NO. 42 MAY 1986

U.S.A. \$3.00 CANADA \$4.75

THE #1 MAGAZINE FOR ATARI® COMPUTER OWNERS

FINELS IS COMPUTING

Modern Relief for Modern Problems

THIS ISSUE:
Bits & Pieces
Atarzee
Printing Utility
M/L Editor



MCLUDING G



Another Great Simulation from Sid Meier -Author of F-15 Strike Eagle

Now he takes you from the cold, thin air and limitless space of F-15 Strike Eagle down into the dark depths of the Pacific Ocean inside an American World War II submarine for a realistic, action-filled simulation —

Thrill to the initial sighting of the enemy's strike force in your periscope as their ships come into your range. But watch out — the enemy's escorts have just sighted you. You're the **hunter** — but suddenly — you've become the **hunted!**

As Commander, you must sink their ships and keep your submarine from being destroyed — if you can. Will you select a quiet patrol sector in the Marianas Islands or choose the dangerous waters off the coast of Japan? Is a submerged daylight periscope attack best or do you charge in on the surface at night using only radar bearings to guide you? Do you fire a spread of your precious torpedoes or can you close the range and pick off the enemy with a single torpedo shot? These decisions and many more are yours to make as you take your place among the elite ranks of the **SILENT SERVICE!**

It's **exciting** — and it's **fun.** It's another great Micro Prose simulation
— and it's called **SILENT SERVICE.** Look for it now on your dealer's shelves.



FIVE AUTHENTIC **BATTLE STATION SCREENS**

Silent Service is available for Commodore 64/128, Apple II Family, Atari XL/XE, IBM PC/PC Jr. computers for a suggested retail of only \$34.95. Available soon for Macintosh for a suggested retail of only \$39.95. Call or write for more information or MC/VISA orders.

COMMODORE, APPLE, ATARI, IBM, and MACINTOSH are registered trademarks of Commodore Business Inc., Apple Computer Inc., Atari Inc., and International Business Machines Inc., respectively.

Photo courtesy Baltimore Maritime Museum

Try These Other Real Life Simulations



Daring Attack Helicopter ction in the AH-64 Apache!

SIMULATION



Thrilling Decathalon of aerobatic events in your own personal jet!!



You are in command — North Africa 1940-1942

SOFTWARE

120 LAKEFRONT DRIVE • HUNT VALLEY, MD 21030 • (301) 667-1151

CIRCLE #101 ON READER SERVICE CARD



SUBMARINE SIMULATION

NO. 42

MAY 1986

THE #1 MAGAZINE FOR ATARI® COMPUTER OWNERS

FINE DE COMPUTING

FEATURES

BASIC XL/XE Switch Matthew J.W. Ratcliff 13 The touch of a button lets you switch BASIC on or off.
Bonsai R.I. MacDonald 23 Combining graphics and mathematics to simulate nature.
M/L Editor
D&D Character Generator II Part 2
Alphabetization and the AtariBrian Schwartz 43 A sorting routine ready to add into your own BASIC application.
ST-Log
The 8-Bit Blues Keith Mosher 87 One user details his trials and tribulations in owning a "state of the art" computer.
Atarzee
Gemsets Matthew J.W. Ratcliff 105 Print your custom character sets on the Gemini 10X/15X or Epson FX/JX/LQ.

Printing Utility Jan Iverson 115

Print ASCII format text to the screen or printer with this short

FEATURES continued

Bits & Pieces Lee S. Brilliant, M.D. 125 The first installment of a new hardware utility series.

REVIEWS

- Spellbreaker (Infocom, Inc.) Greg Knauss 11
 The last chapter in the Enchanter series throws fiendish puzzles your way.
- Hackers (Dell Publishing Co.) . . . Pamela Rice Frank 19
 This book presents a fascinating history of the founding fathers of the computer age.
- Silent Service (Microprose) Daniel A. Silvestri 21 Run silent, run deep—in the comfort of your home.

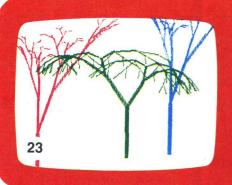
ACE 80/

ACE 80XL Murray D. Kucherawy, Ph.D. 85 (ACE, Ltd.)

This cartridge produces 80 columns of text on any Atari 8-bit.

COLUMNS

Editorial	Clayton Walnum 4
Reader Comme	nt 6
New Products .	
Boot Camp	Karl E. Wiegers 99
The End User .	Arthur Leyenberger 121
Index to Advertis	sers



utility.





ANALOG Computing (ISSN 0744-9917) is published monthly for \$28 (\$36 in Canada, \$39 foreign) per year by ANALOG 400/800 Corp., 565 Main St., Cherry Valley, MA 01611. Second class postage paid at Worcester, MA and additional mailing offices. POSTMASTER: Send address changes to ANALOG Computing, P.O. Box 625, Holmes, PA 19043. No portion of this magazine may be reproduced in any form without written permission of the publisher.

Contents copyright © 1986 ANALOG 400/800 Corp.







ANALOG COMPUTING STAFF

Editors/Publishers MICHAEL J. DESCHENES LEE H. PAPPAS

Managing Editor DIANE L. GAW

Contributing Editors BRADEN E. GRIFFIN, M.D. STEVE PANAK RUSS WETMORE KARL E. WIEGERS

East Coast Editor ARTHUR LEYENBERGER

West Coast Editor IIM DUNION

Contributing Artists MARK ASTRELLA GARY LIPPINCOTT LINDA RICE ARNE STARR

Technical Editors CHARLES BACHAND CLAYTON WALNUM DOUGLAS WEIR

Production CONNIE MOORE EDYTHE STODDARD JANE SULLIVAN

Advertising Manager MICHAEL J. DESCHENES

Marketing Manager TORIN ROHER

Circulation Manager PATRICK J. KELLEY

Accounting ROBIN LEVITSKY

Production/Distribution LORELL PRESS, INC.

Contributors
LEE S. BRILLIANT, M.D.
BOB CURTIN
PAMELA RICE FRANK
SOL GUBER
JAN IVERSON
GREG KNAUSS
MURRAY KUCHERAWY, Ph.D.
JAMES LUCZAK
R.I. MacDONALD
KEITH MOSHER
MATTHEW J.W. RATCLIFF
BRIAN SCHWARTZ
DANIEL A. SILVESTRI

U.S. newsstand distribution by Eastern News Distributors, Inc., 1130 Cleveland Rd., Sandusky, OH 44870

ANALOG Computing magazine (ANALOG 400/800 Corp.) is in no way affiliated with Atari. Atari is a trademark of Atari Corp.

WHERE TO WRITE

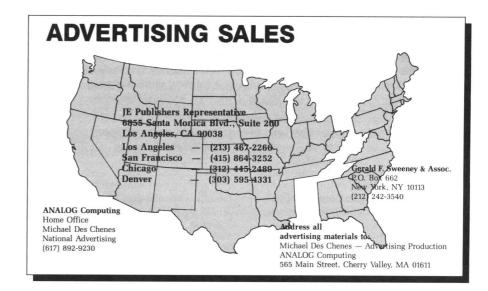
All editorial material (programs, articles, letters and press releases) should be sent to: Editor, **ANALOG Computing**, P.O. Box 23, Worcester, MA 01603. Correspondence regarding subscriptions, including problems and changes

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

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

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

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



PERMISSIONS

No portion of this magazine may be reproduced in any form, without written permission from the publisher. Many programs are copyrighted and not public domain.

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

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

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

SUBSCRIPTIONS

ANALOG Computing, P.O. Box 625, Holmes, PA 19043; or call toll-free: 1-800-345-8112 (PA 1-800-662-2444). Payable in U.S. funds only. U.S.: \$28-1 yr.; \$52-2 yrs.; \$79-3 yrs. Canada: \$36-1 yr.; \$62-2 yrs.; \$89-3 yrs. Foreign: \$39-1 yr.; \$72-2 yrs.; \$99-3 yrs. Foreign airmail - \$48 extra per year. Allow 4-6 weeks.

AUTHORS

When submitting articles and programs, both program listings and text should be provided in printed and magnetic form, if possible. Typed or printed copy of text is mandatory and should be in upper and lower case with double spacing. If a submission is to be returned, please send a self-addressed, stamped envelope.



EDITORIAL

They come in all shapes and sizes; by first-class mail and postage due; from California, Germany and Australia; from doctors and teens, experts and novices.

Regardless of form or origin, all the submissions we receive have one common factor—each carries a writer's desire to see his or her words in the pages of **ANALOG Computing**.

That may sound corny, but if you've consigned the product of several weeks' labor to the U.S. mail, only to wait what seems (to your suspense-stricken mind) enough time for the rise and fall of the Roman empire—for a response you may not even like—you know what I mean.

And don't get the idea that this anticipation is one-sided. Without our contributors, **ANALOG Computing** would be a nonentity

So how can you increase your chances of publication? How can you avoid wasting postage on a submission that doesn't even make the starting gate? Read on.

Rule #1: Common, "old hat" ideas should be avoided like a rabid beast. Not a week goes by that we don't receive a character set editor, labeler, math quiz, disk editor, disk copier, doodle program, player/missile mover, program loader, disassembler, or investment analyzer. The list goes on; you get the point. Unless you convince us your character set editor is absolutely essential to the well-being of the Atari community and mankind's continued survival, don't bother.

Rule #2: Chances of publication are in direct proportion to the size of the article's potential audience.

Not that we're not interested in somewhat esoteric submissions. We believe in pleasing minorities, too. But articles with the general reader in mind have a distinct advantage.

Rule #3: Size of a submission is a definite consideration—the shorter, the better.

This is especially true of articles not under Rule #2.

Take the space to write a decent article—not a word more. Knowing what to cut and what to keep is essential. Take it from someone frequently accused of verbosity; it's tough.

Rule #4: Graphics, graphics, graphics. I can't stress this enough. Nicely designed screens and details make the difference between a contract and a rejection.

Ataris are powerful machines, and we insist that contributors take full advantage of that power. Of course, this rule should be tempered with common sense. If your program's a simple utility, we don't expect menus dancing to Beethoven's Fifth while juggling aliens. That would be a violation of Rule #3. However, if you're writing a game

Rule #5: This is a combination of minor rules: double-spaced manuscripts, inclusion of program and text disks, and, if you wish materials returned, self-addressed, stamped envelopes.

These are the common courtesies one expects from professionals. One of my pet peeves: disks with no DOS. Arrrgh! Work should be neatly prepared. Though we've never rejected a submission because the manuscript was a mess, tramping through a jungle *doesn't* put an editor in the best frame of mind.

Finally, the most important rule is: do the best job possible. There's no scale by which to judge "best." It's the one criteria you must evaluate for yourself.

To be more specific about our wants: ST material is number one on the list. Last month, we premiered our new ST-Log, and all but one article was written by our staff members. The ST market is new and wide open. Most any well written article is sure to find a home.

Second in our hierarchy of needs (now I sound like Maslow) is 100% machine lan-

guage programs. Show us an arcade quality game, and we'll show you a contract. Honest.

Finally, something we're insatiable for—product reviews. When you see something new, hop on it. If you write well and are first through the door, we'll have you signing on the dotted line.

If your submission doesn't fit one of these categories, don't despair. These are the things we need most, There's room for imaginative, carefully crafted projects. Would I lie to you?

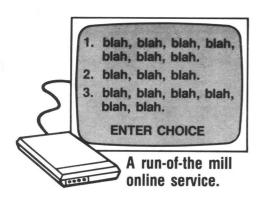
In coming months, ANALOG Computing readers will see the finest work by those hardworking contributors who have successfully juggled the rules. The June issue will be dedicated to computers in the home.

Looking further ahead, we've planned a hardware issue, a language issue and a special 8-bit issue. The latter will feature the latest for the fine machines that started it all. More proof that **ANALOG Computing**'s concerned with all Atari users, not just those who've moved to newer things.

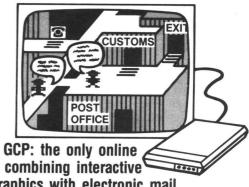
Finally, I'd like to thank everyone for the support I've received. Your kind comments have been welcomed. Forced to truthfulness, I'd have to admit the last six months have been a blast. **ANALOG Computing** is one of the wonders of the world, and I'm still stunned to be a part of it. Hey, thanks.

Clayton Walnum

Clayton Walnum Technical/Submissions Editor ANALOG Computing



MODEM **OWNERS: Tired of Text?** Go for **Graphics!**



service combining interactive graphics with electronic mail. downloads, AND games!

What is an online service?

An online service consists of a large, multiuser computer which your computer can access through the telephone lines. Since many people can access it at one time, you can interact and exchange information with other computer owners.

How is GCP different from other online services?

All other online services are out-growths of business information services. GCP was designed from the ground up to be a service for home computer owners. This means that GCP is easy to learn and fun to use. You can do everything you want with the joystick and function keys on your computer.

In order to provide all these capabilities, we have implemented the entire system using full color graphics. GCP is set up as a City, with buildings for the Post Office, GCP offices, Games and other services. You, and the other customers, are figures which you move around in the City with your joystick.

You mean the City is shown on my TV screen?

Yes. indeed. Not only the City, but the inside of the buildings and the games are shown on your screen in full color graphics. Additionally, the other customers are shown on your screen as they move around the City and buildings.

Isn't it slow downloading the graphics?

No. because we do not download the graphics. All the pictures of the City, buildings and games are supplied on disk. When you go from one building to another, the graphics are accessed at disk drive speeds.

Do I need special software?

Yes, very special. But don't worry, we provide it with your

Can I download public domain programs?

Yes, GCP has a public domain archive in its Post Office with about a Megabyte of Atari programs you can download.

What games do you have?

At the moment, we have BioWar, CyberTank and CyberShip, Lords of Space is under development and may be done by the time you read this. All the games are played online against other customers, so you are matching wits with humans from all over the country.

BioWar is a multi-player adaptation of Conway's game of Life. Each player has a cell colony which he tries to expand, often at the expense of the other players, while contending with the problems of under- and over-population.

CyberTank and CyberShip are tactical design and combat games set on the CyberWorld, an artificial battleground for cybernetic machines. You design your own tank or ship and battle it out with up to 15 other players on a scrolling map.

