSOL      ;WAIT FOR START
        AND #1          ;KEY...
        BNE CKSTRT      ;NOT PRESSED--LOOP.
RELEAS  LDA CONSOL      ;KEY PRESSED, NOW
        AND #1          ;WAIT FOR RELEASE!
        BEQ RELEAS      ;NOT RELEASED YET!
        LDA #SCOLIN&255 ;PUT SCORE
        STA SCDL        ;LINE BACK
        LDA #SCOLIN/256 ;IN DISPLAY
        STA SCDL+1      ;LIST...
        JMP START       ;AND START GAME!
;
;THIS SECTION PLACES PLAYER AT A RANDOM
;LOCATION IF THERE ARE MORE LIVES LEFT.
;
NOTDED  LDA #1          ;DON'T SHOW
        STA SHOOFF      ;PLAYER
NEWLOC  LDA RANDOM      ;GET RANDOM X
        AND #$FE        ;MUST BE EVEN
        CMP #159        ;AND ON SCREEN
        BCS NEWLOC
        STA PLOTX
CSHY    LDA RANDOM      ;GET RANDOM Y
        AND #$7E        ;MUST BE EVEN
        CMP #85         ;AND ON SCREEN
        BCS CSHY
        STA PLOTY
        JSR PLOTCL
        LDY #0
        LDA BITSON,X
        AND (LO),Y      ;IS LOCATION ON
        CMP COLOR1,X    ;COLOR 1?
        BNE NEWLOC      ;NO, TRY AGAIN.
        JSR PMCLR       ;IT'S OK, CLEAR P/M
        LDA PLOTX       ;SAVE
        STA PX          ;THE PLAYER'S
        LDA PLOTY       ;NEW
        STA PY          ;COORDINATES.
        LDA #0          ;REDRAW THE
        STA RDRCOL      ;PLAYER'S TRACK
        LDA HASDRN      ;IN COLOR 0
        BEQ JCTRK
        JSR REDRAW
        LDA INIX        ;THIS PART IS
        STA PLOTX       ;NEEDED TO PLOT
        LDA INIY        ;A COLOR 1 BLOCK
        STA PLOTY       ;AT THE START OF
        JSR PLOTCL      ;THE PLAYER'S TRACK
        LDY #0          ;AFTER IT IS ERASED.
        LDA BITOFF,X    ;(NOBODY'S PERFECT!)
        AND (LO),Y
        ORA COLOR1,X
        STA (LO),Y
JCTRK   LDA #$24        ;RESTORE DRAW LINE
        STA COLPF1      ;COLOR
        LDA #0
        STA NOCCHG
        STA HITCLR
        STA DEADFG
        JMP CLRTRK      ;AND GO START NEW TRACK.
;
;THIS ROUTINE USES THE TRACKING TABLES,
;DIR AND LGTH, TO REDRAW THE LINE THE
;PLAYER DREW.  RDRCOL INDICATES THE COLOR
;DESIRED.
;
REDRAW  LDA INIX
        STA REX
        LDA INIY
        STA REY
        LDA #0
        STA X
REDXLP  LDX X
        LDA DIR,X
        STA REDIR
        LDA LGTH,X
        STA LGTHY
        LDA #1
        STA Y
REDYLP  LDA #3
        STA TIMES
TIMES3  LDA REX
        STA PLOTX
        LDA REY
```

```
        STA PLOTY
        JSR PLOTCL
        LDY #0
        LDA RDRCOL
        BNE RDC1
        LDA BITOFF,X
        AND (LO),Y
        STA (LO),Y
        JMP SETNRP
ENDRD   LDA #0
        STA DRAWFG
        RTS
RDC1    LDA BITOFF,X
        AND (LO),Y
        ORA COLOR1,X
        STA (LO),Y
SETNRP  DEC TIMES
        BEQ NXTY
        LDX REDIR
        LDA REX
        CLC
        ADC XD,X
        STA REX
        LDA REY
        CLC
        ADC YD,X
        STA REY
        JMP TIMES3
NXTY    INC Y
        LDA Y
        CMP LGTHY
        BEQ JNRD
        BCS NXTX
JNRD    JMP REDYLP
NXTX    INC X
        LDA X
        CMP MOVIX
        BEQ JRXLP
        BCS ENDRD
JRXLP   JMP REDXLP
;
;2-BYTE DECIMAL CONVERTER.  CONVERTS
;A 2-BYTE BINARY NUMBER TO A 5-BYTE
;DECIMAL NUMBER.  WILL PLACE THE
;DECIMAL NUMBER IN SCOLIN IF DESIRED
;(SLLOC DETERMINES POSITION).
;
CNVDEC  LDX #4
        LDA #0
CDLP    STA DECIMAL,X
        DEX
        BPL CDLP
        LDX #4
CKMAG   LDA HIWK
        CMP HIVALS,X
        BEQ CKM2
        BCS SUBEM
        BCC NOSUB
CKM2    LDA LOWK
        CMP LOVALS,X
        BCS SUBEM
NOSUB   DEX
        BPL CKMAG
        JMP SHOWIT
SUBEM   LDA LOWK
        SEC
        SBC LOVALS,X
        STA LOWK
        LDA HIWK
        SBC HIVALS,X
        STA HIWK
        INC DECIMAL,X
        JMP CKMAG
SHOWIT  LDX #$4
        LDY SLLOC
        BMI SHEND
SHOLP   LDA DECIMAL,X
        ORA #$D0
        STA SCOLIN,Y
        INY
        DEX
        BPL SHOLP
SHEND   RTS
;
;THIS ROUTINE MOVES THE STAR AROUND ON
;THE PLAYFIELD.  THE STAR IS ROTATED AND
;PLOTTED (IN A PLAYER) IN THE VBI.
;
MOVSTR  LDA SMTIM       ;TIME TO MOVE?
        BEQ MSTR        ;YES, GO DO IT
        JMP GETSTK      ;NO, GET STICK
MSTR    LDA STRSPD      ;SET MOVEMENT TIMER
        STA SMTIM       ;WITH STAR SPEED
        LDA STRHGT      ;ADJUST P/M
        SEC             ;COORDINATES TO
        SBC #13         ;MATCH PLAYFIELD
        STA STRLY       ;PLOTTING
        LDA STRHOR      ;COORDINATES.
        SEC
        SBC #44
        STA STRLX
        LDA RANDOM      ;WANT TO CHANGE
        CMP #240        ;THE STAR'S DIRECTION?
        BCC SAMSTD      ;NO, USE SAME.
NEWDIR  LDA RANDOM      ;GET RANDOM
        AND #7          ;DIRECTION
        JMP DIRCHK
SAMSTD  LDA STRDIR      ;GET OLD DIRECTION.
DIRCHK  TAX             ;CHECK TO SEE
        STA TMPDIR      ;IF STAR WILL
        LDA STRLX       ;BUMP INTO ANY
        CLC             ;PLAYFIELD
        ADC STRDTX,X    ;OBJECT.
        STA PLOTX
        LDA STRLY
        CLC
        ADC STRDTY,X
        STA PLOTY
        JSR PLOTCL
        LDY #0
        LDA BITSON,X
        AND (LO),Y      ;ANY COLLISION?
        BEQ WAYCLR      ;NO, ALL CLEAR!
        LDA #15         ;HIT SOMETHING,
        STA BSCNT       ;START BUMP SOUND AND
        BNE NEWDIR      ;GET NEW DIRECTION.
WAYCLR  LDA PLOTX       ;ADJUST STAR
        CLC             ;COORDINATES
        ADC #44         ;BACK TO P/M
        STA STRHOR      ;COORDINATES
        LDA PLOTY       ;FROM PLAYFIELD.
        CLC
        ADC #13
        STA STRHGT
        LDA TMPDIR      ;SET DIRECTION
        STA STRDIR
        JMP GETSTK      ;AND LOOP
;
;SEARCH FOR FILLABLE AREA
;
;THIS SECTION SEARCHES FOR THE AREA TO
;BE FILLED.  IT IS SO COMPLICATED THAT
;EXPLANATION OF ITS FINER DETAILS
;WOULD BE ALMOST IMPOSSIBLE WITHOUT
;WRITING ANOTHER COMPLETE ARTICLE.  AT
;ANY RATE, IT WORKS.  THOSE WITH ANY
;SPECIFIC QUESTIONS SHOULD WRITE ME,
;CARE OF A.N.A.L.O.G.
;
SEARCH  LDA #1
        STA FILLON
        LDA #0
        STA D
        LDA STRHOR
        SEC
        SBC #44
        STA SX
        LDA STRHGT
        SEC
        SBC #13
        STA SY
FINDCL  LDX D
        LDA SX
        CLC
        ADC SXD,X
        STA SX
        STA PLOTX
        LDA SY
        CLC
        ADC SYD,X
        STA SY
        STA PLOTY
        JSR PLOTCL
        LDY #0
        LDA (LO),Y
        AND BITSON,X
        CMP COLOR1,X
        BEQ FINDC2
        CMP COLOR2,X
        BNE FINDCL
        LDA #0
        STA TD
        JMP FOUND2
FINDC2  LDA D
        STA TD
        JSR DECD
FC2A    JSR SRCHLC
        CMP COLOR1,X
        BNE FC2B
        JSR GRABEM
        JMP FINDC2
FC2B    CMP COLOR2,X
        BNE FC2C
        JSR GRABEM
        JMP OUTLIN
FC2C    JSR INCD
        JMP FC2A
FOUND2  LDA #0
        STA TRIES
        JSR DECD
FND2A   JSR SRCHLC
        CMP COLOR2,X
        BNE FND2B
        JSR GRABEM
        JMP FOUND2
FND2B   LDA TRIES
        CLC
        ADC #1
        STA TRIES
        CMP #3
        BEQ FINDC1
        JSR INCD
        JMP FND2A
FINDC1  LDA D
        STA TD
        JSR DECD
FC1A    JSR SRCHLC
        CMP COLOR1,X
        BNE FC1B
        JSR GRABEM
        JMP FINDC2
FC1B    JSR INCD
        JMP FC1A
OUTLIN  JSR PLSXSY
        LDA #0
        STA TRIES
OUTLA   JSR SRCHLC
        CMP COLOR1,X
        BNE OUTLB
        JSR GRABEM
        JMP OUTLIN
OUTLB   LDA TRIES
```