Do the games use graphics also?

Extensively. For example, in CyberTank, when you design your tank, the hull is shown on the screen, as are all the equipment choices, in full color graphics. You select and place the items by using your joystick.

In the combat phase, your screen shows the status of your tank, the 1 mile area around your tank (only a part of the larger battlefield), and any enemy tanks inside that area.

What equipment do I need?

GCP supports any member of the 8 bit Atari line with 48K of memory. You will also need a disk drive and a modem. We support all the available modems for the Atari.

How much does it cost?

The signup kit includes the software and documentation you need, plus 5 free hours at standard rates. This kit costs \$30. After the free hours are used up, the standard rates are \$6 per hour (weekday evenings after 6pm local time and all day Saturday and Sunday) for either 300 or 1200 baud access. Daytime hours during the week are \$15/hour.

Is it a long distance call?

Not from most U.S. cities. GCP is accessed through Tymnet. a national data service with over 500 locations in the U.S. The Tymnet charges are included in the standard rates, so you don't have to worry about add-on charges.

How do I sign up?

Just fill out the information requested below and send it to us with your credit card number or check/money order. For faster response, call us at: (717) 848-2660 (VOICE)

and give us your logon name, password and credit card number over the phone.

Logon name (letters/numbers only) [hint: keep it short] Choices: 1st 3rd

Password (must be 6-10 chars):



112 East Market Street, York, PA 17401 717-848-2660 (VOICE)

READER COMMENT

Get real!

First let me state right off: I'm both a loyal Atari computer fan and a loyal ANALOG Computing fan. Now, excuse me while I grumble.

To the unknown author of the **Reader Comment** letter entitled "Illegal software distributors" in issue 39, February 1986: let me say that, if you are reading this, then you have just met someone who does not own any pirated (illegal) software. Now to the point. I agree with you; piracy is wrong. However, ranting and raving will not solve anything.

Yes, you suggest we write our congressmen. But what should we advocate? As an audio engineer, the problem of piracy has been a constant headache to my industry. One thing, though, must be realized. If people have cassette recorders, they will dub records or copy videotapes. There are too many of them in people's homes to prevent this. I certainly hope you—or anyone—do not advocate the legal storming of people's homes in order to remove an individual's personal cassette deck or home computer.

Congress tried to pass additional taxes on blank tapes and home recording equipment, in order to lessen the burden of loss incurred by record companies. That plan did not work. The subsequent loss in blank tape and home equipment sales would have killed some of the companies that produce these items.

Don't get me wrong, I'm not suggesting we sit back and let piracy happen, but we must have realistic solutions. And, in that vein, I will offer this one.

In most cases, it is not possible to copy a copy-protected disk without some form of hardware enhancement to a computer system. Since laws exist making piracy illegal (yet piracy continues), let's advocate laws making it illegal to produce or sell the devices that allow people to make copies of copy-protected disks. This will not stop piracy, but it most certainly will slow it down.

Complaint number two is in regard to the editorial in the same issue. As I said, I'm a loyal Atari computer fan. (I have a 400, 800XL, 130XE, two 1050s, a 1030, etc.) However, this does not mean I think everything Atari does is correct.

When we are told, repeatedly, that it is up to us, the Atari users, to "advertise" the wonders of our machines, I get upset. Atari should be thankful if my enthusiasm for my toys incites someone to buy an Atari. But I have no intention of seeking out businesses, or computer shoppers, or comparative advertisers, and informing them about Atari. That is not my job.

I hate to say it, but if Atari wishes to be recognized by people other than loyal Atari users, in this high-tech, PR-saturated world, they will have to advertise! That means TV commercials, radio spots and colorful ads in magazines other than the Atari-oriented ones.

I am sorry, but Atari does not pay my bills. Atari has created some great machines, but if they want people to know that, they will have to tell them.

Sincerely, Keith Mosher Columbia, SC

Actually, your enthusiasm is exactly what our editorial was asking for. No one at ANALOG Computing expects users to actually seek out ways to "sell" Atari, but we think you should know how powerful your individual and collective word of mouth advertising can be. When you mention Atari computers in a positive

way, you've influenced someone. We just wanted to remind our readers that they can and do make a difference, whether it's against piracy or for Atari. —Ed.

Keep those programs coming.

I have been a regular reader of ANA-LOG Computing for over two years. Naturally, I have preferred the contents of certain issues more than others. However, I feel that the February issue, 39, consistently exhibited an overall level of excellence that is unsurpassed by an Atari-specific magazine in recent memory.

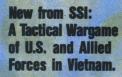
I applaud the recently introduced feature **The End User**, as Mr. Leyenberger continually displays an intelligent approach to his subject matter, that is both entertaining and informative. Mr. Clayton Walnum's articles were a delight, as his unconventional humor (for a "serious" article/tutorial) served to make his work refreshing as well as thought-provoking.

But mostly, I was pleased to see that several utility programs were included. I feel that, as the novelty of computer graphics and arcade games begins to wear off, most serious users prefer to see functional programs, tutorials and recent market developments (especially new product reviews) in their publications.

I would also like to encourage your readers to continue to send in their programs, as some of the most useful programs I have were found as type-in software from your magazine. Specifically, **XL-DOS** (issue 24) is worth its weight in gold. Has anyone modified this program to work with DOS 2.5?

My congratulations to Angelo Giambra for **Home-made Translator** (issue

This time you won't be fighting to stay even. You'll be fighting to win.



In NAM, you command units of American, South Vietnamese, and South Korean infantry, artillery, paratroopers, marines, rangers and air cavalry in six historical operations. The computer directs the elusive Viet Cong and battlehardened regulars of the North Vietnamese Army.

On diskette for 48K APPLE®II Series,
ATARI® Home Computers,
and COMMODORE 64™.
\$39.95. At your local
computer/software or
game store today. Two of the six scenarios: An ambush by Viet Cong forces near Suoi Cat on December 2, 1966...

U.S./ARVN units attempt to retake Hue during the Tet Offensive, February 1968.

OBSERVATION PHASE

MORE \$39.95 TACTICAL WARGAMES FOR THE APPLE®, ATARI® & C-64™



READER COMMENT continued

32). Angelo, please don't let unwarranted criticisms from the unappreciative dissuade you from sharing more of your work with **ANALOG**'s readers. If you have other programs half as good as **Home-made Translator**, many of us less skilled, would-be programmers would really like to see them.

Finally, to all contributors and regular feature writers at **ANALOG Computing**, I say, "Keep up the good work!"

Robert P. Komer St. Louis, Missouri

C language — welcome.

Thanks; I am glad you decided to start on the **C-manship** series. I personally think that this will become the dominant language for the 520ST.

Could you use **C-manship** to start explaining such basic things as: opening windows (all kinds), using the mouse, making comparisons on mouse v.s. window locations, changing colors, saving the color palette, drop-down menus and their entries, VDI, AES and GEM—just to name a few? I mean, let's start at the beginning, the basics of the machine.

One thing that bothers me: why cut down released languages, such as **Hippo-C**? Isn't there quite enough bad press out there about Atari? Yeah, I agree it lacks a lot of things that would be nice, but it will do quite enough to begin with.

I guess you figured it out; I bought **Hippo-C** and I have not bought the development package. I did this because it was what I could afford at the time.

I can't help but wonder how many other beginners did the same thing. My main point here is that I don't think the negative press on any Atari product is helpful and I think—for the beginner—that **Hippo-C** is an okay choice.

Thanks for **The ANALOG Computing guide to ST SOFTWARE**. I think this is a great addition to your magazine—keep up the good work.

Billy Graham Bedford, TX

Regarding *Hippo-C*, the main reason we chose not to recommend it for *C-manship* was that it didn't support floating point numbers. There were also library routines, such as scanf(), that were not handled by the compiler. We understand, though, that newer versions of the program have an expanded function library.

As for the material covered in **C-manship**, the first step was to give an in-

troduction to the language. In future installments, the handling of windows and other GEM functions will be addressed.

-Ec

Home computers?

Shame on you for the leading caption on the cover of your February 1986 edition of **ANALOG Computing**, "Commodore vs. Atari—Whose machine is the real challenger in home computing?"

Let's not cast the ST in the image of a home computer (translated "game machine"). I know you would agree that the ST is a computer which should satisfy the needs of business, education and the consumer market. I believe that using the term "personal computer" would have a broader connatation and not have the negative image that "home computer" may carry.

Keep up the good work. Thanks for the new series on C by Clayton Walnum. Please keep us informed of the latest events with Atari. I'm especially interested in the CD-ROM, hard disk, laser printer, TOS-ROM, memory expansions and, as always, software.

Sincerely, Brian Wilson Austin, TX

Visible support.

I always enjoy Arthur Leyenberger's articles, but I disagree with his evaluation of support from the new Atari Corp. stated in the February 1986 End User column.

Could Atari provide better support? Of course they could, and Mr. Leyenberger's suggestions for areas that could use work are fine. On the other hand, the support provided is far above average, even though it may fall short of excellent.

Consider the number of products Atari introduced in 1985, both hardware and software, both 8- and 16-bit based. Imagine the amount of coordination required to get any new product to market, much less meet a commitment date. Can you think of a single one of these products that did not deliver "power without the price"? This is quite a contrast to other high-technology companies, especially the old Atari.

Atari makes the 520ST Developer's Kit available to serious programmer users, as well as to companies that will develop the software which will ultimately sell machines. Atari BASIC for the 520ST is being distributed, free, to ST owners

who purchased their machines before the language was available. I am writing this letter using a word processor that Atari gave me, free, through my user group. That's pretty good support!

Frank de Lathouder Birmingham, AL

U.S. pen pal wanted.

I would like an American pen pal who owns an Atari computer and is *quite* knowledgeable with games and programming. Anywhere in the U.S. (or even another country) is fine, perhaps to exchange ideas, information, etc.

Here are some of my interests: animals, computers and games (of any kind) and science fiction. I am 14 years old.

I am looking forward to hearing from you.

Jonathan Browning 18 Wilkinson Close Wylde Green, Sutton Coldfield Birmingham, West Midlands England, B733QG

Blue Chip revisited.

In the January 1986 ANALOG Computing magazine (issue 39), in the Reader Comment column, Mr. Marv Larson made positive comments on the Blue Chip M 120/10 Printer.

I have asked several people and computer stores, and none had information about the printer or its dealer.

My last hope is you. I request that you send me the dealer's name and address or phone number.

Sincerely, John Ruiz Santa Maria, CA

Blue Chip Electronics markets the M120/10 Printer by Computer Gesellschaft Konstanz (CGK) of West Germany, which is the "General Electric of Europe." The U.S. distributor for CGK is: Blue Chip, Two West Alameda, Tempe, AZ 85282, (602) 829-7217. — Ed.

Micro-Mail mod.

Here is a modification to **Micro-Mail** (issue 40) by Clayton Walnum. It may interest some of your Canadian readers.

Type in the accompanying listing, including the REM statements at Lines 730 and 740, LIST it to disk or cassette, LOAD the original **Micro-Mail** program, then ENTER the listing. After it is en-

(continued on page 112)



NEW PRODUCTS

RED RAT SOFTWARE

Technicolor Dream enables any user to create on-screen pictures containing up to 256 colors simultaneously. Several utilities, in-



cluded with the program allow the user to store pictures to disk or print out to an Epson (or compatible) printer.

For additional information and prices, contact your local dealer or write to Red Rat Software Limited, 11 Fennel Street, Manchester, England M4 3DU.

CIRCLE #177 ON READER SERVICE CARD

INFOMANIA

This guide to electronic services provides the computer user—experienced pro and novice alike—with all the right connections.

Chapters cover various services available to computer operators, including: news, financial, data, educational and shopping.

Infomania also has plenty of information that will help you tackle life's many chores—things like examining travel resources, job hunting, or choosing careers. BBSs, electronic mail, people, and more are covered, too. The book's 314 pages should prove to be a useful resource for all Atari owners, 8-bit and 16-bit alike.

For more information on *Infomania:* The Guide to Essential Electronic Services, you should contact Houghton-Mifflin Co., 2 Park Street, Boston, MA 02108. Give the ISBN number — ISBN 0-395-36297-0.

CIRCLE #178 ON READER SERVICE CARD

THE GUIDE TO ESSENTIAL ELECTRONIC SERVICES Setting Up • Do you need a computer of a terminal? • What modern is your best buy? • What software will you need? • Does your computer deserve its own planne? Buying In • What are the essential electronic services? • What do these services really ofter you? • How easy are they to use and what are their ead cods? Plus o Pelaided evaluations of over 250 of the most essential electronic services available today. The electronic services resource book for investors, businesspeople, telecommuters, writers, researchers, professionals, and all who want to get more out of their computer than they put into it

THE GRAPHICS MAGICIAN PAINTER

This lets you create colorful graphics onscreen, selecting from hundreds of colors and patterns like circles, boxes, lines, fills and brushes. **Graphics Magician** has a unique storage system to allow storage of hundreds of pictures on a single disk.

The cost is \$39.95, from Polarware/Penguin Software, 2600 Keslinger Rd., P.O. Box 311, Geneva, IL 60134 — (312) 232-1984.

For additional XL/XE products from Polarware, see **ST News**, page 55ST.

CIRCLE #172 ON READER SERVICE CARD

ACCESS SOFTWARE

Raid Over Moscow puts high-resolution graphics, scrolling playfields and sound effects to use, producing a realistic search-and-destroy simulation.

The game has the Soviets launching an atomic strike against major U.S. and Canadian cities. You must deploy stealth bombers from an orbiting space station, to destroy the warheads before they reach their targets.

This disk-based game works with either joystick or keyboard. For all 8-bit formats; \$34.95. Access Software Inc., #A 2561 South 1560 West, Woods Cross, UT 84087.

CIRCLE #181 ON READER SERVICE CARD

RACING DESTRUCTION SET

This new game from Electronic Arts pits one player against the computer or another player. The split screen scrolls as you screaam around your choice of over fifty tracks stored on disk.

Spinouts, collisions, oil slicks and even land mines add to the challenge. You can select between Indy cars, Baja racers, motorcycles, Can-Am cars, and more.



An editor allows you to modify the tracks; add ice, dirt curves, or jumps; or build your own course.

Priced at \$32.95, from Electronic Arts, 2755 Campus Drive, San Mateo, CA 94403.

CIRCLE #182 ON READER SERVICE CARD

OTHER NEWS

Reeve Software has announced the **Evader Construction Set**, a 32-level game, available with or without its construction set.

In the **Evader**, you land your shuttle on various alien landscrapes. With its construction set, the package retails for \$19.95. Game Pack #1 includes: **Battle Tank**, **Bomber** and **Space Hunt** for \$16.95.

Reeve Software also has the **Business Manager**, to give you invoicing, shipping and tax features for \$49.95; plus **Utile Utilities**, which contains many utilities for \$16.95.

For additional information, write to Reeve Software at 29W150 Old Farm Lane, Warrenville, IL 60555, or call (312) 393-2317.

CIRCLE #179 ON READER SERVICE CARD

Screens is a machine language utility allowing for the easy creation of windows on the Atari 8-bits.

By creating a device, W:, a window of any size and color can be opened—at any time. Other features are also included in the 32K+ program.

Priced at \$19.95 from the Soft Cellar, P.O. Box 14393, Rochester, NY 14616-0393.

CIRCLE #180 ON READER SERVICE CARD

ARE YOU LOOKING FOR A DRIVE...

That is fast, quiet, reliable?
That has a built-in printer interface?
That holds 360 KBYTES of information?
That is compatible with Atari® 400, 800, 600XL, 800XL,1200XL and 130XE computers?

THEN, THIS IS
THE "ONE"."



- Single or double density (software selectable).
- · Single or double-sided (software selectable).
- · Direct drive motor.
- · Printer interface built-in.

130XE SUPPORT WITH:

- Standard 64K RAM disk.
- Expanded 78K RAM disk.
- Special 90K buffer for one pass disk duplication with only one drive.

WISE DENSITY

 Automatic selection between single density, double density, and double-sided double density.

AUTO RAM DISK INITIALIZATION FOR ATARI 130XE.

*ASTRA SYSTEMS, INC.

2500 South Fairview/Unit L Santa Ana, California 92704

Call (714) 549-2141

*Atari is a reg. trademark of Atari Corporation.





by Dave Lebling INFOCOM, INC. 125 Cambridge Park Drive Cambridge, MA 02140 48K Disk \$44.95 Also available for 520ST

by Greg Knauss

The people are mad. Magic is failing all across the land, and a meeting at Borphee has been called.

One by one, the head of each Service Guild stands and gives a personal view of how this or that spell has gone haywire. People have been hurt. Time has been lost. And the people are mad.

You attend the meeting as Guildmaster of the Circle of Enchanters at Acardii, a position you inherited from your mentor Belboz, and listen patiently to the stories—stories that slowly become charges...

The word traitors pops out of nowhere, and, just as you think the meeting is going as badly as it can, everybody mysteriously turns into...well, they turn into frogs. Frogs, newts and salamanders—the entire amphibian phylum seems to be represented.

Your keen mind quickly decides that something is wrong. Through the rainbow of hopping, slithering and croaking colors, you notice a black-clothed figure slip out of the room and into the street. You give chase.

The figure turns. Though you strain your eyes in the bright sunlight, its face lies hidden in deep shadow. It jumps, backflips and, in a bright orange explosion, is gone. . .



So begins **Spellbreaker**, the last chapter in the **Enchanter** series of Infocom's all-text interactive fiction.

Once again, you take the guise of the rapidly maturing young enchanter, who has become famous throughout the land for defeating both Krill and Jeearr. Once again, you must venture into the labyrinthian passages running beneath the surface world that you know best. Once again, the future of Frobozz is in your hands. Who is the mysterious, black-cloaked sorcerer? What is becoming of the magic? These are dangerous questions that only one person can answer, only a **Spellbreaker**.

Infocom, as tradition dictates, ends each of their series with the hardest, most fiendish puzzles lumped into one game. This is the case with **Spellbreaker**. I've spent many an hour torturing my mind in various ways, trying to get a new idea to pop out.

In fact, Infocom held a tournament between three groups of college students, to see who could solve the game first—without dying once. The first and only group to finish took twenty (count 'em, twenty) hours! **Spellbreaker** is by far the nastiest, most complex game from the Cambridge, Massachusetts company so far. People who breezed through the Babel Fish situation, rejoice.

One of the problems of the game, not necessarily a puzzle per se, has to do with the game's "inventory" feature. There are several objects in the game identified only as "a featureless white cube." How does the game know which featureless white cube you mean when you type Throw cube?

It doesn't. It assumes that you mean the first cube in your inventory, whether this is the case or not. It is, to say the least, very frustrating, especially for beginning players (but then, beginning players have no business messing with an Expert level game.) Though there is a device that allows you to determine which cube is which, and using the wrong one is never deadly, novices are forewarned.

The prose of the game is excellent. Descriptions are detailed, but not overly lengthy. Continuing tradition, there are several very funny moments for folks who sidetrack from the main plot.

Obviously, you're the major character, but you're also the *only* character who's more than one-dimensional. Though **Spellbreaker** is chock full of objects with personal pronouns for names ("people"), they are but frames—no substance aside from a handful of random, one-sentence responses. This is a magicand object-manipulation game with few verbal interactions, following in the footsteps of **Zork**, rather than **Deadline**.

Magic is bountiful in **Spellbreaker**, and as a Guild Master you have access

to more powerful spells than in either **Enchanter** or **Sorcerer**. This magic, however, doesn't always work. Due to the previously mentioned mysterious force, many a time your spell will misfire, causing distant thunder, temporary blindness, green balls of light and, to the gamer, inconvenience.

Though the spells always work in situations where your life is at stake (this is a selective mysterious force, no doubt), it can be a royal pain typing Learn malyon. Malyon angry Ogre four times before it works.

The game's cosmetics have changed considerably since **Zork**. First, the screen is totally redesigned. With **Wishbringer**, Infocom made several cosmetic changes to their games. The changes remain in **Spellbreaker**.

The familiar white block has been replaced with a flashing black underline of a cursor. The location line at the top of the screen has become permanent. It no longer scrolls off with the text, only

to be redrawn. The keyboard handler has been redone. This remedies the break problem of earlier games (when BREAK was pressed instead of BACK-SPACE, the game would crash), but has some new problems of its own.

The CAPS/LOWER key is totally ignored. When I play adventures, I like to upper-case my commands, to separate them from the text of the game. The new handler prohibits this.

You also cannot use the cursor keys. I am not the world's most accurate typist. When I mistyped a word, I used to simply "cursor up" and change the old line. No more—alack and alas.

Another minor gripe about spells: one oft-used spell, inconveniently named Blorple, involves four keypresses with the last two fingers of your right hand in rapid succession. It's Mistype City.

The map of the game is very strange. There are no connections between major scenes. You have to teleport. This disjointed terrain will provide a challenge for mapmakers, and the teleport availability always gives you a convenient, immediate exit, in case you did something that someone bigger than you didn't like.

The ending is the most climactic anticlimax I've ever seen. The idea is catastrophic, even apocalyptic—the whole universe is at stake, but it just doesn't pack the whallop its potential promised. Still, after such an exciting, riveting game, topping it would have been difficult, if not impossible.

Though the magic is rapidly diffusing from the land, and the Enchanter's powers fail, the wizards at Infocom grow continually stronger. **Spellbreaker** is a vast, sprawling game, finely detailed, intricately designed. It can be easily and wholeheartedly recommended, a grand conclusion to a great series.

Greg Knauss is a senior in Rancho Palos Verdes, California. He's involved in journalism and drama, as well as computers.



WHAT IS CHECKSUM DATA?

Most program listings in ANALOG Computing are followed by a table of numbers appearing as DATA statements, called "CHECKSUM DATA." These numbers are to be used in conjunction with D:CHECK and C:CHECK (which appeared in ANALOG Computing issue 16 and the ANALOG Compendium) or with Unicheck (from issue 24, updated in issues 31 and 39).

D:CHECK and C:CHECK (written by Istvan Mohos and Tom Hudson) and Unicheck (by Tom Hudson) are designed to find and correct typing errors when readers are entering programs from the magazine. For those readers who would like copies of these articles, you may send for back issue 16, 24, 31 or 39 (\$4.00 each) or the ANA-LOG Compendium (\$14.95 plus \$2.00 shipping and handling) from:

ANALOG Computing

P.O. Box 625 Holmes, PA 19045

UTILITY



BASIC XEXEST SWITCH

by Matthew J.W. Ratcliff

One of the nicest features of the newer XL/XE Atari computers is the built-in BASIC. If you've moved up from an old 400 or 800, then you probably find the OPTION key a nuisance when you want to go directly to DOS at power-up. If you forget, you have to type DOS from BASIC or reboot with the OPTION keypress.

The first method leaves BASIC enabled, which is not needed while in DOS. This makes file copying slower, since the 8K of RAM hidden by BASIC isn't used. The second method is just plain annoying. It's quite as irksome to attempt going to BASIC, only to find no cartridge installed. You have no choice but to reboot. This is a minor hassle, but the BASIC XL/XE Switch (known as Switch from here on) provides a simple solution for 800XLs, 64K 600XLs and the new 130XE computers.

Listing 1 is the BASIC data for XL/XE Switch. You should create the file under the filename SWITCH. COM. Please refer to M/L Editor on page 00 for typing instructions.

Whenever you go to DOS from BASIC, you need only load SWITCH.COM from Atari DOS, or just type SWITCH from OSS DOS-XL, and you'll have an additional 8K of RAM for file copying.

When you decide to go back to BASIC, just "flip the switch" again. Should you attempt a Switch when an external cartridge is installed, you will be reminded of the fact and returned to the DOS prompt.

Listing 2 is the MAC/65 source code. There are a

few special memory locations new to the XL/XE machines. Location \$3FA (1018), called GINTLK in Atari's 1200XL addendum to their technical notes, is the external cartridge flag.

A 0 here tells the OS that no external cartridge is installed. It's set at power-up and examined during a RESET key warmstart. A 1 here indicates that an external cartridge is installed.

Another special location is what I call LATCH, memory location \$3F8 (1016). So far as I know, this has not been documented elsewhere. It's set by the OS during power-up. If OPTION is not pressed during power-up, the OS sets this location to 0. If OPTION is pressed, then this location will contain a 1. During a RESET keypress warmstart, the OS looks here to decide whether to re-enable the built-in BASIC, if no external cartridge is installed.

Some of you may be aware that memory location PORTB, \$D301 (54017), is now used to control the ROM/RAM bank switching in XL/XE computers. As a technical note: PORTB, part of a 6520 PIA (Peripheral Interface Adapter), used to be joystick ports 3 and 4 on the Atari 400/800 computers. It now controls built-in BASIC on the XL/XE machines, and communicates with FREDDY for extended RAM bank switching on the 130XE computer. Setting bit 1 (LDA PORTB, ORA #\$02, STA PORTB) of PORTB disables built-in BASIC. Clearing this bit (LDA PORTB, AND #\$FD, STA PORTB) re-enables it.

The switching of the BASIC simply involves setting or clearing this bit in PORTB and the LATCH flag. To get the 8K of RAM for file copying after BA-



SIC is turned off, RAMTOP must be moved up and a graphics 0 command executed (see Lines 890-1040).

When BASIC is turned back on, RAMTOP must be moved back down. Note that a quick and dirty way to get to DOS with BASIC off is to use POKE 1016,1 and then press the RESET key (thanks to Ian Chadwick, author of COMPUTE!'s Mapping the Atari, for that tidbit). You still need to switch to get back to BASIC without rebooting.

If you have some disks with machine language utilities on them, which never require built-in BASIC, you might want to put **Switch** on that disk. If it's put on a disk as an AUTORUN.SYS file, you can forget about pressing the OPTION key altogether—and you won't have to enter DOS and then give the switch command. The AUTORUN **Switch** will see that BASIC is enabled, then disable it.

Note: it effectively "inverts" the function of the OP-TION key. If **Switch** is an AUTORUN file, and you've pressed OPTION at power-up, it will see that BA-SIC is off and turn it on. Using it as an AUTORUN might get confusing.

This little utility will save you XL/XE owners many, many reboots—which are both time consuming and quite annoying. This "soft" switch will be much easier on your computer in the long run, not to mention your nerves.

Matthew Ratcliff is an electrical engineer in St. Louis, Missouri. When not using his spare time to write articles, he's president of ACE St. Louis and a remote SYSOP on Gateway City BBS, (314) 647-3290.

Listing 1. BASIC listing.