```
         CLC
         ADC #1
         STA TRIES
         CMP #4
         BEQ OUTLD
         JSR INCD
         JMP OUTLA
OUTLD    JSR LOCTXY
OUTLD2   CMP COLOR2,X
         BNE OUTLE
         JSR FILL
         LDA #0
         STA FILLON
         RTS
OUTLE    JSR INCD
         JSR SRCHLC
         JMP OUTLD2
SRCHLC   LDX TD
         LDA SX
         CLC
         ADC SXD,X
         STA TX
         STA PLOTX
         LDA SY
         CLC
         ADC SYD,X
         STA TY
         STA PLOTY
LOCTXY   LDA PLOTX
         CMP #159
         BCS NOREAD
         LDA PLOTY
         CMP #85
         BCS NOREAD
         JSR PLOTCL
         LDY #0
         LDA (LO),Y
         AND BITSON,X
         RTS
NOREAD   LDA #0
         LDX #0
         RTS
GRABEM   LDA TD
         STA D
         LDA TX
         STA SX
         LDA TY
         STA SY
         RTS
INCD     LDA TD
         CLC
         ADC #1
         AND #3
         STA TD
         RTS
PLSXSY   LDA SX
         STA PLOTX
         CMP MAXX
         BCC TMINX2
         STA MAXX
         JMP CKYMM2
TMINX2   CMP MINX
         BCS CKYMM2
         STA MINX
CKYMM2   LDA SY
         STA PLOTY
         CMP MAXY
         BCC TMINY2
         STA MAXY
         JMP ENDMM2
TMINY2   CMP MINY
         BCS ENDMM2
         STA MINY
ENDMM2   JSR PLOTCL
         LDY #0
         LDA BITOFF,X
         AND (LO),Y
         ORA COLOR2,X
         STA (LO),Y
         RTS
;
;FILL ROUTINE
;
;AS WITH THE 'SEARCH' SUBROUTINE, THE
;FILL SUBROUTINE IS FAR TOO COMPLEX TO
;EXPLAIN HERE.  THIS FILL IS ENTIRELY
;DIFFERENT FROM THE SYSTEM'S FILL
;ROUTINE, AS IT WILL FILL ANY SHAPE
;THAT IS OUTLINED IN COLOR 2.
;
FILL     LDA #0          ;TURN OFF
         STA AUDC2       ;SOUND CHANNELS
         STA AUDC3       ;2 AND 3.
         LDA MAXY        ;INITIALIZE
         SEC             ;THE FILL
         SBC MINY        ;SOUND
         STA FILFRQ      ;FREQUENCY.
         LDA MINX
         SEC
         SBC #1
         STA MINX
         STA FX
         LDA MINY
         STA FY
         SEC
         SBC #1
         STA MINY
         LDA MAXX
         CLC
         ADC #1
         STA MAXX
         LDA MAXY
         CLC
         ADC #1
         STA MAXY
         LDA #0
         STA SCTALY
CLRC2T   LDA #0
         STA C2TALY
LOCLP1   JSR LOCATE
         CMP #2
         BNE LOCLP1
LOCLP2   INC C2TALY
         JSR LOCATE
         CMP #2
         BEQ LOCLP2
         AND #1
         BNE CLRC2T
         LDA C2TALY
         CMP #1
         BEQ FILLIT
         JSR LOCPRV
         BEQ CLRC2T
FILLIT   LDA FX
         STA PLOTX
         LDA FY
         STA PLOTY
         JSR PLOTCL
         LDY #0
         LDA (LO),Y
         ORA COLOR3,X
         STA (LO),Y
         INC SCTALY
         JSR LOCATE
         CMP #0
         BEQ FILLIT
         AND #1
         BNE CLRC2T
         LDA #1
         STA C2TALY
FOLLOW   JSR LOCATE
         CMP #0
         BEQ LOCLP3
         AND #1
         BNE CLRC2T
         INC C2TALY
         JMP FOLLOW
LOCLP3   LDA C2TALY
         CMP #1
         BNE LOCLP4
         JMP CLRC2T
LOCLP4   JSR LOCPRV
         CMP BITSON,X
         BEQ FILLIT
         JMP CLRC2T
LOCATE   LDA FX
         CLC
         ADC #1
         STA FX
         CMP MAXX
         BNE STOFX
         LDA CURLO
         CLC
         ADC SCTALY
         STA CURLO
         LDA CURHI
         ADC #0
         STA CURHI
         LDA #0
         STA SCTALY
         LDA MINX
         STA FX
         LDA #0
         STA C2TALY
         LDA #$86
         STA AUDC1
         LDA FILFRQ
         STA AUDF1
         BEQ NOFFDC
         DEC FILFRQ
NOFFDC   LDA FY
         CLC
         ADC #1
         STA FY
         CMP MAXY
         BEQ FILEND
         LDA FX
         CMP MINX
         BNE STOFX
         PLA
         PLA
         JMP CLRC2T
FILEND   PLA
         PLA
         RTS
STOFX    LDA FX
         STA PLOTX
         LDA FY
         STA PLOTY
         JSR PLOTCL
         LDY #0
         LDA BITSON,X
         AND (LO),Y
         CMP COLOR2,X
         BNE NOTC2
         LDA BITSON,X
         ORA (LO),Y
         STA (LO),Y
         INC SCTALY
         LDA #2
         RTS
NOTC2    CMP COLOR1,X
         BNE NOTC1
         LDA #1
         RTS
NOTC1    CMP #0
         BNE C3
         RTS
C3       LDA #3
         RTS
LOCPRV   LDA FX
         STA PLOTX
         LDA FY
         SEC
         SBC #1
         CMP MINY
         BEQ NOLOCP
         STA PLOTY
         JSR PLOTCL
         LDY #0
         LDA BITSON,X
         AND (LO),Y
         RTS
NOLOCP   LDA #0
         LDX #0
         RTS
;
;VBI ROUTINE
;
INTRPT   LDA KEY         ;IS SPACE BAR
         CMP #$21        ;PRESSED?
         BNE NOPRES      ;NO, CHECK FOR PAUSE.
         LDA #$FF        ;CLEAR OUT
         STA KEY         ;KEY CODE,
         LDA PAUSE       ;COMPLEMENT
         EOR #$FF        ;THE PAUSE
         STA PAUSE       ;FLAG.
NOPRES   LDA PAUSE       ;ARE WE PAUSED?
         BEQ NOPAUS      ;NO!
         JMP XITVBV      ;PAUSED, NO VBI!
NOPAUS   LDA BSCNT       ;MORE BUMP SOUND?
         BMI NOBS        ;NO, PROCESS TIMER.
         ORA #$A0        ;MIX VOLUME WITH
         STA AUDC4       ;PURE TONE,
         LDA #$80        ;SET UP BUMP
         STA AUDF4       ;SOUND FREQUENCY
         DEC BSCNT       ;AND DECREMENT COUNT.
NOBS     LDA TIMER       ;TIMER DOWN TO ZERO?
         BEQ NODEC       ;YES, DON'T DECREMENT.
         DEC TIMER       ;DECREMENT TIMER.
NODEC    LDA FILLON      ;ARE WE FILLING?
         BEQ NOFILL      ;NO, DO REST OF VBI.
         JMP XITVBV      ;YES, EXIT VBI
NOFILL   LDA #0          ;CLEAR OUT
         STA DEADFG      ;DEAD FLAG
         LDA P0PL        ;HAS PLAYER 0
         AND #$08        ;HIT PLAYER 3?
         BEQ NOHITP      ;NO!
         INC DEADFG      ;YES!!!
NOHITP   LDA P0PF        ;HAS PLAYER 0
         AND #$02        ;HIT COLOR 2?
         BEQ NOHITL      ;NO!
         INC DEADFG      ;YES!!!
NOHITL   STA HITCLR      ;CLEAR COLLISION.
```

```
        LDA MOVTIM      ;MOVEMENT TIMER ZERO?
        BEQ NOMDEC      ;YES, DON'T DECREMENT.
        DEC MOVTIM      ;DECREMENT TIMER.
NOMDEC  LDA SMTIM       ;STAR MOVE TIMER ZERO?
        BEQ NMTDEC      ;YES, DON'T DECREMENT.
        DEC SMTIM       ;DECREMENT TIMER.
NMTDEC  LDA STARCT      ;STAR ROT. TIMER ZERO?
        BEQ STAROT      ;YES, ROTATE STAR!
        DEC STARCT      ;DECREMENT TIMER
        JMP VBREST      ;AND SKIP ROTATION.
STAROT  LDA #1          ;SET ROT. TIMER
        STA STARCT      ;TO 1
        LDA STRPOS      ;INCREMENT
        CLC             ;STAR ROTATION
        ADC #1          ;COUNTER,
        CMP #7          ;ALLOW ONLY 0-6.
        BNE STOSTP      ;ROT. COUNT OK
        LDA #0          ;ZERO ROT. COUNTER.
STOSTP  STA STRPOS      ;SAVE ROT. POS.
VBREST  LDY STRPOS      ;THIS SECTION
        LDX STRHGT      ;DRAWS THE STAR
        LDA #0          ;IN PLAYER 0
        STA PL0-1,X     ;MEMORY USING
        STA PL0+8,X     ;THE TABLES
        LDA STARB1,Y    ;'STARB1' THRU
        STA PL0,X       ;'STARB8'.
        LDA STARB2,Y
        STA PL0+1,X
        LDA STARB3,Y
        STA PL0+2,X
        LDA STARB4,Y
        STA PL0+3,X
        LDA STARB5,Y
        STA PL0+4,X
        LDA STARB6,Y
        STA PL0+5,X
        LDA STARB7,Y
        STA PL0+6,X
        LDA STARB8,Y
        STA PL0+7,X
        LDA STRHOR      ;SET STAR'S
        STA HPOSP0      ;HORIZ. POS.
        LDA SHOOFF      ;OK TO SHOW PLAYER?
        BNE ENDVBI      ;NO, EXIT VBI
        LDA PX          ;SET PLAYER'S
        CLC             ;HORIZONTAL
        ADC #47         ;POSITION
        STA HPOSP3
        LDA PY          ;DRAW PLAYER
        CLC             ;IN PLAYER 3
        ADC #$10        ;MEMORY
        TAX
        LDA #0
        STA PL3-3,X
        STA PL3-2,X
        STA PL3+2,X
        STA PL3+3,X
        LDA #$40
        STA PL3-1,X
        STA PL3+1,X
        LDA #$A0
        STA PL3,X
        LDA NOCCHG      ;COLOR CHANGE OK?
        BNE ENDVBI      ;NO, EXIT VBI
        INC COLPM3      ;YES, CYCLE THE COLOR.
ENDVBI  JMP XITVBV      ;DONE WITH VBI!
;
;DATA
;
DLIST   DB  $70,$70,$70
        DB  $4D,DISP&255,DISP/256
        DB  $D,$D,$D,$D,$D,$D,$D,$D,$D,$D
        DB  $D,$D,$D,$D,$D,$D,$D,$D,$D,$D
        DB  $D,$D,$D,$D,$D,$D,$D,$D,$D,$D
        DB  $D,$D,$D,$D,$D,$D,$D,$D,$D,$D
        DB  $D,$D,$D,$D,$D,$D,$D,$D,$D,$D
        DB  $D,$D,$D,$D,$D,$D,$D,$D,$D,$D
        DB  $D,$D,$D,$D,$D,$D,$D,$D,$D,$D
        DB  $D,$D,$D,$D,$D,$D,$D,$D,$D,$D
        DB  $D,$D,$D,$D,$D,$20,$46
SCDL    DW  SCOLIN
        DB  $46
        DW  SCOLN2
        DB  $41,DLIST&255,DLIST/256

SCOLIN  DB  CT,CG,CT,CCOL,0,0,0,0,0,0
        DB  0,CC,CU,CR,CCOL,0,0,0,0,0
SCOLN2  DB  CL,CV,CCOL,0,0,0,CS,CC,CO
        DB  CR,CE,CCOL,0,0,0,0,0,0,0,0
GOMSG   DB  0,0,0,0,0,CG,CA,CM,CE,0
        DB  0,CO,CV,CE,CR,0,0,0,0,0
;
;LEVEL TABLES
;
TGTLO   DB  64,16,224,40,248,212,16,4
        DB  248,224,212,224,68,168,112,212
TGTHI   DB  31,39,46,35,42,48,39,41,42
        DB  46,48,46,47,47,48,48
STARSP  DB  4,4,4,3,3,3,2,2,2,2,2,1,1
        DB  1,1,1
KILLFG  DB  0,0,1,0,1,1,0,1,1,1,1,0,0
        DB  1,1,1

ZERO1   DB  0
SCORE   DB  0,0,0,0,0,0
SLLOC   DB  0
CURLO   DB  0
CURHI   DB  0
LEVEL   DB  0
PAUSE   DB  0
HASDRN  DB  0
LOWK    DB  0
HIWK    DB  0
SCTALY  DB  0
LIVES   DB  0
;
;STAR PLAYER-MISSILE IMAGES
;
STARB1  DB  $81,$40,$20,$10,$08,$04,$02
STARB2  DB  $42,$43,$20,$10,$08,$04,$C2
STARB3  DB  $24,$24,$13,$10,$08,$C8,$24
STARB4  DB  $18,$18,$1C,$1F,$F8,$38,$18
STARB5  DB  $18,$18,$38,$F8,$1F,$1C,$18
STARB6  DB  $24,$24,$C8,$08,$10,$13,$24
STARB7  DB  $42,$C2,$04,$08,$10,$20,$43
STARB8  DB  $81,$02,$04,$08,$10,$20,$40

STARCT  DB  0
STRPOS  DB  0
STRHGT  DB  0
STRHOR  DB  0
STRLX   DB  0
STRLY   DB  0
TMPDIR  DB  0
STRDIR  DB  0
STRDTX  DB  1,1,0,255,255,255,0,1
STRDTY  DB  0,1,1,0,1,255,255,255
STRSPD  DB  4
COLOR1  DB  $40,$10,$04,$01
COLOR2  DB  $80,$20,$08,$02
COLOR3  DB  $C0,$30,$0C,$03
BITSON  DB  $C0,$30,$0C,$03
BITOFF  DB  $3F,$CF,$F3,$FC
BXSTRT  DB  0,158,158,0
BYSTRT  DB  0,0,84,84
BXINC   DB  1,0,255,0
BYINC   DB  0,1,0,255
BORCNT  DB  159,85,159,85
BORNUM  DB  0
BDINCX  DB  0
BDINCY  DB  0
BDCNT   DB  0
PXWC    DB  0
PYWC    DB  0
SHOOFF  DB  0
CKX     DB  0
CKY     DB  0
INIX    DB  0
INIY    DB  0
MINX    DB  0
MINY    DB  0
MAXX    DB  0
MAXY    DB  0
REX     DB  0
REY     DB  0
X       DB  0
Y       DB  0
SX      DB  0
SY      DB  0
TX      DB  0
TY      DB  0
FX      DB  0
FY      DB  0
TD      DB  0
D       DB  0

BSCNT   DB  0
FILFRQ  DB  0
TRIES   DB  0
FILLON  DB  0
C2TALY  DB  0
NOCCHG  DB  0
DEDBRT  DB  0
STKHLD  DB  0
RDRCOL  DB  0
REDIR   DB  0
LGTHY   DB  0
TIMES   DB  0
CKV     DB  0
CKVX    DB  0
DRAWFG  DB  0
MOVIX   DB  0
XD      DB  0,0,0,0
        DB  0,0,0,1
        DB  0,0,0,255
        DB  0,0,0,0
YD      DB  0,0,0,0
        DB  0,0,0,0
        DB  0,0,0,0
        DB  0,1,255,0
SXD     DB  0,1,0,255
SYD     DB  255,0,1,0
DECIMAL DB  0,0,0,0,0
ZERO2   DB  0
HIVALS  DB  0,0,0,3,39
LOVALS  DB  1,10,100,232,16
DIR     DS  256
LGTH    DS  256

        .END
```

WORD SQUARE

16K cassette or disk

by Sol Guber

The computer can be used as a very good teaching tool. The uses for teaching of mathematics are endless, from simple addition to calculus. Concepts are easily represented through the arithmetic algorithms that are common to computer-assisted instruction (CAI). The teaching of other subjects like geography and history can lend themselves to CAI, either through quizzes or games with the computer either scoring or asking a series of predetermined questions and monitoring the answers. The use of CAI in teaching English and spelling is weak since these subjects lend themselves to repetitive drilling of the concepts. The following is a game that can be used to teach spelling.

The game is called MAGIC SQUARE, and the concept comes from a book called *Puzzelment* by Kohl. The computer makes a square of letters in a random order. The player moves a joystick over the square and forms the letters into words. The letters have to be one of the letters around the previous letter. There is a two-minute time limit, and the only skills needed are in moving the joystick; no typing is needed. There are two levels of difficulty, a six-by-six square containing 11 extra vowels and the standard five-by-five square containing all the letters except Q. The game is non-scoring, in that there is no internal scoring of the game for the number of words or the number of letters used, so that any rules can be made up. The computer also does not check to see if the letters make up a real word.

The following is a quick description of the game. A question is asked if extra vowels are wanted. If a "Y" is pressed, then a six-by-six square is formed. The square is made up in the left corner of the screen. Every time the joystick is moved, it highlights a letter. If the trigger is pressed, the letter is put on the screen below the square. When the word is completed, then the Start button is pushed. When the trigger is pressed for the next letter, another part of the screen shows the next word. The system is set up for a maximum of eight letters in a word. In the upper right corner is a real-time clock that is set for two minutes of time. After the two minutes are up, hitting another key will start the system with a new word square and another two minutes.

The following is a line by line description of the program. Line 10 dimensions the various variables that will be needed. Line 15 puts the subroutine lines into variables. Line 20 determines if extra vowels are desired. Line 30 determines if FLG is set to 1 or 0. In Line 20, a logical IF is performed, and the question X$(1,1)="Y" (1) or does not equal "Y" (0) is answered. This answer is placed into the variable FLG. Line 40 puts the alphabet into A$ and the extra vowels into B$ and determines the values for the size of the square. Line 50 determines if FLG has been set and extra vowels are wanted.

The Line 55 goes into Graphics 2 without a text window and changes the color registers from the default to other colors. Line 60 starts a FOR-NEXT loop that puts the square on the screen. Lines 70-80 determine the position of the next letter. Line 90 determines a random number between 1 and the number of letters still needed. Line 100 puts the letter on the screen in the proper position. Lines 105 and 110 shorten the variable A$ so that fewer letters are needed for the next choice. By decreasing both the size of the variable I and moving the unused letters internal to the variable A$, there is no need to check if the letters have been used yet. This also increases the randomization of the square.

Line 125 goes to a subroutine that puts the possible values of the joystick into a look-up table for quicker translation from numbers to direction. This eliminates many IF tests. Line 130 puts 0 into the two low bits of the real time internal clock in the ATARI. Locations 18, 19, 20 are the real time clock. The value of 20 is changed every 1/60 of a second. When the value reaches 255 in location 20, then the next number is 0 and location 19 is updated by one. When location 19 is 255, the next update is to 0 and location 18 is updated by one. Thus, location 20 is accurate to 1/60 of a second, location 19 is accurate to about 4 seconds, and location 18 is accurate to about 17 seconds. Every 77 hours, the clock starts itself again. Line 140 starts printing the clock on the screen.

Lines 150 and 160 initialize several variables. Line 170 determines the address of the screen memory. Line 175 determines the address in ROM of the position of the joystick, and lines 178 and 190 change the color of that letter. Line 210 determines if the trigger has been pressed, and if it has, then it goes to subroutine line. Lines 212 and 214 determine if the START button has been pressed and if it is the first or the second time in the line. Line 218 is a delay to make the joystick less responsive to movement. Line 220 determines the position of the joystick. If it is 15, it is in the neutral position, then GOSUB clock and go check the trigger again. If it is not in neutral,

then change the color of the letter in line 228, add the appropriate value of the X and Y direction in line 230. Check the movement to see if it is not off the square in lines 240 and 250. If it is, then do not make the movement. Go change the clock in line 300 and then go to change the color of the letter and check the trigger again.

Lines 1000-1090 are the standard subroutine to make a look-up table for the joystick. The various numbers returned by the joystick controller are translated into an X and Y direction which corresponds to the way the joystick is oriented. This greatly speeds up the use of the joystick.

Lines 2000-2060 are subroutine clock. Line 2000 determines how many 1/60's of a second have elapsed since the clock was turned on. Line 2010 determines the minutes, and lines 2020-2030 determine the seconds. Lines 2045 and 2050 print the minutes and seconds that have elapsed. If the number of seconds is less than ten, then a blank is printed after the colon mark. Line 2055 determines if 2 minutes have elapsed, and if they have, then the program goes to line 4000 where it is stopped.

Lines 3000-3070 are subroutine LINE. Line 3000 determines the letter under the joystick. Line 3005 determines if the position is the same as the last time the trigger has been pressed. If it is, then the program is returned. The program is fast and it is hard to press the trigger for a short enough interval to signal the system and not long enough to signal the system twice. As a compromise, no letter is allowed to be used as a double letter, and, to have a letter be printed on the screen, it must not be the same as the last letter. In other words, the position of the joystick must have been changed. Line 3007 updates the position. Line 3010 determines the color of the letter. Line 3020 determines the spot to put the letter and lines 3030-3040 put the letter on the screen and updates the position. Lines 3050-3060 make a random sound, and the subroutine returns to the program.

Lines 4000-4040 put a message in the right hand corner that the game is over. Lines 4042 make a sound to signify the same thing if the person was not paying attention. Line 4050 determines if a key has been pressed to start the next game. If it has, then the system goes to line 20, and a new game is started. □