1000 DATA 255,255,0,52,251,52,173,250,3,240,56,32,65,53,76,27,3337
1010 DATA 52,197,248,244,229,242,238,2
25,236,160,195,225,242,244,161,155,926
5
1020 DATA 4,162,11,160,52,32,25,53,76,53,52,160,190,206,239,160,8277
1030 DATA 211,247,233,244,227,232,174,188,160,155,4,162,37,160,52,32,7650
1040 DATA 25,53,96,173,1,211,41,2,208,49,173,1,211,9,2,141,3157
1050 DATA 1,211,169,192,133,106,32,65,53,76,102,52,252,160,194,193,9290
1060 DATA 211,201,195,160,207,198,198,160,252,29,155,4,162,86,160,52,8640
1070 DATA 32,25,53,169,1,141,248,3,76,8,53,173,1,211,41,253,5651
1080 DATA 141,1,211,16),160,133,106,32,65,53,76,150,52,252,160,194,8587
1090 DATA 193,211,201,195,160,207,206,160,252,29,155,4,162,135,160,52,9391
1100 DATA 32,25,53,169,0,141,248,3,173

,226,168,201,96,208,74,76,9186
1110 DATA 179,52,82,69,86,46,66,155,4,
162,172,160,52,32,25,53,2138
1120 DATA 76,206,52,160,195,239,238,24
4,225,227,244,160,193,212,193,210,9062
1130 DATA 201,160,155,4,162,189,160,52
,32,25,53,76,233,52,160,160,6362
1140 DATA 230,239,242,160,101,197,214,
174,195,160,161,160,160,155,4,162,284
1150 DATA 216,160,52,32,25,53,76,8,53,
201,234,208,17,76,1,53,2714
1160 DATA 82,69,252,52,189,53,86,46,67,155,4,162,250,160,52,32,5500
1170 DATA 25,53,76,17,53,29,29,29,29,1
55,4,162,11,160,53,32,9960
1180 DATA 25,53,96,142,68,3,134,208,14
0,69,3,132,209,160,0,140,5891
1190 DATA 72,3,140,73,3,177,208,201,4,
240,6,238,72,3,200,208,8785
1200 DATA 244,169,11,162,0,141,66,3,76,86,228,162,96,169,12,157,6097
1210 DATA 66,3,32,86,228,162,96,169,3,
157,66,3,169,187,157,68,6475
1220 DATA 3,169,53,157,69,3,169,0,157,75,3,169,28,157,74,3,1838
1230 DATA 32,86,228,162,112,160,53,76,25,53,252,160,216,204,175,216,2457
1240 DATA 197,160,194,193,211,201,195,160,211,247,233,244,227,232,229,242,13
83
1250 DATA 160,194,249,160,205,225,244,170,210,225,244,160,252,155,252,160,91
58
1260 DATA 212,239,240,160,184,203,160,211,247,233,236,233,244,247,239,236,160,216,207,205,175,210,193,205,160,195,75
1270 DATA 239,238,244,242,239,236,160,213,244,233,236,233,244,249,160,160,65
1280 DATA 252,29,29,155,4,83,58,0,224,2,225,20,652,0,0,8484
1290 REM * 464 BYTE5

_

Listing 2. Assembly listing.

```
*************************************
* BASIC Switcher for the 800XL
* 64k-600XL. & 130XE Computers.
                                            ¥
* By Matthew J. W. Ratcliff
* E=
            .OPT NO LIST
.INCLUDE #D:SYSEQU.M65
.INCLUDE #D:IOMAC.LIB
            .ORG $3400
            OPT NO MLIST
            .OPT UBS

.OPT LIST

.TITLE "XL/XE BASIC Switcher"

= $0301 :ROM/RAM ctrl

= $03FA :EXT CART FLAG

= $03F8 :LATCH ON/OFF
PORTB
GINTLK
LATCH
BASREV
                 $A8E2
                            :BASIC revision
                            :TEXT LEN POINTER
                 $D0
TXPNT
                            TOP OF RAM
RAMTOP
                 186
```

```
. MACRO PRNO
              .IF %0()1
              ERROR "BAS PRNO CALL!"
              . ENDIF
           JMP @SKPTX
.BYTE %$1.$9B,$04
LDX # <@TXT
LDY # >@TXT
 etxt
 eskptx
           JSR PRINTXT
            ENDM
BEGIN
           LDA GINTLK
                          :EXT CART HERE?
           BEQ CNTNU
JSR GRAFO
                          :NO, CONTINUE
                   External Cart!
>No Switch.<
            PRNO
            PRNO
                          :YES. HOME JAMES!
:BASIC OFF?
           RTS
CNTNU
               PORTB
           LDA
           OND
                #$02
           BNE
                TURNON
                          :YES-TURN IT ON
           LDA
                PORTB
                          :ON-TURN IT OFF
           ORA #$02
           STA
               PORTB
           LDA #$CO
           STA RAMTOP
           .ISP
               GRAFO
            PRNO
                   " BASIC OFF 4"
           LDA
               #1
           5TA
               LATCH
                         :LATCH IT OFF
           JMP
               EXIT
TURNON
           LDA
               PORTB
                         :BASIC ON
                         : WAS OFF-GO ON
               #$FD
           OND
           STA
               PORTB
           LDA
               MSAR
           STA
               RAMTOP
           J5R
               GRAFO
            PRNO
                   BASIC ON U
           LDA #0
           STA LATCH
                         :LATCH IT ON
               BASREV
           LDA
                         : SHOW REVISION #
           CMP
               #95
                         :REV.B ?
           BNE REVC
                         :REV.C ?
            PRNO
                         B"
                   Contact ATARI "
for REV.C!"
            PRNA
            PRNO
           JMP EXIT
                         :REV.C?
REUC
           CMP #234
           BNE EXIT
                   "REU.C"
            PRNO
            PRNO
                   "1111"
EXIT
           RT5
PRINTRY
           STX
               ICBADR
                         :PRINT TO #0
           5TX
               TXPNT
           STY
               ICBADR+1
               #0
                         :FIND LENGTH
           STY
               ICBLEN
           STY
               ICBLEN+1
               (TXPNT).Y
LEN
          LDA
           CMP
              #$04
                         :ETX-END OF TEXT
          BEQ
INC
               OUTPUT
           INY
          BNE LEN
                         :256 CHARS MAX.
OUTPUT
          LDA
               #11
                         : PUT RECORD
          LDX #0
           STA
               ICCOM
               CIO
          JMP
GRAFO
          LDX #$60
                         :CLOSE #6-SCREEN
              #CCL05E
          LDA
          STA
               ICCOM, X
           JSR
               CIO
          LDX
               #$60
          LDA HCOPN
                         : OPEN 5:
          STA ICCOM, X
LDA # (SCRN
               ICBADR.X
          STA
          LDA # >SCRN
```

```
STA ICBADR+1.X
              LDA HO
                   ICAUX2.X ;GR. 0 FOR 5:
#$1C :FLIP BIT 4
              STA
             LDA #$1C
: & ALLOW READ/WRITE
                  # <TITLE
# >TITLE
PRINTY*
              STA ICAUXI.X
JSR CIO
             LDX
              JMP
              .BYTE " | XL/XE BASIC "
.BYTE "Switcher By Mat*Rat |
TITLE
              BYTE $98
              BYTE "I Top 8K ROM/RAM"
BYTE "Gontrol Utility | "
BYTE "44", $9B, $84
BYTE "5:", 8
SCRN
                   $02E0
             ¥=
              . WORD BEGIN
              . END
```

ULTIMATE STORAGE

Here's the perfect way to organize your **ANALOG Computing** library—sturdy, custom-made binders and files in deep blue leatherette with embossed silver lettering. Silver labels are included to index by volume and year. One binder or a box-style file is all you'll need to accommodate 12 issues (1 year) of **ANALOG Computing**—all the games, programs, tutorials and utilities that you want handy.



The ANALOG Computing binder opens flat for easy reading. They're economically priced at only \$8.50 each—3 binders for \$24.75 or 6 binders for \$48.00, postage paid.

The ANALOG Computing file is attractive and compact, holding 12 issues for easy access. Files are only \$6.95 each —3 files for \$20.00 or 6 files for \$36.00, postage paid.

Foreign orders add \$2.50/item shipping & handling. Allow 4-5 weeks for delivery.

I enclose my check or money order for \$_____.

Send me: ____ ANALOG Computing files ____ ANALOG Computing binders.

PLEASE PRINT.

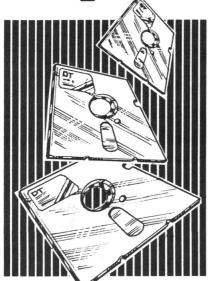
Name: _____ Address: _______

City: _____ State: ___ Zip Code: ______

Mail to: Jesse Jones Industries

P.O. Box 5120, DEPT. ACOM, Philadelphia, PA 19141

Expert Back-up for Atari Users.



THE ST DUPLICATOR™

Our famous 1050 DUPLICATOR has been converted to service the ATARI 520 ST. It is a software only disc copy system.

You can now back up heavily copyguarded and protected discs. Presently, we can't find anything the ST DUPLICATOR will not copy. And if new forms of software protection should appear on the market, we will provide software upgrades.

ST DUPLICATOR™

INCLUDES USER FRIENDLY SOFTWARE AND INSTRUCTIONS

Plus 3.50 Shipping dd 7% Outside U.S.A

SPECIALIZING IN BACKUP HARDWARE & SOFTWARE

THE HACKER'S TREASURE CHEST On Disk

18 Utility Programs on disk. Each program is specifically designed to aid you in backing-up your software collection. You will be able to duplicate **disks**, cartridges and cassettes. Any one program is worth the price of all 18. It has gram is worth the price of all 18. It has taken us over one year to put together this fine collection on the **Hacker's Treasure Chest** disk. Some of the programs you will receive are: Cartridge Copy, Bootape Maker, Tape to Disk, SectorCopy, The Unprotector, Sector Disassembler, Bad Sector Finder, Modem Program...plus more. All of these programs plus 10 more on this disk. You will also receive a menu that will run basic and binary files just by typing the number of the program. Any file on any disk will

load automatically from this menu. ALL FOR ONLY

Plus \$3.50 Shipping

Add 7% outside U.S.A

835, 1030 & XM 301 MODEM BULLETIN BOARD

This BBS Bulletin Board System wili run on any ATARI Home Computer including the XE No costly interface needed All you will need is an 835 or 1030 Modem and any disk drive (printer optional). Auto Answer feature will allow you to leave the BBS running unattended. This BBS has over 25 functions including: XMODEM Upload/Downloading. User Passwords, Full Function Message Base plus many more features.

This package comes on a double sided disk, full documentation included plus a fully assembled and tested ring detector. Nothing

else will be needed BBS software and ring detector.

Plus \$3.50 Shipping Add 7% outside U.S.A

DENSITY "DOUBLER" DOUBLE THE POWER... TRIPLE THE SPEED...

Get TRUE double density, full compatibility with any DOS. Now store twice as much data on each disk. Read and write up to 3X faster in single or double density (Whole Track Buffering). Includes ultra-speed software, simple plug-in P.C. plug-in P.C. board. No solder-

ing or cutting required. For more info. on the density doubler refer to the 1050 Duplicator ad on opposite page.

Plus \$3.50 Shipping Add 7% outside U.S.A.

CART CLONE™ COPY ANY ATARI™ CARTRIDGE

MUST FOR ALL ATARI™ USERS CART CLONE will backup and transfer any 8 or 16k cartridge to disk or tape. The contents of the cartridge will become a file which you can transfer, rename or delete. They will execute from DOS. No need to run a special menu or program to run these files. It goes in the left cartridge slot enabling it to work in all ATARI ™ Home Computers. Including the XL series. You can

series. You can with software for

Plus \$3.50 Shipping Add 7% outside U.S.A.

WRITE-RIGHT

This device will allow you to write to side 2 of any disk. Install this box to your ATARI™ 1050 or Indus GT Disk Drives in 5 minutes. Just plug in one cable - no cutting or soldering required. Push a button and a LED will light, allowing you to write to a disk without notching out a hole in the disk. Easy plug-in installa-

Instructions included. Fully tested and assembled.

Plus \$3.50 Shipping Add 7% outside U.S.A.

TELEGUARD

Technical Breakthrough

Truly a technological breakthrough! Now you can send any copy-guarded disk over the telephone lines by Modem. Of course, you must have our DUPLICATOR 1050 to send and receive. Teleguard will be

available delivery by April 1 st.

Plus \$3.50 Shipping Add 7% outside U.S.A.



"Our competition promises tomorrow... We Deliver Today!

DUPLICATING TECHNOLOGIES inc.

Formerly Gardner Computing

Order Business Hrs. (516)333-5805, 5807, 5808

Order Eve's. and Weekends (516) 333-5950







99 Jericho Tpke., Suite 302A Jericho, N.Y. 11753

TERMS: We accept American Express, Visa, MasterCard and C.O.D. orders. Foreign orders must be in U.S. dollars. All personal checks allow 14 days to clear. Most items shipped within 24 hours.

The 1050 **DUPLICATOR** IS HERE...

INCLUDES NEW ULTRA-SPEED SOFTWARE. **READ & WRITE 3X FASTER** IN SINGLE AND DOUBLE DENSITY!

THE 1050 DUPLICATOR: The most powerful diskdrive copy system ever developed for the ATARI.

The only Copy System You will ever need! What will it do?

► The main purpose of the Duplicator is to copy disks! You will be able to copy just about any disk! The copies you make will run on any Atari drive. The Duplicator need not be present to run your backup copies. The Duplicator is fully automatic. You need only insert source and destination disks. Custom formats will be read and in turn reproduced on the backup copy disk. Our device will reproduce any custom format or heavily copy guarded scheme, bad sectors, double sectors. 19 through 24 sector format will present no problem to the

▶You will still have single density, density and one half, and double density. When you have a Duplicator installed in a 1050 drive that drive will be turned into true double density. You will have twice the disk storage. Your drive will be compatible with other double density drives such as The Rana Indus. Percom, etc.

HARDWARE POWER

High speed read & write. Your disk drive will read and load all of your software, saving wear and tear on your drive. The 1050 drive now reads one sector at a time. This is slow and inefficient. With the duplicator installed you will be able to read eighteen sectors in the time. It takes in the time it takes standard, unenhanced drives to read one.

► Included with every Duplicator will be user friendly disk software. A simple, menu driven program will allow you to copy all of your software. A Duplicator enhanced drive will be a SMART drive. We plan to write many new and exciting programs that can only be run on an enhanced drive, eg. sending a copyguarded disk over the phone. Since the drive is now fully programmable, future upgrades can be made available to you on disks, should the need arise. No further hardware changes will ever be needed. The Duplicator comes with a full hardware and software guarantee.

Plus \$3.50 for shipping and handling Add 7% outside U.S.A.

N.Y. State Residents add 71/2% Sales Tax.

520 ST Duplicator Now available!

Duplicator.

EASY 5 MINUTE INSTALLATION

NO HARM TO YOUR DRIVE OR INCOMPATIBILITY PROBLEMS CAN EVER ARISE AS A RESULT OF THE INSTALLATION OF OUR DUPLICATOR.

IMPORTANT:

Only a hardware device like the DUPLICATOR can backup heavily copyguarded disks. Don't be fooled by software programs that claim to do this.

Fully Compatible with the XL & New XE Series.



"Our competition promises tomorrow... We Deliver Today!

DUPLICATING TECHNOLOGIES inc. Formerly Gardner Computing







99 Jericho Tpke., Suite 302A Jericho, N.Y. 11753 Business Hrs. (516) 333-5805, 5807, 5808 and Weekends (516) 333-5950 TERMS: We accept American Express, Visa, MasterCard and C.O.D. orders. Foreign orders must be in U.S. dollars. All personal checks allow 14 days to clear Most Items shipped within 24 hours.

SG-10 PRINTER & **U-PRINT A INTERFACE** \$275

This is a SHIPPED PRICE anywhere in Continental USA

PANASONIC 1091 & **U-PRINT A INTERFACE** \$309

This is a SHIPPED PRICE anywhere in Continental USA

MONITORS

Commodore 1802 169	Amdek Call
Taxan Call	Samsung Green 79.95
Sakata 100-C 169	Samsung Amber 79.95

Indus GT . . Call Monitor Shipping \$10.00

Infocom ST THE ENTIRE CATALOG OF INFOCOM IS AVAILABLE **CALL FOR PRICES**

Hippopatamus

Call for items and prices

Haba ST	
Hippo C 54.95	Haba File 54 95
Checkminder 54 95	
Business Letters 34.95 Wills	T2 220
Haba Writer	Personal Pascal 64.95
Haba Calc 54.95	Personal Disk Kit 27 95
Haba Graph 54.95	Personal Prolog 79.95
0-1-07 101 Flant	! Mandaand

Casio CZ-101 Electronic Keyboard

BUFFERS

U-Buff 16K ...79.95 U-Buff 64K ... 99.95

PRINTER INTERFACES

		•	•	
U-Print A				59.95
P.R. Conn.				69.95
U-Print A				
W/16K				79.95
U-Print A				
W/64K				99.95
MPP 1150				

		_		
SG-15				369
SD-10		٠		339
SD-15		•		449
SR-10				Call
SR-15				Call

MODEMS

Volksmodem
1200 189
Atari XM-301 44.95
Prometheus
1200 299
Maxwell 1200 Call
Maxwell 2400 Call
Prometheus
2400 Call

While Supplies last 850 INTERFACE 125

. 24.95

PRICE

ATARI 130XE 1050 Disk Drive 1027 Printer

CALL FOR INDIVIDUAL AND **SUPER PACKAGE**

Volksmodem
1200 189
Atari XM-301 44.95
Prometheus
1200 299
Maxwell 1200 Call
Maxwell 2400 Call
Prometheus
2400 Call

HUNDREDS OF ITEMS AVAILABLE FOR

PRINTERS

Citoh 7500AP . . .

Toshiba 1340 559

Legend 808 169

Panasonic 1091 ... 245

Panasonic 1080 . . 215

Powertype.....309

... Call

Epson

PLEASE CALL

ATARI 520 ST

SOFTWARE & HARDWARE*
520 ST RGB System Call
520 ST Monochrome
System Call
SF 354 SS/DD
Disk Drive Call
20 Megabyte
Hard Drive Call
SF 314 DD/DD
Disk Drive Call
*Please call for stock availability on
ST products before ordering by mail

Miscellaneous	
Gato	34.9
King's Quest II	
ST Talk	17.9
H & D Base	
Typesetter ST	
Habadex Phone	
General Ledger	
Word Invaders	
M-Copy	
Financial Cookbook .	
Brataccus	
Michtron Utilities	
Exploding Fist	
Ballyhoo	
Black Cauldron	

Printmaster ST Call

Miccellaneous CT

P.C. Intercom .				. 89.95
The Final Word				. 94.95
Hex				. 27.95
Sundog				.27.95
Flip Side				
Softspool				
VIP Professiona				
Ultima II				
Perry Mason				
Degas				
Farenheit 451 .				. 34.95
Amazon				.34.95
Hacker				. 29.95
9 Princesses Ar				
Dragonworld .				. 34.95
Treasure Island				
Wizard of Oz				

Transylvannia			×		. 27.95
Borrowed Time					
Mi-Term					
Regent Word					. 34.95
Regent Spell					.34 95
Zoomracks					. 59.95
Winnie the Pool	1				. 19.95
Isgur Portfolio					Call
Easy Draw					. Call
ST Tool Box					. 24.95
Mudpies	ě				. 23.95
Mindshadow					.34.95
Music Studio .					. Call
Silent Service .					Call
Flight Simulator	r				Call

* SUPER SPECIALS *

XLENT SOFTWARE

M-Dupe.

Typesetter 24.95 Rubber Stamp 20.95 Megafont II 16.95 Megafiler 20.95 **Typesetter 520 ST 24.95** Page Designer 20.95

PRICES EFFECTIVE NOW THROUGH MAY 31, 1986

A O F T W

ACTIVISIONCall for items and prices **BRODERBUND** ...20.95 Karateka-D . . Champ Loderunner-D . . . 23.95 Print Shop-D 28.95 Print Shop Graphics

I. II or III-D 19.95 Print Shop Paper 16.95 Print Shop Comp. 27.95 INFOCOM Deadline-D 24.95 Enchanter-D 24.95 Infidel-D 29.95 24.95 Planetfall-D......24.95 Sorcerer-D Starcross-D 29 95 29.95 Suspended-D . 29 95 Witness-D . . . Sea Stalker-D .24 95 Cutthroats-D 24.95

29 95

. 24.95

24 95

. 27 95

Wishbringer-D 27.95 Spellbreaker-D 29 95 27.95 Ballyhoo **XLENT SOFTWARE** Typesetter-D Megafiler-D.

Suspect-D.

Zork I-D

Hitchhiker-D .

Zork II or III-D

23 95 Rubber Stamp 23 95 **GAMESTAR** Star League Baseball . . . 20.95 Starbowl Football-D/T 20.95 On Track Racing-D 20.95

MICROPROSE Silent Service-D Gunship-D 23.95 Accroiet-D .23.95 F-15 Strike Eagle-D23.95 Decision in Eagle-D 27 95 Kennedy Approach-D Crusade in Europe-D 27.95 OPTIMIZED

SYSTEMS Basic XE-Cart . . . MAC 65 XL-Cart 49.95 Action-Cart 49 95 All Tool Kits 20 95

ELECTRONIC ARTS Realm/Impossibility 19 95 Murder/Zinderneuf . . Music Construction Pinball Construction . One on One 24 95 Seven Cities of Gold 24.95 Financial Cookbook . . . Racing Destruction 24.95

Koronis Rift-D GooniesZorro

Alternate Reality 23.95 D-DISK T-CASSETTE CART-CARTRIDGE

BATTERIES INCLUDED

MISCELLANEOUS TAC III Joystick TAC II Joystick . 12 95 Starfighter Joystick . . . 9.95 Silk Stik Joystick Wico 3-Way Joystick . . . 23.95

P.O. Box 17882, Milwaukee, WI 53217

ORDER LINES OPEN Mon-Fri 11 a.m. - 7 p.m. CST • Sat. 12 p.m. - 5 p.m. CST

To Order Call Toll Free

For Technical Info, Order Inquiries, or for Wisc. Orders

ORDERING INFORMATION: Please specify system. For fast delivery send cashier's check or money order. Personal and company checks allow 14 business days to clear. School P.O.'s welcome. C.O.D. charges are \$3.00. In Continental U.S.A. include \$3.00 for software orders, 4% shipping for hardware, minimum \$4.00. Master Card and Visa orders please include card #, expiration date and signature. WI residents please include 5% sales tax. HI, AK, FPO, APO, Puerto Rico and Canadian orders, please add 5% shipping. minimum \$5.00. All other foreign orders add 15% shipping, minimum \$10.00. All orders shipped outside the Continental U.S.A. are shipped first class insured U.S. mail. If foreign shipping charges exceed the minimum amount, you will be charged the additional amount to get your package to you quickly and safely. All goods are new and include factory warranty. Due to our low prices all sales are final All defective returns must have a return authorization number. Please call (414) 351-2007 to obtain an R.A.# or your return will not be accepted. Prices and availability subject to change without notice.

MISCELLANEOUS

Countdown/Shutdown-D 19.95 Cross Ctrv. Road Race-D 19.95 Master of Lamps-D 19.95 Mastertype-D Flight Simulator-D34.95 49.95 Home Accountant-D Monkey Wrench-Cart . . . 23.95 Ultima III-D 37 95 Sargon III-D .34.95 Spy vs Spy-D 23.95 Odesta Chess-D 49 95 MMG Basic Compiler-D Net Worth-D 49 95 Universe-D 69 95 Beachead-D Letter Perfect-D 39 95 . 39.95 49.95 . 23.95 Halley Project-D 29.95 Micro League Baseball-D 29.95 Harcourt/Brace S.A.T.-D 49.95 Ultima II-D F-15 Strike Eagle-D 23 95 Ultima IV-D Alien Voice Box 99 95 Spy Hunter-D Tapper-D.. 29 95 Ken Uston's Blackjack-D 49.95 23 95 General Manager/MLB Fight Night 24 95

SSI

* SUPER SPECIALS *

Carrier Force-D Combat Leader-D Cosmic Balance II-D . 24 95 Cosmic Balance-D ... Broadsides-D War in Russia-D . . . 24 95 50 Mission Crush-D 24 95 Questron-D 32.95 Rails West-D 24 95 Computer Ambush-D 37.95 Galactic Adventures-D Computer Baseball-D 37.95 24.95 Reforger 88-D Objective Kursk-D . 24 95 Breakthru/Ardennes-D Field of Fire-D... 24 95 Imperium Galatium-D Oper. Market Garden-D 32.95 .37.95 Kampfgruppe-D Computer Quarterback-D 24.95 Colonial Conquest-D 24.95 Gemstone Warrior-D . Six Gun Shootout-D . 21.95 24.95 Battle of Antietnam . . . USAAF 37 95

SYNAPSE Synfile

Syncalc 32 95 Synchron Syncom 25 95 Synstock Loderunner's Rescue 20.95 Syncalc Templates . . . Essex 27 95 Brimstone Mindwheel 27.95

ATARI is a trademark of ATARI, INC.

No surcharge for MasterCard



Visa

Raid Over Moscow

27 95

VISA



HACKERS: Heroes of the Computer Revolution

A book by Steven Levy DELL PUBLISHING CO., INC. 1 Dag Hammarskjold Plaza New York, NY 10017 448 ppg. \$4.50 U.S., \$5.95 Canada

by Pamela Rice Frank

Talk to anyone who knows me; they'll confirm that I read just about anything I can get my hands (eyes) on. If I'm not devouring a novel, I'm concentrating on one of the many monthly computer magazines. (Since I'm still not too technically oriented, many times it's more like wading through the stuff. Someday, I theorize, it'll all soak in, and—voila!—a genius will emerge.)

I read inspirational books, books on the Atari, People, ANALOG Computing, cereal boxes...you get the idea. One book I was dying to get my hands on, but couldn't afford in the hard cover edition, is Hackers: Heroes of the Computer Revolution by Steven Levy.

The local library didn't have it and—I guess, since I sometimes have so many requests—never got around to ordering it. The book's popularity was reflected by the fact that none of the libraries connected with the interlibrary loan program would let it out. It seems everyone wanted to read it. Now that I have, I can understand why.

Hackers is now available for \$4.50 in a Dell paperback edition. It reads like a fantasy, but is all the more absorbing because this stuff really happened.

The first third of *Hackers* is devoted to those techies who emerged as pio-

neers of the hacker ethic. Total devotees, they existed only to compute. Their sleep schedules were adjusted to allow for marathon coding sessions.

They lived to bum code, content to share knowledge with those who earned the respect of this domain by demonstrating abilities to improve, refine, and expand the capabilities of the new computing machines.

Members of the MIT Tech Model Railroad Club's "Signals and Power Subcommittee," those involved in devising and maintaining the intricate mazes of connections to power the scale railroad setup, drifted into the EAM (Electronic Accounting Machinery) room simply by following the same curious path that had started them tracing phone lines. A desire to determine how things worked dictated that you get your hands on it and learn.

Those who began working with Professor John McCarthy in 1959, in the arrogant (these guys had the audacity to believe machines could be smart!) new field of Artificial Intelligence (AI) would be responsible for the cataclysmic discoveries that set the stage for the home computer revolution two decades later. With monastic devotion and a total hostility to the IBM batch-processed mentality, these pioneers forged the mold of an entirely new, exciting mentality.

Steven Levy, the author of Hackers,

creates such a vivid picture of these early computer explorations that at times I felt a rush of excitement such as the hackers must have known. These guys were doers.

Formal education was set aside for this real-world/real-time learning. Nothing seemed to deter their quest for completing the task at hand. Hackers weren't hung up on accomplishments; they were accomplishing.

If a part was needed, the Midnight Requisitioning Committee saw that it was acquired (appropriated). If a change in the system was necessary, the Midnight Computer Wiring Society made sure it was done. These improvisations were responsible for the first computer chess game, the first joystick, the first robotics arm, etc. It's a real joy sharing such discoveries through the book.

One of my favorite anecdotes from *Hackers* involves a robotics arm devised to play ping-pong. The system could detect the light reflected off the ping-pong ball and react accordingly. This was fine, until a bald professor walked too close to the table and almost lost his head. Whack!

Since I'm also a trivia nut (undefeated family champion—I also occasionally brag), I can't resist mentioning the fact that the same fascination hackers had for coding followed them in their pursuit of cheap food. When they weren't feeding



the system, they were feeding themselves Chinese food.

It was only logical that they learn to read Chinese. . .They found the hieroglyphs almost as intriguing as the other symbols they were so wrapped up in.

I'm sure it's obvious by now that I could go on and on about this book. I loved it. There's plenty of information on Atari included, as well.

John Harris's **Frogger** and other successes are discussed. The old Atari corporate mentality (under Warner Communications), which led to mass migration of their star programmers, is also mentioned.

This book abounds in rags to riches (and, sometimes, back to rags) stories. The successes that began in the Homebrew Computer Club include many that are already familiar.

Although we all recognize that, when compared with the Atari, the Apple is just a toy, it's still fascinating to discover that company's remarkably humble beginnings. Steve Wozniak from Hewlett-

Packard was passing plans around at meetings, for his vision of a home computer. Once he teamed with a gentleman from Atari, Steve Jobs, the rest became history.

Two interesting notes from this "era" include: first is the fact that, except for the marketing genius of Jobs, the Sol computer might have been the one to start the revolution. Second, in hind-sight, it seems surprising that many at Homebrew failed to realize what "Woz" was on to.

Because the club was founded primarily by those who'd been building their own simple computers at home—mostly from kits like the Altair—there were many members who simply didn't believe a market existed for a computer that hadn't been built by its user.

Once the home computer boom began, it was logical that the software bonanza would follow. All the new computerists needed something to do with their machines.