```
10 DIM A$(36),B$(11),X$(3),XSTEP(15),Y
STEP(15)
15 CLOCK=2000:LINE=3000
20 ? "DO YOU WANT EXTRA VOWELS":INPUT
X$
25 FLG=0
30 IF X$(1,1)="Y" THEN FLG=1
40 A$="ABCDEFGHIJKLMNOPRSTUVWXYZ":B$="
AAAEEEIIIOO":SSQ=5:SQ=25
50 IF FLG=1 THEN A$(LEN(A$)+1)=B$:SSQ=
6:SQ=36
55 GRAPHICS 17:SETCOLOR 0,4,10
58 SETCOLOR 1,9,6:SETCOLOR 2,15,10
60 FOR I=SQ TO 1 STEP -1
70 R=INT((I-1)/SSQ)
80 POSITION R+2,-R*SSQ+I
90 S=INT(RND(0)*I)+1
100 PRINT #6;A$(S,S)
105 IF S=I THEN 120
110 A$(S,S)=A$(I,I)
120 NEXT I
125 GOSUB 1000
130 POKE 20,0:POKE 19,0
140 GOSUB CLOCK
150 R=8:T=1
160 X=2:Y=1
170 SC=PEEK(88)+256*PEEK(89)
175 LOC=SC+20*Y+X
178 Z=PEEK(LOC)
190 POKE LOC,Z+64
210 IF STRIG(0)<>1 THEN GOSUB LINE
212 IF PEEK(53279)<>7 AND T>10 THEN R=
R+1:T=1:Y1=0:X1=0
214 IF PEEK(53279)<>7 AND T<>1 THEN T=
9:X1=0:Y1=0
218 FOR J=1 TO 25:NEXT J
220 S=STICK(0)
225 IF S=15 THEN GOSUB CLOCK:GOTO 210
228 Z=PEEK(LOC):IF Z>64 THEN POKE LOC,
Z-64
230 X=X+XSTEP(S):Y=Y+YSTEP(S)
240 IF X>SSQ+1 OR X<2 THEN X=X-XSTEP(S
)
260 IF Y<1 OR Y>SSQ THEN Y=Y-YSTEP(S)
300 GOSUB CLOCK
330 GOTO 175
1000 XSTEP(5)=1:YSTEP(5)=1
1010 XSTEP(6)=1:YSTEP(6)=-1
1020 XSTEP(7)=1:YSTEP(7)=0
1030 XSTEP(9)=-1:YSTEP(9)=1
1040 XSTEP(10)=-1:YSTEP(10)=-1
1050 XSTEP(11)=-1:YSTEP(11)=0
1060 XSTEP(13)=0:YSTEP(13)=1
1070 XSTEP(14)=0:YSTEP(14)=-1
1080 XSTEP(15)=0:YSTEP(15)=0
1090 RETURN
2000 Z=256*PEEK(19)+PEEK(20)
2010 MIN=INT(Z/3600)
2020 SEC=Z-MIN*3600
2030 SEC=(INT(SEC/60)*10)/10
2040 POSITION 12,0
2045 IF SEC<10 THEN ? #6;MIN;": ";SEC:
GOTO 2055
2050 ? #6;MIN;":";SEC
2055 IF MIN=2 THEN GOTO 4000
2060 RETURN
3000 Z=PEEK(LOC)
3005 IF X1=X AND Y1=Y THEN RETURN
3007 X1=X:Y1=Y
3010 IF Z>64 THEN Z=Z-64
3020 SPOT=SC+R*20+T
3030 POKE SPOT,Z+128
3040 T=T+1
3050 SOUND 0,X*Y*8*RND(0),10,10
3060 FOR J=1 TO 15:NEXT J:SOUND 0,0,0,
0
3070 RETURN
4000 POSITION 12,2:? #6;"TIME"
4010 POSITION 12,3:? #6;"IS UP"
4020 POSITION 10,4:? #6;"PRESS ANY"
4030 POSITION 10,5:? #6;"KEY TO"
4040 POSITION 10,6:? #6;"START"
4042 FOR J=1 TO 255:SOUND 0,J,10,10:FO
R K=1 TO 3:NEXT K:NEXT J:SOUND 0,0,0,0
4050 IF PEEK(764)=255 THEN GOTO 4050
4060 POKE 764,255:GOTO 20
```

•

(see D:CHECK 2, p. 26)

```
10 DATA 612,955,774,151,644,562,701,14
8,710,255,809,401,623,529,599,8473
110 DATA 487,734,798,816,230,470,484,7
21,216,206,365,825,3,328,144,6827
220 DATA 936,46,558,83,461,94,222,722,
329,526,336,516,793,604,702,6928
1070 DATA 536,710,788,453,550,656,509,
405,575,591,685,787,413,560,933,9151
3010 DATA 83,784,649,554,912,954,790,8
23,29,357,862,123,614,375,246,8155
```

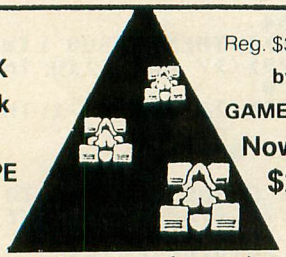
Royal Software

Make Royal Your ATARI® *Source!*

ATARI®

Over 1000 items for your Atari!

BAJA BUGGY



16K Disk OR TAPE

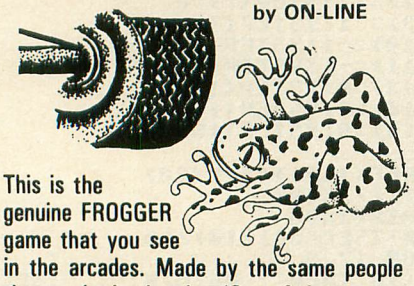
Reg. $32.95 by GAMESTAR

Now Only **$29.60**

If you're looking for a fast action driving game then we recommend this one. Good graphics and sound.

FROGGER

by ON-LINE



This is the genuine FROGGER game that you see in the arcades. Made by the same people that made Jawbreaker (One of the top ten sellers.)

Reg. $34.95 **Now Only**

32K Disk 16K Tape **$31.40**

DISK or Tape

Zaxxon

Reg. $39.95 **ONLY $35.10**

Non-Stop, 3-D Scrolling Action For Your Atari...

HARDWARE

400 Computer 16K (Used)	Call
400 Computer 16K (New)	Call
400 Computer 32K (New)	Call
400 Computer 32K (New) with Full-Stroke Keyboard	Call
400 Computer 48K (new) with Full-Stroke Keyboard	Call
800 Computer 48K (Used)	Call
800 Computer 48K (New)	Call
1200 Computer 64K (NEW! Call For Prices)	
810 Disk Drive	Call
850 Interface	Call
410 Recorder	Call
Atari 16K RAM	Call
Intec 32K RAM	89.00
Intec 48K RAM (For 400)	139.00
Full-Stroke Keyboard (For 400)	109.00
Percom Disk Drive ((DD/SS)	599.00
WICO Joystick	26.90
WICO Trac-Ball	63.00
Blank Diskettes (10/box)	28.00
Mark II Modem	99.00
Alien Group Voice Synthesizer	139.00
Epson MX-80FT + Printer	588.00
Amdek Color 1 Monitor	387.00
12' Joystick Extension Cord	9.95
Computer Paper (1000, 8½"x11")	16.95

Trade in your 400 or 800 on a new 800 or 1200... CALL!

SOFTWARE

De Re Atari (Book)
This manual is The Favorite among serious programmers. Learn the secrets of your Atari!
Reg. $19.95 **NOW ONLY $17.90**

GALAXIAN Now you can play the arcade game at home!
16K Cartridge, Joysticks.
Reg. $44.95 **NOW ONLY $39.50**

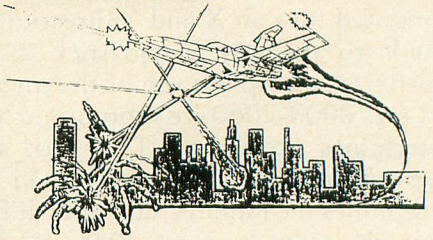
GORF Just like the arcade game.
16K Cart. Reg. $44.95 **ONLY $39.90**
24K Disk. Reg. $39.95 **ONLY $35.10**

EASTERN FRONT The MOST POPULAR APX game ever, and one of the best war games!
16K Tape 32K Disk
Reg. $29.95 **NOW ONLY $27.90**

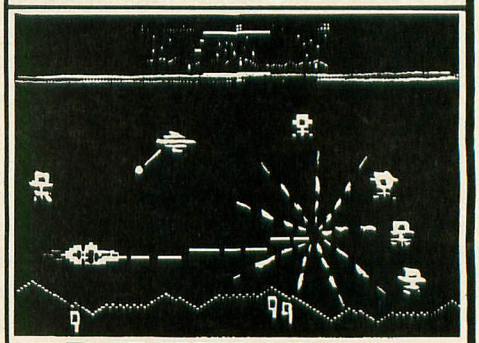
METEOR STORM

16K Tape/Disk

NOW ONLY $29.95



The city is about to be destroyed and ONLY you can save its people from destruction. FAST, arcade type action game.



DEFENDER

New!

- **16K Cartridge**
- **Super Excitement**

Reg. $44.95 **NOW ONLY $39.50**

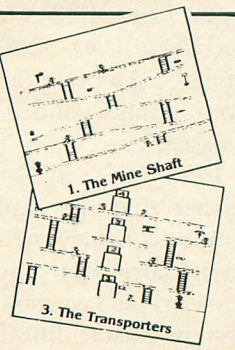
New!

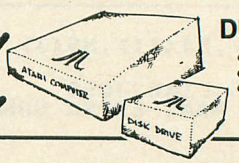
MINER 2049er

- 10 Different Screens
- 16K Cartridge
- Spectacular Sound & Graphics

Reg. $49.95

OUR PRICE ONLY $44.90





DUST COVERS

- 400/800 Computer
- 410 Recorder
- 810 Disk Drive

Only $8.95 Each

Free Catalog!

Full of program descriptions!
►WITH ANY ORDER◄
OR SEND $1.00 Refundable with first order
Send us your name/address for Free Flyers!

Royal Software
2160 W. 11th Avenue
Eugene, Oregon 97402

48 Hour Shipping Available

For Credit Card Orders Call 1-800-452-8013

Open 8am-6pm, Mon-Sat.

We deal *Exclusively in Atari Compatible Products.* Because of this, We Know What Works Best!

Call us for the latest info **(503)683-5361**

BEGINNER'S PILOT

by Thomas M. Krischan

Recently I attended a convention which introduced computers to the novice user. The most popular demonstration there was a simple graphics program written in ATARI Pilot. The program would ask the user to type in the answer to four questions about a pattern to be drawn. The computer would then sketch the pattern on the screen, play a little tune and repeat the questions for the next user. At times fifteen to twenty people would gather around the machine to try their hand at this computerized spirograph. The number of viewers grew even larger when I began to explain how the Pilot language worked. The language consists of only a handful of commands and special characters. Figure 1 lists the most fundamental of these.

Figure 1. Some Pilot commands.

```
T:  TYPE
A:  ACCEPT
M:  MATCH
JM: JUMP ON MATCH
U:  USE
J:  JUMP
E:  END
GR: GRAPHICS
SO: SOUND
PA: PAUSE
*   LABEL
#   NUMERIC VARIABLE
```

The commands of ATARI Pilot consist of one to two key letters followed by a full colon or a special character (eg. #). Each command is directly followed by a subcommand. The subcommand may be an instruction, label, numeric variable, character string or some other statement depending upon the nature of the original command. We will describe the nature of each of the commands that are listed in Figure 1.

The TYPE command (T:) is roughly equivalent to the PRINT command of ATARI BASIC. The character string that you wish to display on the screen is typed after the command. However, the character string does not need to be enclosed by quotation marks. If quotation marks are included they will also be displayed on the screen. The ACCEPT command (A:) is similar to the INPUT command of BASIC, with two major exceptions. Character string variables do not have to be dimensioned nor do variables have to be included at all. In the event that no subcommand follows the ACCEPT command, Pilot will automatically place the character string in a special test register. In the event that the user wishes to type in a number then a numeric variable should follow the command. NUMERIC VARIABLEs consist of a pound sign (ie. #) followed by a single letter; A through Z. Consequently, there are a maximum of 26 numeric variables.

The MATCH command (M:) compares the character string of the special test register against the character strings in the subcommand. Character strings in the subcommand are separated from each other by commas. If a match occurs, Pilot notes which subcommand was the successful one (ie. first, second, third...). The JUMP ON MATCH command (JM:) recalls this notation and executes the corresponding subcommand. Subcommands are in the form of LABELs which are denoted by an asterisk (i.e. *) followed by one to several letters. Again, commas separate the subcommands. In the event that a match has occurred, Pilot will search the entire program for a LABEL that corresponds to the appropriate subcommand of the JUMP ON MATCH. Execution is then transferred to this point.

The USE command (U:) causes Pilot to once again search the entire program for a LABEL that matches the subcommand. Execution is as well transferred to this point. However, upon reaching an END command execution is returned back to the line directly below the originating USE command. The USE command is similar to the GOSUB command of BASIC. It calls subprograms, executes them and returns back to the main program. The JUMP command (J:) is equivalent to a GOTO command in BASIC. It causes Pilot to search the entire program for a LABEL that matches the subcommand and transfers execution to that point. The END command (E:) indicates the terminating point of a program or subprogram.

The GRAPHICS command (GR:) causes the computer to enter the graphics mode. The subcommand instructs Pilot on how to draw, fill, turn, change color, clear the screen or to quit the graphics mode and return to the text mode. The graphic techniques of Pilot are quite different from those of ATARI BASIC and further explanation will

be necessary. The two major differences lie in how the languages reference points and how they issue line drawing instructions. In BASIC the point (0,0) lies in the upper left hand corner of the screen. In Pilot the point (0,0) lies in the direct center of the screen. This conforms to the popular Cartesian coordinate system which is taught in geometry class. The visible portion of this grid accounts for 160 points horizontally by 80 points vertically. This is equivalent to the visible number of points in BASIC's GRAPHIC MODE 6 and 7. However, nonvisible points may be addressed in Pilot without causing an error statement. The second difference is how the languages issue drawing instructions. Instructions in BASIC are an absolute reference system, (ie. PLOT x,y and DRAWTO x,y). In Pilot the only absolute reference point is the initial one (ie. GR:GOTO -20,5) after that all references are relative to the last point. The last point is referred to as the "turtle", hence the nickname "turtle graphics". The subcommand TURN redirects the turtle. A positive value after the subcommand turns the turtle so many degrees clockwise. A negative value turns the turtle counterclockwise. The subcommand DRAW sketches a line. The value after the subcommand determines the length of the line. In ATARI BASIC every line length and turn requires a separate calculation. In the case of the latter, calculation could be quite complex.

The SOUND command (SO:) allows you to create musical tones. Up to four subcommands, separated by commas, can be assigned. The subcommands are in the form of integer values from 0 through 31. These values correspond to musical tones, where 1 represents low C and 31 represents high F. Zero turns the sound off. Four subcommands allow for four separate tones to be played at the same time. The PAUSE command (PA:) determines the length of play for the preceding tone. The subcommand is in the form of a positive value. Tones may be played in 1/60th second intervals; 60 pauses one second, 120 pauses two seconds, and so on.

There are several other commands and special characters. We have described the ones essential to understanding the Pilot program referred to in the opening paragraph and have listed it in Figure 2. We will now go through this example step by step.

Figure 2.