Ken and Roberta Williams combined

SOFTWARE CLUB

GAMES, UTILITIES, TUTORIALS...and more...

7.95 Introductory diskette29.95 Three months49.95 Six months89.95 One year

All programs (including documentation) reside on diskette.

Back issues starting with January, 1986 can be obtained for \$7.95 each.

TUTORIAL DISKS ALSO AVAILABLE:

Basic	\$9.95
Atari graphics	9.95
C programming language	9.95
Pascal	9.95

Send check or money order to:

SOURCEFLOW MEDIA 225 CONGRESS SUITE 132 AUSTIN, TEXAS 78701

SUBMISSIONS NOW BEING ACCEPTED
CIRCLE #143 ON READER SERVICE CARD

SOUTHERN SOFTWARE 1879 RUFFNER ROAD BIRMINGHAM, AL 35210

205-956-0986

24 HOUR PHONE
CALL FOR FREE CATALOG
ALL SOFTWARE 30% OFF
OVER 1500 ITEMS
CALL FOR ITEMS NOT LISTED

WE WILL BEAT ANY VERIFIED PRICE

1050 DISK DRIVE \$139 HAPPY ENHANCEMENTS \$132

1040 ST

ST OWNERS CALL FOR ST CATALOG *REPAIR PRICES*

800XL OR 850 INTERFACE \$45 520 ST \$99 DISK DRIVE \$89 130XE & ATARI PRINTERS \$79 1050 DISK DRIVE \$69

ADD \$5 FOR SHIPPING. MOST ORDERS SHIPPED SAME DAY. FOREIGN ORDERS WELCOME WITH SUFFICIENT POSTAGE ALL PRICES ARE FOR MAIL ORDER ONLY NO RETAIL SALES

CIRCLE #144 ON READER SERVICE CARD

graphics with text in their adventure games. With Roberta copying disks at home, adding the typewritten labels, sticking them into Ziploc bags and inserting xeroxed instructions to the packages to be mailed out, the Williamses made \$20,000 the second month after they "released" their new game. Sierra On-Line evolved from these efforts.

Scruffy kids hacking around on the new machines were earning megabuck 30% commissions for their efforts.

I found only one aspect of Hackers distressing. I realize that Steven Levy's job was to tell us the story of the computer revolution—a job he's done remarkably well. This, I suppose, really didn't permit him the license a reviewer has, to criticize an aspect of the revolution.

Actually, "criticize" probably isn't the correct term to use, but it'll have to suffice. The aspect I found distressing in Hackers was the casual way drug use was mentioned. The book glamorizes kids turning on to computers and (for many) finally finding a place to "fit in." I find it hard to imagine these people even considering using anything that would fry their brains. They depended on their intellect for existence and identity.

I would have liked to see some mention of the consequences of this means of coping with the money and success these kids acquired. I feel, since drug use was simply described as part of the fun, a teenager hoping to emulate these people might find drugs a part of the hoped-for glamour—especially if the success eludes him. (So much for my soapbox!)

Read *Hackers*. It was the best four-hundred-plus pages I've read in a long time. \blacksquare

Pamela Rice Frank, a free-lance writer and part-time police dispatcher, works on two computer-oriented newsletters. She has owned her Atari 800XL for 2½ years.





MICROPROSE SOFTWARE 120 Lakefront Drive Hunt Valley, Maryland 21030 (301) 667-1151 48K Disk \$34.95

by Daniel A. Silvestri

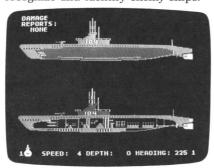
World War II rages on, and shipping lanes in the South Pacific increase in importance with each passing day. The engines on your sub are humming, the battery's fully charged, and the aft and bow torpedo tubes are loaded and waiting. You've been assigned convoy action duty and are waiting for your sonar report to verify the location of your targets. Then it happens...Sonar picks up a convoy of five ships with a destroyer escort, about ten thousand yards east of you. "Hard left rudder. Engines flank speed; dive to periscope depth." The hunt is on!

Silent Service by MicroProse is by far the best submarine simulation game I've seen thus far. A superb job has been done integrating play/action and historical facts which affect the outcome of battles. So much research has gone into this game, that it's actually a history lesson on World War II submarine construction and capabilities.

You'll also become familiar with South Pacific islands, land masses, important shipping lanes, and Allied naval bases. And all this learning is pain free, as you feel the chill of the hunt.

Silent Service gets its name from "The American Silent Service," which is what the U.S. submarine fleet was called in the second world war. The primary objective of the fleet was to disrupt the Japanese Merchant Marine, in order to prevent supplies and additional troops from getting to key battlefronts. This simulation offers a variety of scenarios, based on actual historical convoy battles and war patrols. For the Ensign assignee, target identification practice is your first stop.

Target Identification Practice lets you get into the simulation by offering a chance not only to take target practice (Torpedo/Gun Practice), but to learn to recognize and identify enemy ships.



Silent Service.

It's so important to know which ship is a destroyer and which is a cargo or troop ship, that when you elect to go on War Patrols, you must first take a quiz to see if your ability to identify targets has been developed enough to take on this dangerous assignment. If you flunk the quiz, you're reassigned to Target Identification Practice just outside the American base at Midway Island. No

fooling around here—your commanding officers are serious.

The Convoy Action scenario offers six different convoy battles, based precisely on historical battles that occurred—down to the actual sub name, whether it was a day or night skirmish (which affects visibility), tonnage actually sunk, year the battle took place, and type of sub that participated.

Both the year and type are important, because the simulation takes into account advancements made in submarine warfare during the war. A battle that occurs early in the war would be fought using a sub with limited diving capabilities (300 feet or less), "steam" torpedoes that leave a bubbly track which can be traced to the firing sub, and so on. Incredible! And this is only the beginning of the game's possibilities.

The War Patrol selection allows you to roam the South Pacific waters at will, searching for unsuspecting convoys. You begin from any of three American naval bases and end your "run" by returning to base when you feel it's necessary for repairs, fuel, etc. Part of your commanding ability is to know when to quit. This selection is extremely tough.

In addition to the variety of choices in scenarios, **Silent Service** offers you "skill" and "reality" levels. The skill levels affect such things as: damage sustained from enemy depth charge attacks, accuracy of your torpedoes, skill of the enemy crews, and so on.

The reality levels control factors which reflect weather conditions like visibility, evasive techniques of the enemy (like zig-zagging convoys), dud torpedoes (a definite reality in the war), expert destroyers with seasoned crews which can hunt you down more effectively, and more. Based on the skill and reality levels selected, an overall "difficulty" level is produced. This is used to determine your ranking when the run is complete, or you've been sunk.

Six graphic screens offer the scene from the conning tower (control center), periscope and binocular views, battle station bridge, instruments and gauges, damage control and sonar map. The latter can be zoomed out on the area of the battle.

Instrumentation includes battery charge level, speed, depth, depth below the keel, torpedo ready indicator, fuel levels, compass, clock, water temperature, etc. Ships explode and sink when struck with torpedoes...if you stick around to watch.

You control your sub by using a combination of the keyboard and the joystick. A concise "keyboard command" table is included to make this option easy to use. Of course you can dive, surface, change speeds, reverse engines, even blow the emergency tanks to prevent an otherwise fatal dive and release fake debris to fool the destroyer into thinking that it has sunk your sub.

A valid feeling is inspired by this simulation—it makes your pulse pound as the enemy above launches a depth charge attack and sonar reports depth charges exploding all around you. Your decision-making abilities are tested every nautical know of the way. Very little luck is involved in **Silent Service**. Your skill in maneuvering your sub, your decision to attack from a submerged or surface position, your ability to outrun destroyers closing in on you—all are on the line.

If you do well, your names will be entered into the "submarine Hall of Fame," which will record your difficulty level and tonnage sunk, as well. You definitely have your work cut out for you in this simulation, but it's great.

In general, the documentation is excellent. It includes maps, submarine tactics, charts on actual U.S. subs and tonnage they sunk, and more. It's by far the best documentation I've seen for such a game.

The war patrol missions section, however, is not as clearly written as the rest. I couldn't figure out how to move quickly from my base to the shipping lanes... It was taking me an hour of real time. I finally placed a call to MicroProse, and they courteously informed me that, when you select war patrol, you'll be placed on the big map. You can then move your blinking dot with the joystick to quickly head for the action. When you

encounter a convoy, you may engage it by pressing the fire button, or ignore it (the screen will flash red when you find the enemy). After an engagement, use the joystick from the coming tower to select the option to "resume patrol," and you'll be returned to the big map, where you can move quickly again. I'm totally happy now.

The only negative thing I can say about **Silent Service** has nothing to do with its game play. I tried loading the current version on a Trak drive, and some features of the game didn't work—which rendered it unplayable. I've heard that the same thing happens with Rana drives. I did successfully load it on my Atari 1050, however, and it ran well. You might check with MicroProse about this.

All in all, this submarine simulation really puts you in control, recreates a feeling of reality and gives your dollar an excellent run for the money— considering the great control **Silent Service** gives you over skill and reality factors. This is an excellent strategy game that deserves to surface victoriously to the top!

Daniel A. Silvestri has been working with computers for three years now, and is employed by a major publisher of business software for MS DOS machines. His interests in computers lie in business applications, financial planning, adventure gaming and strategic battle simulations.

ATTENTION PARENTS!

Announcing a new series of Inexpensive disks designed by educators—especially for children!

TINY TOTS — A collection of eight programs enlivened by sound and graphics to help your pre-schooler learn letters and numbers.

LITTLE FOLKS — Eight fun-filled activities for age five to seven. Beginning spelling, math skills stressed.

SMALL FRY — For the seven- to nine-year-old child. Introduces multiplication. Includes word games, two-player games, logic development activities.

THAT'S LIFE — A full length, non-violent, multiple player game the whole family can enjoy. Go to college, choose a career, get married, raise a family. Deal with the crises of every-day living. Requires 48K.

SPANISH PRETERITE — A workbook-type set of drills on past tense verbs in Spanish.



DOCUMENTATION INCLUDED
Only \$12 per disk POSTPAID.
Send check or money order to:

P.O. Box 2788
Turlock, CA 95381-2788

Allow 3-4 weeks for delivery. (Calif. residents, add 6% tax.)

All New Games from England First Time Available in the USA



Special Introductory Prices Dealer Inquiries Invited

	Disk	Tape
Smash Hits #1 5 great games: Jet-Boot Jack/Firefleet/Dan Strikes Back/Captain Stickey's Gold/Hyperblast	\$16.95	\$14.95
Smash Hits #2 5 great games: Jet-Boot Jack/Stranded/Diamonds/Robin Hood/ Citadel Warrior	\$16.95	\$14.95
Smash Hits #3 5 great games: Jet-Boot Jack/Airstrike 2/Batty Builders/Breath of the Dragon/Neptune's Daughters	\$16.95	\$14.95
Colossus Chess 3.0	\$14.95	\$11.95
Hijack	\$17.95	\$14.95
Chop Suev	\$17.95	\$14.95

Order from: BIG BEN GAMES, LTD. 1765 Maple Street, Suite 4 Northfield, IL 60093 (312) 251-8668 VISA • MASTERCARD Add \$2.00 for Shipping & Handling Illinois residents add 7% tax.

CIRCLE #110 ON READER SERVICE CARD





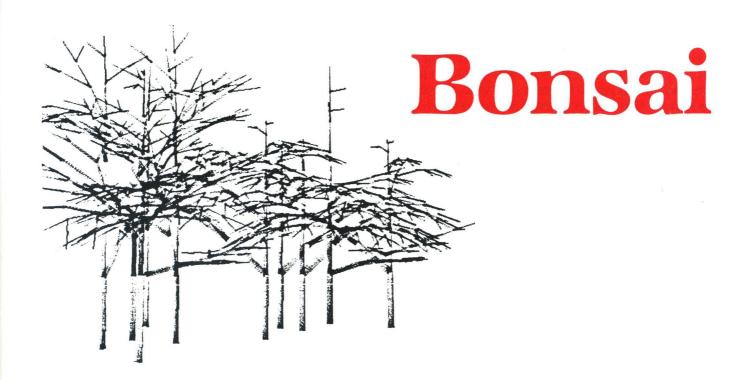
NOW! Have 80 BEAUTIFUL columns for your LETTER PERFECT and BASIC programs! Great on TV & Monitors! For ALL 400/600/800/1200/130 Reg/XL/XEs with Min. of 48K. Please specify model. Send \$49.95 (Mich. Res. add 4% tax) + \$2.50 postage, call for a C.O.D. or see your local dealer. Money Back Guarantee! For more information call (517) 394-2412 Quantity Discounts

P.O. Box 443 Holt, Mich. 48842

Amiable Computer Enhancements™
Atari Corp.™, LJK Enterprises ™

CIRCLE #111 ON READER SERVICE CARD





by R.I. MacDonald

This program constructs trees (of the botanical variety), which can then be drawn with a 3-D perspective drawing program (such as **Solid States** in **AN-ALOG Computing**'s issue 16). Drawing trees is not as trivial as it might seem.

A realistic representation of a tree can come only from a data set constructed with due attention to some model of tree growth. Trees are complex, and data sets that represent them convincingly are too large to be entered by hand in the usual way for **Solid States** images. **Bonsai** is a BASIC program that creates the data sets to represent many kinds of trees, according to a new model of growth designed for computer drawing in architecture.

From this model, a great deal can be discovered about the growth of plants. Many different kinds of trees can be generated with a few parameters. Finding the correct parameter values required to generate different species leads to some understanding of the construction of real trees. The effects of weather and gravity can be simulated. New types of alien botany can even be constructed.

If a collection of tree datasets is made, these can be included in drawings made with **Solid States**, with great effects. Computer pictures in general tend to be representations of artificial things, mainly because these are easier to define in coordinates. Natural objects like trees can be impressive.

Organization.

There are two programs given here. The first, which is **Bonsai** proper, creates the tree data sets and stores them on disk. To create a realistic tree requires at least 128 points and an equal number of lines to connect them. Each point requires a representation of the X-, Y-, and Z-coordinate, and each line has two ends and a width parameter, leading to a data set occupying almost 5K.

Generally speaking, only the data representing one tree can be held in memory at a time, with the perspective drawing program in place. It's convenient to store the data sets as disk files to be called up by the drawing routine.