```
10 *LOOP
12 T:WHAT COLOR(RED,BLUE,YELLOW)
13 A:
14 M:RE,BLU,YE
16 JM:*RED,*BLUE,*YELLOW
18 *CONTINUE
20 T:NUMBER OF SIDES
30 A:#S
32 T:LENGTH OF SIDE
34 A:#L
40 T:NUMBER OF DEGREES
50 A:#D
85 U:*DRAW
86 U:*SOUND
90 J:*LOOP
99 E:
100 *DRAW
130 GR:CLEAR
140 GR:GOTO -20,5
150 GR:#S(DRAW #L;TURN #D)
160 E:
200 *SOUND
210 SO:13,17,20
220 PA:60
230 SO:13,18,22
240 PA:60
250 SO:15,20,24
260 PA:60
270 SO:13,17,20,25
280 PA:120
290 SO:0,0,0
294 E:
300 *RED
310 GR:PEN RED
320 J:*CONTINUE
400 *BLUE
410 GR:PEN BLUE
420 J:*CONTINUE
500 *YELLOW
510 GR:PEN YELLOW
520 J:*CONTINUE
599 E:
```

Line 12 types the question, "WHAT COLOR (RED, BLUE, YELLOW)". Line 13 accepts the user's reponse. Line 14 matches this response to the character strings, "RE", "BLU", and "YE". If a match exists, it notes which character string caused the match. Line 16 transfers execution to the corresponding label. Lines 20 and 30 type the question, "NUMBER OF SIDES" and accept the user's response as numeric variable #S. Lines 32 and 34 and 40 to 50 behave in a similar fashion. Lines 85 and 86 use two subprograms labeled "*DRAW" and "*SOUND". Line 90 causes Pilot to jump back to a statement labeled "*LOOP" on line 10. Line 99 indicates the end of the main program.

The main program illustrates two techniques of calling subprograms. The first technique is the JUMP ON MATCH method; line 16. The second technique is the USE method; lines 85 and 86. The first method causes the program to jump from line 16 to one of three labeled statements, depending upon the preceding match; line 14. If the user's response was "RED" then Pilot will find a match in the first character string. This will cause execution to jump from line 16 to the labeled statement "*RED" on line 300. Line 310 causes the turtle to select a red colored "PEN". Line 320 causes the execution to jump back to line 18 which is labeled "*CONTINUE". This just so happens to be the very next line after the JUMP ON MATCH command. Had the user responded "BLUE" or "YELLOW" then the turtle would have selected that corresponding "PEN" color.

The second method of calling a subprogram is the USE command. Line 85 causes Pilot to transfer execution to the statement labeled "*DRAW" on line 100. Line 130 clears the screen while line 140

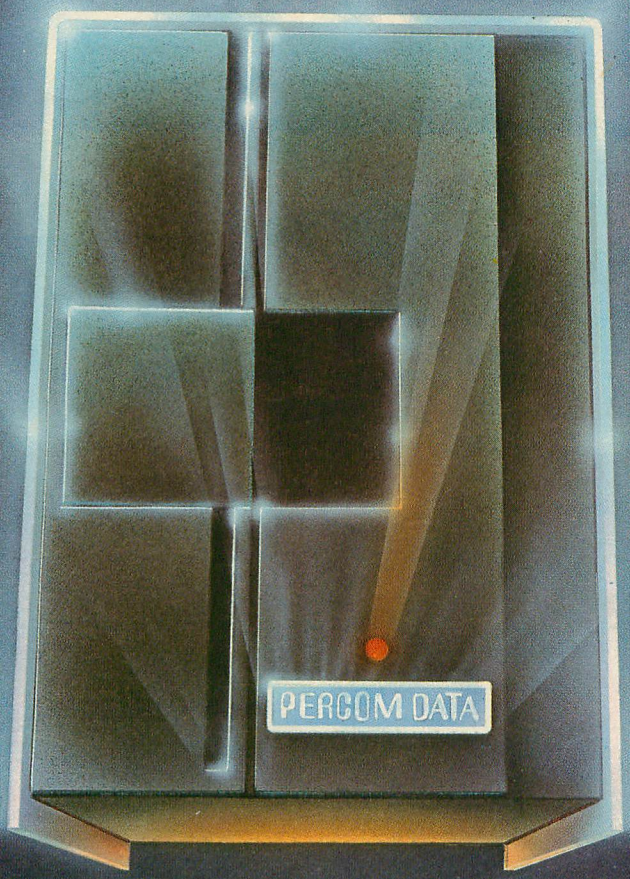
positions the turtle on coordinates (-20,5). Line 150 tells the turtle to draw a line of length #L, then turn #D degrees and repeat this pattern for #S number of times. The color of the pattern will depend upon which color "PEN" the turtle has selected. Line 160 indicates the end of the subprogram and Pilot transfers execution back to the very next line after the USE command.

The next command happens to be another USE command. This command causes the program to transfer execution to the statement labeled "*SOUND" on line 200. Line 210 causes three musical tones to be played. The values 13, 17, and 20 correspond with the musical notes of middle C, middle E, and middle G, respectively. Line 220 causes the tones to be played for one second. Line 230 through 280 are similar in fasion. Line 290 turns the sound off. Line 294 indicates the end of this subprogram. Pilot transfers execution back to the very next line after the second USE command. This line is a JUMP command which causes the entire process to repeat.

For those of you that are not duly impressed with the Pilot language after reading this article, I have a little exercise for you. Part one of the exercise requires you to write a program similar to this one using ATARI BASIC. Sounds simple, doesn't it? The rules for writing the BASIC program limit you to 42 lines with one statement per line; just like the Pilot program. Part two of the exercise requires you to enter into a small race. In this race there will be a turtle (me) and a hare (you). Our programs will do the actual running. For judges we need to find two novice programmers. The race begins when you hand my turtle article over to one judge and you then start to explain your harebrained program to the other judge. The race is over when either judge completely understands the entire program and finishes the explanation by saying "Ah ha!" Who will you bet on, the turtle or the hare? □

```
ISSUE #9 CONTAINED ERRORS IN 2 PROGRAM
LISTINGS.  HERE ARE THE CORRECTIONS:

DISKTOOL PART 2 (PG. 38, LISTING #2):

120 GOTO 2000

330 SECNUM=VAL(A$):IF SECNUM<1 OR SECN
UM>720 THEN ? "      INVALID SECTOR. RA
NGE IS (1-720)":POP :GOTO 370

340 SECHI=INT(SECNUM/256):SECLOW=INT(S
ECNUM-(SECHI*256)):RETURN

BURP! (PG. 62, BASIC LISTING):

150 TRAP 170

160 READ A:PUT #1,A:GOTO 160
```

INDEX TO ADVERTISERS



We've Got More Than A Fond Attachment For Your ATARI

We've Got A Disk Drive For $488.

Percom Data Corporation believes your Atari* home computer is more than just fun and games. We believe you should be able to get a single-density, floppy-disk-system for your Atari 400 or 800 at a price that will take you into the future without knocking you into the next galaxy.

Percom Data has been manufacturing disk-drive systems, and other accessories for personal computers since the mid-1970's and is the industry standard to follow when it comes to data separation and system compatibility.

The Percom Data AT-88 combines Percom Data quality and reliability at a price that is not a budget-buster.

The Percom Data AT-88 offers 88 Kbytes (formatted) in single-density, with plug-in ease of attachment to your Atari. The AT-88 has integral power supply, "no-patch" to Atari DOS and critical constant speed regulation.

Take advantage of this low introductory price of $488 by calling Percom Data now to get more information, or the name of an authorized dealer nearby. Call toll-free
1-800-527-1222

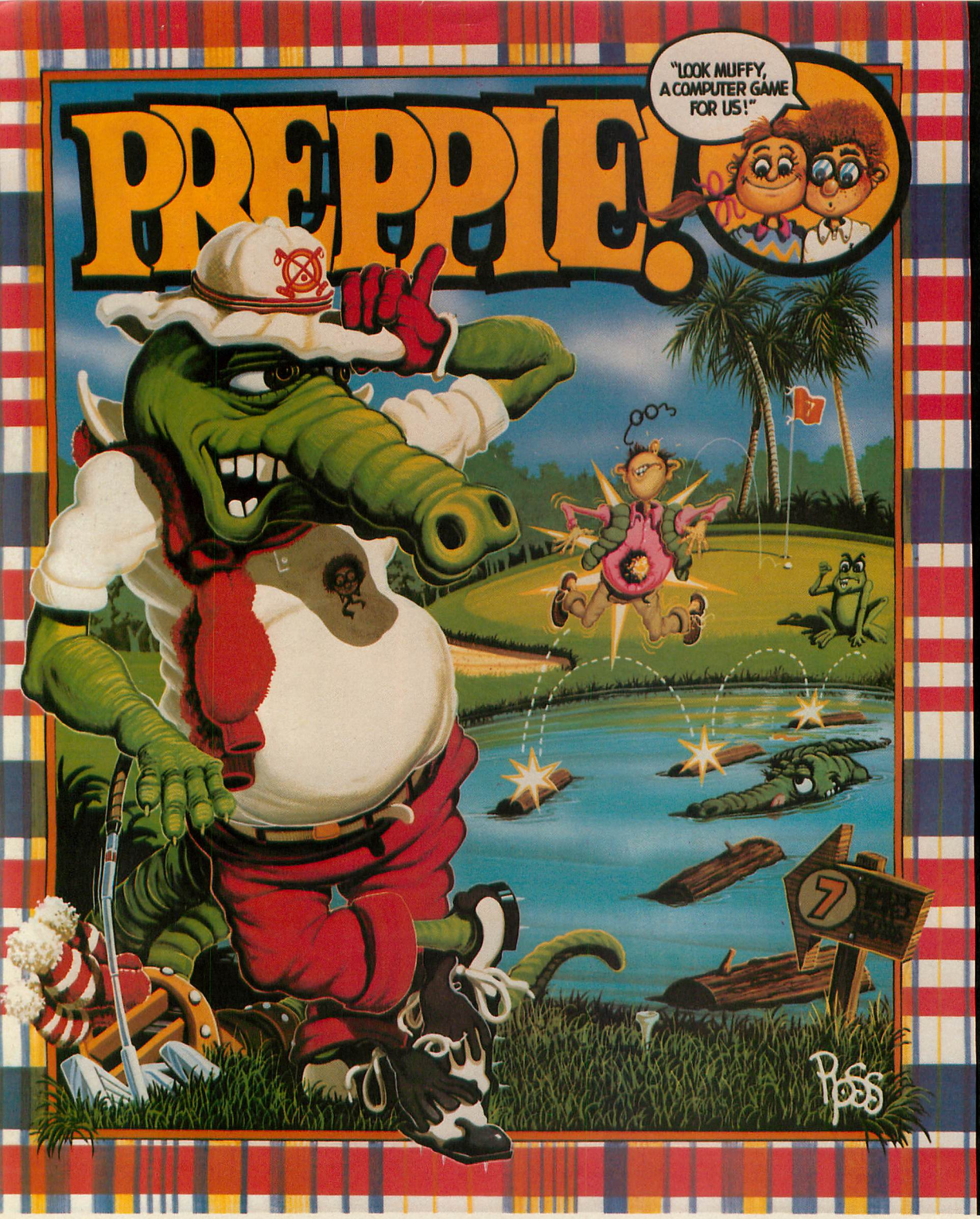
PERCOM DATA
CORPORATION

Expanding Your Peripheral Vision

DRIVES • NETWORKS • SOFTWARE

11220 Pagemill Road Dallas, Texas 75243 (214) 340-7081
1-800-527-1222

*Atari 400/800 is a trademark of ATARI, INC.

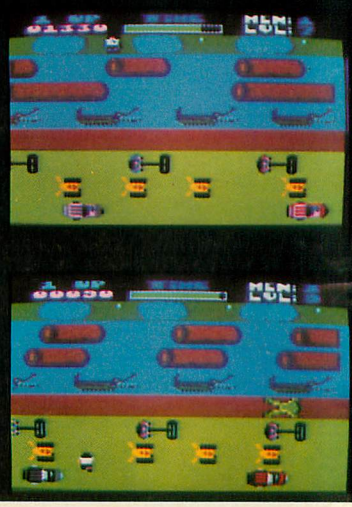


PREPPIE II
IS HERE!

That's *right you* LaCoste-clad Atari owner. Wadsworth Overcash, our Weejuned young *prepster* continues his exploits — this time at college and just like daddy, he's decided to pledge a fraternity. Have we got surprises for him (and you)!

AVAILABLE NOW
AT FINE COMPUTER STORES EVERYWHERE

by Russ Wetmore



Good Golly! What A GAME!

The original arcade game **PREPPIE!** will give you hours of toe-tickling fun. **You** take the controls, moving your young prepster about on the golf course. And what a golf course! It's unlike any you have ever played on before. There are dangers **everywhere,** and only you can keep the little Ivy Leaguer from a fate worse then Penn State!

PREPPIE! is written in state-of-the-art machine language, is joystick compatible and fully utilizes the Atari's sound and graphics capabilities. Quite frankly, it will give you the most fun you can have on an Atari microcomputer.

PREPPIE! is available at fine computer, book, and hobby stores everywhere.

An exclusive game from

ai Adventure INTERNATIONAL
A DIVISION OF SCOTT ADAMS, INC.

To order, see your local dealer. If he does not have the program you want, then call 1-800-327-7172 (orders only) or write for our free catalog.

Published by ADVENTURE INTERNATIONAL
a division of Scott Adams, Inc.
BOX 3435 • LONGWOOD, FL 32750 • (305) 862-6917

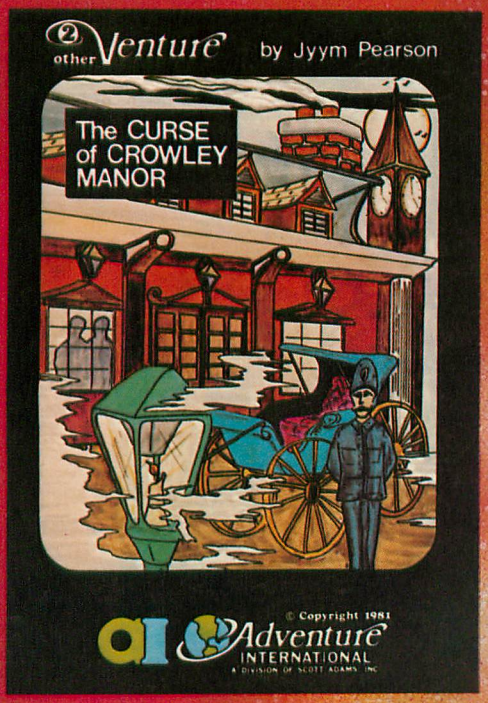
"My Atari never did things like this before!"
—Holister Townsend Wolfe

"I had so much fun I almost blew my doughnuts."
—Theodore Boston III

"I haven't had this much fun since Buffy and I went to Princeton for the weekend."
—Martha Vineyard

OTHER WORLDS. OTHER REALITIES.

(FOR EXPERIENCED ADVENTURERS ONLY!)



THE CURSE OF CROWLEY MANOR

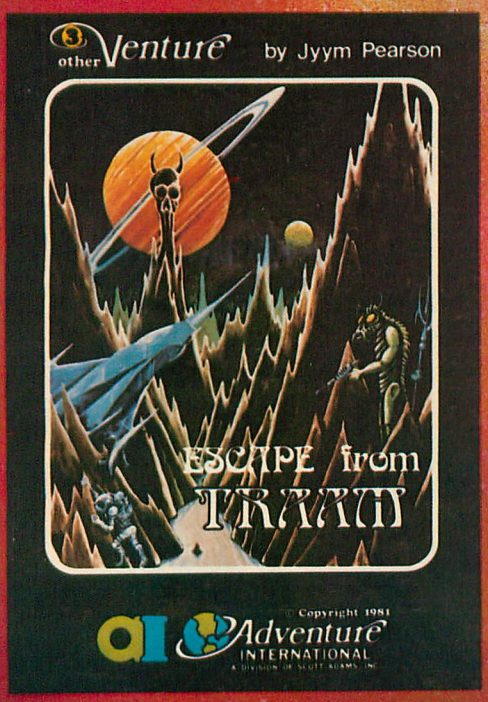
by Jyym Pearson

You've sensed it before: nameless, unreasoning fear. Fear of the unseen — of things that scurry and scrabble through the shadows when the lights have been put out. How then will you fare when you face the Ultimate Evil; how will you possibly survive — THE CURSE OF CROWLEY MANOR?

Jyym Pearson, author of ESCAPE FROM TRAAM and many other fine programs, explores a new dimension in fright with a macabre tale of things that go bump in the night. THE CURSE OF CROWLEY MANOR is an excursion into mind-wrenching terror as you enter the dreaded Crowley Estate in search of answers to some pretty grisly questions. Fear fans take note: This is the stuff that nightmares are made of, so think twice before you approach...

THE CURSE OF CROWLEY MANOR features Adventuring the way YOU like it, with plenty of clever plot twists, and a scenario that'll roll your socks up and down your legs! If Adventuring has become a bit tame for you lately, this is one sure-fire cure! THE CURSE OF CROWLEY MANOR will run on any ATARI 400 or 800 with ample memory. We supply the software; you supply the atmosphere. (A well-lit room is optional, but recommended!)

ATARI 16K TAPE 050-0108 $24.95



ESCAPE FROM TRAAM

by Jyym Pearson

As soon as your small space cruiser began losing altitude, you knew you were in for serious trouble. You somehow walked away from a fiery landing that would've spelled certain death for a less fortunate man, but as one may quickly learn, there are fates far worse than a rapid death...

You've managed to walk away intact from the awesome Curse of Crowley Manor. So far, so good. But will even your finely tuned Adventuring skills give you the necessary edge to ... ESCAPE FROM TRAAM?

ESCAPE FROM TRAAM is a detailed Adventure for the ATARI 400 or 800 computer that defies the player to successfully search a bizarre alien world for a means of escape. The perils are many and the opportunities for survival are few. But for the clever Adventurer, a single opportunity is all that might be needed for a speedy exit from this hellish world. Are you up to the challenge?

All of the traditional Adventure elements are in ESCAPE FROM TRAAM, including two-world command input, game save feature, and an extensive vocabulary. Add to this the impact of a dynamic storyline that'll give even the most experienced Adventurer a real workout! ESCAPE FROM TRAAM — a fine addition to any Adventure collection.

ATARI 16K TAPE 050-0109 $24.95

PRICES SUBJECT TO CHANGE

Adventure INTERNATIONAL
A DIVISION OF SCOTT ADAMS, INC

To order, see your local dealer. If he does not have the program, then call 1-800-327-7172 (orders only please) or write for our free catalog.

Published by ADVENTURE INTERNATIONAL
a subsidiary of Scott Adams, Inc.
BOX 3435 • LONGWOOD, FL 32750 • (305) 830-8194

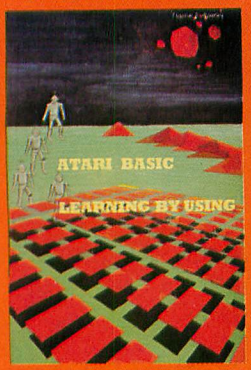
HOFACKER

ELCOMP PUBLISHING, INC.
53 Redrock Lane, Pomona CA 91766 / USA
Phone (714) 623-8314

Payment: Check, money order, VISA, Master Charge, Eurocheck
Orders from outside USA: add 15 % shipping.
CA-residents add 6.5 % tax.

BOOKS + SOFTWARE

FOR ATARI 400/800® · VIC-20® · SINCLAIR/TIMEX® · OSI · APPLE® PET/CBM



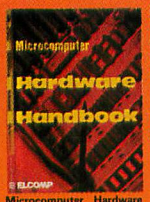
ATARI BASIC — Learning by Using
An excellent book for the beginner. Many short programs and learning exercises.
Order-No. 164 $7.95

Games for the ATARI Computer
This book describes advanced programming techniques like player-missile-graphics and use of the hardware-registers. Contains many ready-to-run programs in BASIC and one called GUNFIGHT in machine language.
Order-No. 162 $7.95

How to program your ATARI in 6502 machine language
The subject of this book is to teach you how to program your ATARI computer in 6502 machine language. Contains a large collection of programs.
Order-No. 169 $9.95

Program Descriptions (ATARI)
Order-No. 173 $5.00

FORTH on the ATARI—Learning by Using, Order-No. 170 $7.95



Microcomputer Hardware Handbook (845 pages)
Descriptions, pinouts and specifications of the most popular microprocessors and support chips.
A MUST for the hardware buff.
Order-No. 29 $14.95

Care and Feeding of the Commodore PET
Eight chapters exploring PET hardware. Includes repair and interfacing information. Programming tricks and schematics.
Order-No. 150 $9.95

Complex Sound Generation
New revised applications manual for the Texas Instruments SN 76477 Complex Sound Generator.
Order-No. 154 $6.95

8K Microsoft BASIC Reference Manual
Order-No. 151 $9.95

Expansion Handbook for 6502 and 6802
Order-No. 152 $9.95

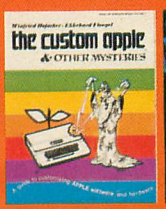
Books for OSI

The First Book of OHIO	#157	$7.95
The Second Book of OHIO	#158	$7.95
The Third Book of OHIO	#159	$7.95
The Fourth Book of OHIO	#160	$9.95
The Fifth Book of OHIO	#161	$7.95

Bare boards from the Custom APPLE Book

6522 I/O Board	#605	$39.00
EPROM Burner	#607	$49.00
8K EPROM/RAM Board	#609	$29.00
Prototyping board	#604	$29.00
Slot repeater board	#606	$49.00

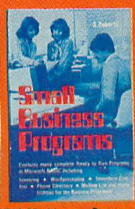
Order two boards and get the book FREE!



The Custom Apple + Other Mysteries — A complete guide to customizing the Apple Software and Hardware.
Order-No. 680 $24.95

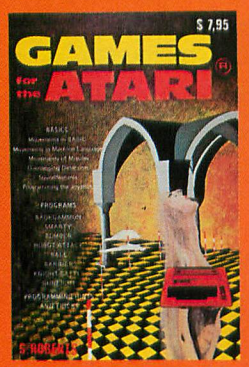