The second program, called PERSPEC, is a 3-D drawing system using **Solid States** as its core. It has an altered file structure matching that of **Bonsai**, with some added routines to permit drawing with lines of variable width, as well as moving, scaling and rotating the data to be drawn, so that many items can be combined into a single drawing.

The program isn't interactive like the original **Solid States**. It's organized as a group of subroutines to be called by a main drawing program, which was writ-



ten to describe the particular picture being created, and uses previously created files as sources of data.

This approach makes it possible to write a program to draw complex pictures and leave it alone to produce them. With so much data to deal with, the process can be slow. One can cook supper, shovel the driveway and play two full games of Monopoly, while the computer gets on with things.

The tree creation program **Bonsai**, on the other hand, can be used either interactively or under the control of a main program. To use it at all, however, requires an understanding of the model basic to it.

GMT models.

Bonsai employs a tree growth model called GMT2 that was developed by M. Aono and T. Kunii at the

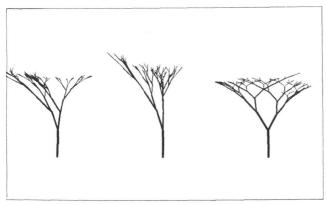


Figure 1.

University of Tokyo. This work is described fully in the Computer Graphics and Applications Journal of the Institute of Electrical and Electronic Engineers for May 1984. A brief description of the principles is given here.

While trees appear to be fairly random in construction, random lines actually make a very unsatisfactory representation of a tree. This is because trees, and all plants, follow quite systematic rules during growth. The trees generated by **Bonsai** are not random at all, but grow entirely deterministically, according to the following simple rules.

- (1) Two child branches are generated at the end of every branch.
- (2) As the tree grows, this bifurcation occurs simultaneously at the end of all branches.
- (3) The child branches are shorter and narrower than the parent branches by given ratios. (In the model, it's actually possible to change the ratios at each level of branching.)
- (4) The child branches make specified (possibly different) angles to the left and right with

the direction of the parent branch, and lie in a plane containing the parent branch. This plane (the maximal gradient plane) lies along the parent branch in such a way that a marble placed at the high end of that branch would roll on the plane right along the branch to the other end.

(5) Rule four has to be varied when one branching angle is zero, or near zero. Such a situation occurs in trees like evergreens, in which one child branch always continues along the line of the parent, forming a central, pillarlike trunk. This type of branching is called monopodial. For monopodial branching, an angle must be defined (the divergence angle), by which the position of each new branch advances around the trunk from the direction defined by the previous child.

Many types of tree can be represented by this simple scheme. In Figure 1, some examples are given.

The realism of the trees can be enhanced by adding a dash of imperfection. As noted, mere randomness imposed as a perturbation on the tree does not add much to the visual appearance. Much more dramatic effects are obtained by adding "external influences." **Bonsai** permits the tips of the branches to be deviated by a fixed amount in the X-, Y- or Z-direction from their calculated position at each branching stage.

This uniform deviation produces a curve in the tree or its branches that's reminiscent of the effects of wind, or, if it's in the downward direction, of gravity. Non-uniform deviation is also possible. In this process, imaginary "controllers" are located at points around the tree. Each such location either attracts or repels the tips of the branches according to their distance from it. The effect on the tree can only be described as "added character." The effects of adding uniform and non-uniform deviation to the trees of Figure 1 are shown in Figure 2.

Tree parameters.

Each tree is defined by twenty parameters. Since a continuous range of values is permissible for most of them, there are very many possible trees. Not all look good. Part of the fun is finding out what ranges of parameter values are reasonable. An understanding of the function of each parameter is necessary. In the following, each parameter is described, and the name of the corresponding variable in **Bonsai** is given.

Number of levels (L). This is the number of generations of branching that occur. The number of data points goes as 2^L, so vast amounts of data will be

generated if L is too large. **Bonsai** can coexist in memory with the data for nine levels of branching in a 48K machine, but the drawing program PERSPEC can only handle seven levels at a time.

Initial diameter (WID). This is the width of the trunk at the ground. A value of 6 is a good starting point.

Contraction ratio of diameter (DIAM). At each level of branching, a new diameter for the branch is established by replacing the current value of WID (see above) by WID*DIAM. Normally, you would set DIAM to be between 0 and 1. A value of 0.7 works well.

Angles, left and right (H1,H2). These are the angles that the child branches make to the left and right of the line of the parent branch. If one angle is set to 0, monopodial branching results. In such cases, you should specify a divergence angle (see below), otherwise all the branches come out on the same side of the tree. any branching angle between 0 and 90 degrees is reasonable.

Angle decrements, left and right (DL,DR). At each branching, the branching angles will be decreased by the amounts given here. Most real trees seem to have almost no decrement of branching angle with growth, but it's an interesting parameter to play with. Negative values give increments instead of decrements.

Shortening ratios, left and right (R1,R2). The length of each child branch will be shorter than that of the parent branch by these ratios. The trees of North America seem to correspond to values between 0.6 and 0.9.

Shortening ratios, left and right (RD1,RD2). The shortening ratios are incremented by these values at each stage of branching. This is an advanced parameter I haven't investigated yet. Zero works.

Divergence angle (DIV). This one's very important for evergreens and some other trees. When one branching angle is 0 or near 0, the tree has a main stem growing more or less straight up, with side branches growing out of the stem. If DIV is set to 0, all these branches will come out the same side of the tree. When specified, DIV sets the angle by which the direction of each side branch is rotated around the trunk from the one below it.

It only applies to the trunk, but when it's been given a value, the divergence angle also signals the program to produce sub-side branches on opposite sides of the side branches, to increase the symmetry of the tree further. Divergence is a feature of many real plants, and it's interesting that, expressed as fractions of a full circle, these angles for various plants are always members of the Fibonacci sequence $\frac{1}{2}$, $\frac{1}{3}$, $\frac{3}{5}$, $\frac{3}{8}$... Thus, 180,120,140,135...degrees are good values.

When DIV is set nonzero, the program always takes the left branch as the trunk, reversing the branching angles if the right one's smaller. This may cause confusion if other parameters, such as shortening ra-

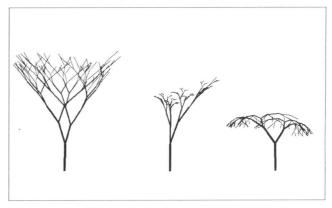


Figure 2.

tio, are not symmetrical in the branching, since it's up to you to get these right.

Uniform deviation (UDX,UDY,UDZ). At every branching stage, the positions of the tips of the branches will be calculated according to the five rules of GMT2. Then they'll be moved by the amounts given here in the X-, Y- and Z-directions. Small values work best, up to 0.3, say. Negative values are also permissible, of course.

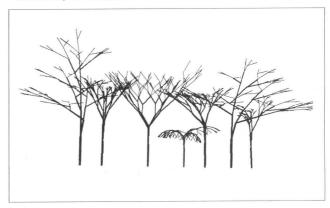


Figure 3.

Number of controllers (MM). This is the number of discrete attractors or repellers used. Set to 0 if none needed.

Strength and coordinates of controllers (matrices FACTOR(MM), QX(MM), QZ(MM).). Values of the strength and coordinates go in matrices. There's no reasonable limit on the number permissible. The

T Bonsai continued

strengths should be negative for a repeller, positive for an attractor, and small in magnitude if the controller's near the tree—for example, about .05.

How to use the program.

Bonsai is given in Listing 1. You should list it to disk after typing, since you'll want to combine it with various controller programs to do different things.

The most straightforward way to use **Bonsai** is to RUN it and respond N to the query AUTORUN? You'll be prompted for the parameters, and the disk drive number and filename they're stored under. The program will then generate the corresponding tree data and store it in the disk file specified.

A more satisfactory way to proceed is to generate a lot of trees in one run. To do this, you include a controller program like the one shown in Listing 2 at the end of **Bonsai**. (Type it in, LIST it to disk, then ENTER both **Bonsai** and Listing 2 from disk.)

In the controller program, the parameters of many trees are stored in data statements. Listing 2 will generate ten trees that are a good starting library and store them in files called NO1 through NO10. When you RUN **Bonsai**, respond *Y* to the *AUTORUN?* query, and control is transferred to your controller program after Line 20000. (This line should not be altered or removed, by the way.)

A few conveniences are provided to aid in writing programs like Listing 2. To avoid the necessity of remembering line numbers in **Bonsai**, these are contained in mnemonic variables. You need only include the statement GOSUB GO to generate the tree data, and GOSUB WRITE to write it to a disk file.

Before the latter, you must have specified the drive number in the variable DRIVE in the form DRIVE\$ = "D1:", and the name of the file in the variable FILE\$. Eight letters here only; no file extenders are allowed. Note that **Bonsai** files are incompatible with the original **Solid States** files. In **Bonsai**, separate files distinguished by the extenders .PNT and .LIN are used for point and line data, and the .LIN files contain the width data, as well.

(continued on next page)

FOR ATARI*400/800/1200/130XE/800XL*

8203 JX ^{edb}

For ATARI 800XL, 130XE Replacement operating system to run the vast majority of all ATARI software. No translator or disk to load!

Proper RESET operation especially important for programs like LETTER PERFECT, DATA PERFECT, TEXT WIZARD, etc. One touch access to extra RAM, all RAM. One touch BASIC on.

INCLUDES DUAL OPERATING SYSTEM BOARD AND MacroMon XL which is an excellent, unique monitor for beginner and pro alike—written especially for the BOSS. \$69.95 for 800XL/130XE. \$79.95 for 1200XL (Socket Instl.: 130XE \$20.00)





An all machine language text, graphics, mixed mode dump for EP-SON, GEMINI, NEC, PROWRITER, OKIDATA, OKIMATE, 160L, KXP-1090, DMP-80, ISD 480, SEIKO/AXIOM GP550A.

Self booting can be used while programming or even running other programs.

Works with or without BASIC, ED/ASM, PILOT, LOGO. Calendar generator. Horizontal format allows text to be continued in same direction. Change widths, height, center and much more from the keyboard or your program. Special handlers for PAINT, Micro-Illustrator, LOGO, Micropainter, etc. Includes LISTER program for inverted and special characters plus demos and ideas. \$29.95* 16K Disk-All Interfaces.

diskwiz-II

Fast and easy to use repair, edit, explore, dup, disk utility package. Single load, single or double density. Special printout capabilities.

Repair or change of linked DOS2 or OSA+2 files, directories, dup filenames. Fast searches, mapping, file trace. Disassembler, speed check and much more! Low priced, fast, easy, and powerful! \$29.95 16K Disk.

Send s.a.s.e. for update info.

*TERMS: U.S. funds; check or M.O. add \$2.50 shipping/handling add 6% CA — 6.5% LA COUNTY add \$3.00 for C.O.D. No charge cards accepted add \$2.50 foreign orders normally out within 48 hours.

P.O. BOX 2205/REDONDO BEACH, CA 90278

(213) 376-4105

* Trademark of Atari, Inc.

CIRCLE #112 ON READER SERVICE CARD

PERSPEC.

After typing PERSPEC, which is given in Listing 3, you should also LIST it to disk. This version of **Solid States** runs under the control of a control program, which you enter after Line 30000 in a similar way to the **Bonsai** controller programs. A very simple one is shown in Listing 4. This program prompts for the name of a tree file and then draws it.

PERSPEC is really **Solid States**, modified to provide for variable line width drawing and convenient scaling, rotation and translation of the data, as well as drawing many data files to one picture. For convenience, the subroutines have been given names, as in **Bonsai**. These subroutine calls and the associated variables which must be set before use are given in Table 1.

Subroutine Call GOSUB PLOTON	Variables	Purpose Initializes 1020
GOSUB PLOTOFF		plotter. Disables 1020 plotter.
GOSUB DUMP		Epson-compatible screen dump.
GOSUB RED,BLUE GREEN,BLACK GOSUB BIG GOSUB SMALL	Ē	Change pen colour on 1020 plotter. Sets large format. Sets small format (thick lines sup- pressed).
GOSUB PAGE GOSUB FRAME		New plot on 1020. Draws frame.
GOSUB GETFILE GOSUB OLDFILE	FILE\$,DRIVE\$ FILE\$,DRIVE\$ WIDTH	Gets Bonsai file. Get Solid States file.
GOSUB ROTATE GOSUB GO	THETA (angle) SCL,ZOOM (scale & zoom) XS,YS,ZS (tree location) OX,OY,OZ (observer location) VX,VY,VZ (point observed)	Rotate data. Draw data.

Table 1.

Note that the variables must be established before the subroutine calls. The variable DIVE\$ must be in the form D1: and FILE\$ is limited to eight letters, no extenders. THETA is the rotation angle about the trunk, in degrees; SCL is a scale factor applied to the whole tree; and XS,YS,ZS are the coordinates of the root of the tree as it will be drawn. In scaling and moving, remember that the raw tree data is such that the distance from the root along the trunk to the first branch is always 1 before scaling.

The drawing parameters ZOOM (telescope-type magnification— use 1, normally), OX,OY,OZ (observer location), and VX,VY,VZ (point looked at) must also be set before calling GO.

Finally, Listing 5 is a control program for PER-SPEC, that uses the trees generated by **Bonsai** and Listing 2 to make the picture you see in Figure 3. Happy gardening!

Dr. MacDonald is a research scientist in integrated optics for the Department of Communications of Canada in Ottawa. He's owned a 48K Atari 400 for two years, time-shared with two children, and is a member of the National Capital Atari Users' Group (NCAUG).