We also stock the boards which are used in the book "The Custom Apple..." (bare boards).

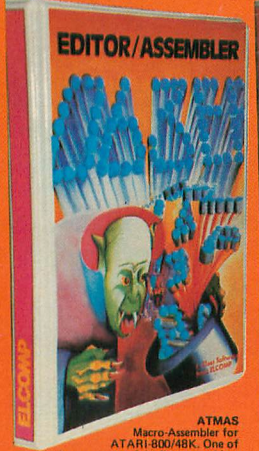
Programming in 6502 Machine Language on your PET + CBM
2 complete Editor/Assemblers (Source code 3 hexdump + description plus a powerful machine language monitor (hexdump).
Order-No. 166 $19.95
Above assemblers on cassette (Book No. 166 included).
Order-No. 4812 $39.95



Programming in BASIC and machine language with the ZX-81 (82) or TIMEX 1000.
Order-No. 174 (book) $9.95

Small Business Programs
Complete listings for the business user. Inventory, invoice writing, mailing list and much more.
Order-No. 156 $14.90





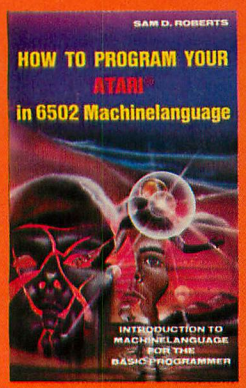
ATMAS
Macro-Assembler for ATARI-800/48K. One of the most powerful editor assemblers on the market. Versatile editor with scrolling. Up to 17k of source-code. Very fast, translates 5k source-code in about 5 sekonds. Source code can be saved on disk or cassette. (IncludesATMONA-1).
Order-No. 7099 disk version $89.00
Order-No. 7999 cartridge version $129.00

ATAS
Same as ATMAS but without macro-capability. Cassette-based.
Order-No. 7098 32K RAM $49.95
Order-No. 7998 48K RAM $49.95

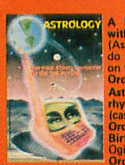
ATMONA-2
This is a tracer debugger) that lets you explore the ATARI RAM/ROM area. You can stop at previously selected address, opcode, or operand. Also very valuable in understanding the microprocessor. Includes ATMONA-1.
Order-No. 7049 cassette version $49.95
Order-No. 7050 disk version $54.00

ATMONA-1
A powerful machine language monitor. Disassemble, dump (hex and ASCII), change memory location, block transfer, fill memory block, save and load-machine-language programs, start programs. Printer option via three different interfaces.
Order-No. 7022 cassette version $19.95
Order-No. 7023 disk version $24.95
Order-No. 7024 cartridge version $59.00

FORTH from Elcomp Publishing, Inc. is an extended Fig-Forth-version, Editor and I/O package included. Utility package includes decompiler, sector copy, Hex-dump (ASCII), ATARI Filehandling, total graphic and sound, joystick program and player missile. Extremely powerful!
Order-No. 7055 disk $39.95
Floating point package with trigonometric functions (0–90°).
Order-No. 7230 disk $29.95
Learn-FORTH from Elcomp Publishing, Inc.
A subset of Fig-Forth for the beginner. On disk (32K RAM) or on cassette (16K RAM).
Order-No. 7053 $19.95



COMING SOON! ORDER NOW!
A Look in the future with your ATARI
(Astrology and how to do your own horoscope on the ATARI 800).
Order-No. 171 $9.95



Astrology and Biorhythm for ATARI (cass. or disk).
Order-No. 7223 $29.95
Birth control (Knaus Ogino). Cass. or disk.
Order-No. 7222 $29.95

Programs from Book No. 164
The programs from book No. 164 on disk (book included).
Order-No. 7100 $29.00
Programs from Book No. 162 on disk (book included)
Order-No. 7221 $29.95
GUNFIGHT
This game needs two joysticks. Animation+ sound. Comes on a bootable cassette.
Order-No. 7207 $19.95

Hardware-ADD-ONs for ATARI

EPROM BOARD
(Cartridge) — Holds two 4k EPROMs (2532). EPROMs not included.
 # 7043 $29.95

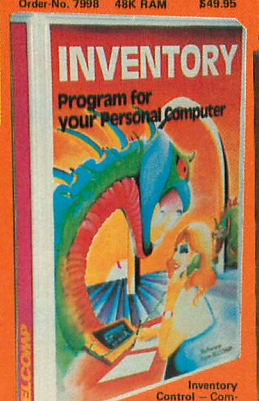
EPROM BOARD KIT
Same as above but bare board only with description.
Order-No. 7224 $14.95

Printer Interface
This construction article comes with printed circuit board + software. You can use The EPSON printer without the ATARI printer interface. (Gameport 3 and 4).
Order-No. 7211 $19.95

RS-232 Interface for your ATARI 400/800
Software + connector + constr. article.
Order-No. 8291 $19.95

EPROM BURNER for ATARI 400/800
Works with gameport. No additional power supply. Comes compl. assembled with software (2716,2732,2532).
Order-No. 7042 $179.00

EPROM BURNER for ATARI 400/800 Kit
Printed circuit board incl. software and extensive construction article.
Order-No. 7292 $49.00



Inventory Control — Completely menu driven.
Order-No. 7214 cass. $19.95
Order-No. 7215 disk version $24.95

Invoice writing for Small Business
This program makes writing invoices easy.
Order-No. 7201 cassette version $29.95
Order-No. 7200 disk version $39.95

ATAMEMO — This is the date-block you always wanted. Makes effective time planing easy!
Order-No. 7310 disk only $29.95

Mailing-List — This menu driven program allows the small business man to keep track of vendors and customers. You can search for a name or address of a certain town or for an address with a certain note. 50 addresses are put into one file.
Order-No. 7212 cassette version $19.95
Order-No. 7213 disk version $24.95

ATEXT-1
This wordprocessor is an excellent buy for your money. It features screen oriented editing, scrolling, string search (even nested), left and right margin justification. Over 30 commands. Text can be saved on disk or cassette.
Order-No. 7210 cassette version $29.95
Order-No. 7216 disk version $34.95
Order-No. 7217 cartridge version $69.00
A version for the BIT3-80 col. card is avail.
ATCASH-1 — Cash register for ATARI
Order-No. 7307 disk only $49.95

Universal Experimenter Board for the VIC-20 — (Save money with this great board). This board plugs right into the expansion slot of the VIC-20. The board contains a large prototyping area for your own circuit design and expansion. The construction article shows you how to build your own 3k RAM expander and ROM-board.
Order-No. 4844 $18.95

Software for SINCLAIR ZX-81 and TIMEX 1000
Machine Language Monitor
Order-No. 2399 $9.95
Mailing List # 2398 $19.95

Books + Software for VIC-20 (requires 3K RAM Exp.)

Wordprocessor, 8K RAM	# 4870	$19.95
Mailing List, 16K RAM	# 4883	$14.95
Tricks for VICs (book)	# 176	$ 9.95
TIC TAC VIC	# 4880*	$ 9.95
GAMEPACK I (3games)	# 4881	$14.95
Dual Joystick Instruct.	# 4885	$ 9.95
INPUT/OUTPUT Progr	# 4886	$ 9.95
Miniassembler	# 4896	$19.95
Tennis, Squash, Break	# 4881	$ 9.95
Runfit for VIC	# 4894	$ 9.95

Finally, a computer game you can BEAT your kid at

It's the same old story. Your kid boots up his favorite space swash-buckler and pleads, "Ah, come on, Dad, just one game of Starstruck."
Naturally, you resign yourself to humiliating defeat. Another day, another loss.
Well, take revenge with Golf Challenge™!
Practice by yourself, rain or shine, then challenge your kid or the whole family to nine or 18 holes of championship golf - up to four at a time.
Soon you'll be saying, "C'mon, son, just one more game of Golf Challenge™."

Order Golf Challenge™ cassette for Atari 400/800 from your local computer dealer for $24.95 or directly from Sierra On-Line, Inc., Sierra On-Line Building, Coarsegold, CA 93614 (209) 683-6858. Add one dollar for shipping and handling. VISA • MASTERCARD • CHECK • COD ACCEPTED

Sierra ON-LINE INC

SIERRAVISION™

WHEN YOU SIT DOWN TO A SCOTT ADAMS' GRAPHIC ADVENTURE . . .

. . . ANYTHING CAN HAPPEN!

That's right — anything can happen, and it usually does! Because with a Scott Adams Graphic Adventure, the fantastic is as close as your computer — and your own fertile imagination. Each S.A.G.A. features the finest in hi-resolution graphics — graphics which compliment and enhance the classic text — and, they can be toggled on or off with a single keystroke, too. Plus, optional Votrax Type 'N Talk™ and printer compatibility give you the flexibility to add new dimensions to your Adventuring — when you're ready.

The incomparable S.A.G.A. Series — experience the magic yourself. But be prepared for anything.

S.A.G.A. #1 — Adventureland (Skill Level: Moderate)		
APPLE 2 PLUS 48K Disk (DOS 3.3 req.) . .	042-0201	$39.95
ATARI 48K Disk	052-0201	$39.95
S.A.G.A. #2 — Pirate Adventure (Skill Level: Beginner)		
APPLE 2 PLUS 48K Disk (DOS 3.3 req.) . .	042-0202	$39.95
ATARI 48K Disk	052-0202	$39.95
S.A.G.A. #3 — Mission Impossible (Skill Level: Advanced)		
APPLE 2 PLUS 48K Disk (DOS 3.3 req.) . .	042-0203	$39.95
ATARI 48K Disk	052-0203	$39.95
S.A.G.A. #6 — Strange Odyssey (Skill Level: Moderate)		
APPLE 2 PLUS 48K Disk (DOS 3.3 req.) . .	042-0206	$39.95
ATARI 48K Disk	052-0206	$39.95

PRICES SUBJECT TO CHANGE

Also, look for the Scott Adams Text Adventure Series on these fine computers:
TRS-80 • COMMODORE VIC • NEC PC-8001
TEXAS INSTRUMENTS 99/4 • CP/M Z-80

Adventure INTERNATIONAL
A DIVISION OF SCOTT ADAMS, INC

To order, see your local dealer. If he does not have the program, then call 1-800-327-7172 (orders only please) or write for our free catalog.

Published by ADVENTURE INTERNATIONAL
a subsidiary of Scott Adams, Inc.
BOX 3435 • LONGWOOD, FL 32750 • (305) 830-8194