Listing 1.

```
REM XXXXXXXXXXXXXXXXXXXXXXXXXXXX
                           BONSAI
    REM *
   REM *
                    R.I. MACDONALD
    REM *
   REM *****************
   WRITE=2310:G0=58:DIM DRIVE$(3),FILE$
(12),P$(1),F$(10),F1$(20):? "AUTORUN?"
:INPUT P$:IF P$="Y" THEN 20000
10 TRAP 20:? :? "NUMBER OF LEVELS":
INPUT L:DIM R(L,1),H(L,1)
24 TRAP 25:? :? "INITIAL DIAMETER":INP
UT WID
     TRAP 30:? :? " CONTRACTION RATIO OF
  DIAMETER": INPUT DIAM
30 TRAP 40:? :? "LEFT ANGLE":I
H1:? :? :? "LEFT ANGLE DECREMENT"
                                            ANGLE": INPUT
40 TRAP 45:? :? :? "RIGHT ANGLE":INPUT
H2:H2=H2:? :? :? "RIGHT ANGLE DECREME
  H2:H2=H2:?
NT": INPUT DR
45 TRAP 46:? :? :? "LEFT RATIO":INPUT
R1:? :? :?'"RATIO INCREMENT (DECREMENT
)":INPUT RD1
46 TRAP 47:? :? :? "RIGHT RATIO":INPUT
R2:? :? :? "RATIO INCREMENT (DECREMEN
T)":INPUT RD2
47 TRAP 48:? :? :? "DIVERGENCE ANGLE?"
:INPUT DIV:IF (DIV<>0) AND ABS(H2) (ABS
(H1) THEN GOSUB 400
48 TRAP 54:? :? "DEVIATIONS":? "UNI
48 TRAP 54:? :? :? "DEVIATIONS":? "UNI
FORM:DX,DY,DZ":INPUT UDX,UDY,UDZ
49 TRAP 54:? :? "CONTROLLED:HOW MAN
   CONTROLLERS?": INPUT MM: IF MM=0 THEN
50 TRAP 49:? :? :? "GIVE STRENGTH AND X,Y,Z CO-ORDINATE FOR EACH":DIM FACTOR (MM),QX(MM),QX(MM),QZ(MM)
52 FOR M=1 TO MM:INPUT 5,X,Y,Z:FACTOR(M)=5:QX(M)=X:QY(M)=Y:QZ(M)=Z:NEXT M
54 ? "DRIVE?":INPUT DRIVES:?
LENAME TO SAVE":INPUT FILES
58 F=2:POKE 559,0:TRAP 59:DIM R(L,1),H
59
     TRAP 3000
57 INMP 3000

60 H2=-H2:DEG :FOR J=1 TO L:H(J,0)=H1+

(J-1)*DL:H(J,1)=H2-(J-1)*DR:R(J,0)=R1+

(J-1)*RD1:R(J,1)=R2+(J-1)*RD2:NEXT J

100 TRAP 40000:P5=2^L:L5=P5-1
110 TRAP 120:DIM X(PS),Y(PS),Z(PS),LN(
P5,2)
120 X(1)=0:X(2)=0:Y(1)=0:Y(2)=0:Z(1)=0
:Z(2)=1:J=2:GOSUB 245
122 W=1:T=1:Q=2:H4=1:JP=2:JG=1:C=0:J=3
,1)=0:LN(2,0)=1:LN(2,1)=2
124 G05UB 300:LN(0,2)=WID:LN(1,2)=WID:
```

Bonsai continued

LN(2,2)=WID:WID=WID*DIAM:LN(3,2)=WID:L N(4,2)=WID 125 OLDIV=0:FOR Q=3 TO L:H4=(-1)^Q 126 WID=WID*DIAM:IF (DIV>0) THEN DIVFL 130 H3=0:FOR JG=INT(F^(Q-3)+1.001) TO
INT(F^(Q-2)+1.0E-03):GP=JG-(F^(Q-3)+1)
136 FOR P=0 TO 1:FOR C=0 TO 1
140 J=INT(F^(Q-1)+1.001+C+2*P+4*GP):JP
=INT(F^(Q-2)+1.001+P+2*GP) -145 LN(J,0)=JP:LN(J,1)=J:LN(J,2)=WID 150 U=X(JP)-X(JG):V=Y(JP)-Y(JG):W=Z(JP)-Z(JG):T=(U*U+V*V+W*W)^0.5 160 S=(U*U+V*V)^0.5:IF S=0 THEN GOSUB 305:GOTO 215 180 S=1/5 181 HHH=H(Q,C):IF (C<>1) OR (DIV=0) TH EN 190 182 HHH=HHH*H4:IF H3=0 THEN HHH=ABS(HH 190 X(J)=UDX+X(JP)+R(Q,C)*(U*CO5(HHH)-\$\times \text{X} \text{Y} \text{X} \text{Y} \tex S*T*U*SIN (HHH)) 210 Z(J)=UDZ+Z(JP)+R(Q,C)*W*CO5(HHH):G 05UB 220 215 NEXT C:H3=1:NEXT P:NEXT JG:NEXT Q: GOTO 2310 234 IF DX=0 THEN PHI=PH/2+(5GN(DY) <>1) *PH:GOTO 240 236 PHI=ATN(DY/DX):IF SGN(DX)=1 THEN P HI=2*PH*(5GN(DY)=-1)+PHI:GOTO 240 238 PHI=PH+PHI 240 X(J)=X(JP)+R*COS(OLDIV+PHI):Y(J)=Y (JP)+R*SIN(OLDIV+PHI):DIVFLG=0
241 REM ****CONTROLLERS
245 IF MM=0 THEN 280
246 FOR M=1 TO MM:QX=QX(M)-X(J):QY=QY(248 NEXT M 280 RETURN 300 REM ***** VERTICAL BRANCH ***** 302 LN(J,0)=JP:LN(J,1)=J:LN(J,2)=WID 305 HHH=H(Q,C):IF (C<>1) OR (DIV=0) TH EN 310 306 HHH=HHH*H4:IF H3=0 THEN HHH=ABS(HH H) 310 Y(J)=UDY+Y(JP)+R(Q,C)*T*SIN(HHH):X (J)=UDX+X(JP):Z(J)=UDZ+Z(JP)+R(Q,C)*W* COS (HHH) 320 GOSUB 220:RETURN 400 REM *** EXCHANGE VALUES 401 TT=H2:H2=H1:H1=TT:TT=DL:DL=DR:DR=T T:RETURN 2310 F\$=DRIVE\$:F\$(LEN(F\$)+1)=FILE\$:CLO SE #1:F1\$=F\$:F1\$(LEN(F\$)+1)=".PNT":OPE N #1,8,0,F1\$ 2320 ? #1;P5 2320 ? #1;P5 2330 FOR X=1 TO P5:? #1;X(X):NEXT X 2340 FOR X=1 TO P5:? #1;Y(X):NEXT X 2350 FOR X=1 TO P5:? #1;Z(X):NEXT X 2360 CLOSE #1:TRAP 1210:F1\$=F\$:F1\$(LEN (F\$)+1)=".LIN":OPEN #1,8,0,F1\$:TRAP 11 2370 ? #1;LS:FOR X=1 TO LS:? #1;LN(X,0):? #1;LN(X,1):? #1;LN(X,2):NEXT X 2380 GRAPHICS 0:IF AUTFLG THEN RETURN

CHECKSUM DATA.

(see page 12)

1 DATA 58,613,730,516,66,597,819,712,3
0,619,331,389,286,790,429,6985
49 DATA 392,857,15,673,51,689,57,528,6
93,284,876,477,814,588,83,7077
124 DATA 794,495,441,162,637,785,666,3
68,214,320,307,422,792,768,161,7332
215 DATA 412,165,256,997,827,234,96,96
5,97,94,498,630,883,758,667,7519
300 DATA 113,655,277,406,6,974,689,554
,293,645,295,286,527,492,495,6707
2350 DATA 498,948,544,996,599,123,188,36,874,108,200,896,6010

Listing 2.

```
20001 GOTO 22000
20002 REM ****DATA LOGGING****
20010 CLOSE #1:OPEN #1,8,0,"P:"
20015 ? #1:? #1:? #1;" ";FILE$
20020 ? #1;"NUMBER OF LEVELS",L
20030 ? #1;"INITIAL WIDTH",WID
20040 ? #1;"CONTRACTION RATIO",DIAM
20050 ? #1;"LEFT ANGLE ",H1
20060 ? #1;"INCREMENT LEFT",DL
20070 ? #1;"INCREMENT RIGHT",DR
20080 ? #1;"INCREMENT RIGHT",DR
20100 ? #1;"LEFT SHORTENING RATIO",R1
20100 ? #1;"LEFT S. RATIO INCREMENT",R
D1
20110 ? #1;"RIGHT SHORTENING RATIO",R2
20120 ? #1;"RIGHT S. RATIO INCREMENT",R
D2
20130 ? #1;"RIGHT S. RATIO INCREMENT"
RD2
20140 ? #1;"NO. CONTROLLERS",MM
20170 ? #1;"STRENGTH","X","Y","Z"
20180 FOR M=1 TO MM:? #1;FACTOR(M),QX(M),QY(M),QZ(M):NEXT M
20198 ? #1;"UNIFORM DEVIATIONS"," ",UD
X,UDY,UDZ
20195 ? #1;CHR$(12)
20210 RETURN
20999 REM ***DATA READER ROUTINE ****
21000 READ L,WID,DIAM,H1,H2,DL,DR,R1,R
2,RD1,RD2,DIV,UDX,UDY,UDZ,MM:IF MM=0 THEN RETURN
21010 FOR J=1 TO MM:READ FF,X,Y,Z:QX(J)=X:QY(J)=Y:QZ(J)=Z:FACTOR(J)=FF
21020 RETURN
21999 REM ****MAIN PROG****
22000 DIM FACTOR(10),QX(10),QY(10),QZ(
10):DRIVE$="D1:"
22005 FOR JK=0 TO 9
22016 FILE$="NO":FILE$(LEN(FILE$)+1)=S
IR$(JK):RESTORE 23000+JK:GOSUB 21000:G
```

OSUB 20010:GOSUB GO:GOSUB WRITE

22020 NEXT JK
23000 DATA 7,6,.7,30,35,0,0,.7,.9,0,0,
0,0,0,0,0
23001 DATA 7,6,.7,0,25,0,0,.7,.9,0,0,1
40,0,0,0,0
23002 DATA 7,6,.7,10,35,0,0,.7,.9,0,0,
140,0,0,0
23003 DATA 7,6,.7,20,25,2,2,.7,.9,0,0,
0,0,0,0,0
23004 DATA 7,6,.7,60,65,0,0,.5,.9,0,0,
0,0,0,0,0
23005 DATA 7,6,.7,30,35,0,0,.7,.9,0,0,
0,0,0,0,0,0
23005 DATA 7,6,.7,30,35,0,0,.7,.9,0,0,
10,0,0,1,0,0,1,1,1,1
23007 DATA 7,6,.7,30,35,0,0,.7,.9,0,0,0,0,0,0,0,10,0
23008 DATA 7,6,.7,30,35,0,0,.7,.9,0,0,0,0,0,0,0,1,.05,0,1,1
23009 DATA 7,6,.7,10,35,0,0,.7,.9,0,0,0,0,0,0,0,0,1,.05,0,1,1

CHECKSUM DATA.

(see page 12)

20001 DATA 187,747,902,879,114,260,690,274,958,518,219,977,243,962,508,8438,20130 DATA 507,237,24,113,30,447,46,987,376,286,49,376,545,719,746,5488,22020 DATA 978,790,16,259,801,812,259,129,245,112,877,5278

Listing 3.

```
5 REM ****************
 10 REM *
20 REM *
                                                                    PERSPEC
                                              AUTOMATIC 3-D
                                                               PROGRAMME
 30 REM *
 80 GOTO 20000
 440 REM
                                   REM #
                                                                               BEGIN
 442
                  REM MINIMUM MANAGEMENT AND A STATE OF THE ST
                 X(0)=UX:Y(0)=UY:Z(0)=UZ:D0=1
DX=UX-OX:DY=UY-OY:DZ=UZ-OZ
 450
 490
 495 POKE 559,0
500 U1=5QR(DX*DX+DY*DY+DZ*DZ):IF U1=0
 THEN U1=1E-06
510 CX=DX/U1:CY=DY/U1:CZ=DZ/U1
520 S3=5QR(1-CZ*CZ):S2=5QR(1-CY*CY)
 530 QX=OX+D0*CX:QY=OY+D0*CY:QZ=OZ+D0*C
540 XM=X(0):YM=Y(0):ZM=Z(0):GOSUB 610
541 FOR I=1 TO PS:XM=X(I)*SCL+XS:YM=Y(
I)*SCL+YS:ZM=Z(I)*SCL+ZS:GOSUB 610:NEX
 T I
549 I=0:IF VIS(I)(>0 THEN XW=X(0):YW=Y
(0):ZW=Z(0):GOSUB 610:GOSUB 670
550 FOR I=1 TO PS:IF VIS(I)=0 THEN 570
560 XW=X(I)*SCL+XS:YW=Y(I)*SCL+YS:ZW=Z
 (I)*SCL+ZS:GOSUB 610:GOSUB 670
570 NEXT I:GOTO 740
 580 REM *****************
610
               VIS(I)=1:VCX=XM-0X:VCY=YM-0Y:VCZ=Z
M-OZ
```



THE AMAZING VOICE MASTER®

Speech and Music Processor

Your computer can talk in your own voice. Not a synthesizer but a true digitizer that records your natural voice quality—and in any language or accent. Words and phrases can be expanded without limit from disk.

And it will understand what you say. A real word recognizer for groups of 32 words or phrases with unlimited expansion from disk memory. Now you can have a two way conversation with your computer!

Easy for the beginning programmer with new BASIC commands. Machine language programs and memory locations for the more experienced software author.

Exciting Music Bonus lets you hum or whistle to write and perform. Notes literally scroll by **as you hum!** Your composition can be edited, saved, and printed out. You don't have to know one note from another in order to write and compose!

Based upon new technologies invented by COVOX. One low price buys you the complete system—even a voice controlled black-jack game! In addition, you will receive a subscription to COVOX NEWS, a periodic newsletter about speech technology, applications, new products, up-dates, and user contributions. You will never find a better value for your computer.

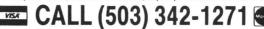
ONLY \$89.95 includes all hardware and software.

Available from your dealer or by mail. When ordering by mail add \$4.00 shipping and handling (\$10.00 foreign, \$6.00 Canada).

The Voice Master is available for the Commodore 64, 128, Apple IIc, IIe, II+, and Atari 800, 800XL, 130XE. Specify model when ordering. (Apple II+ owners must have joystick adapter. Available from Covox at only \$9.95.)

Apple Ile and II+ owners: Enhance speech quality and music capabilities with optional Sound Master hardware card. Installs in slot 4 or 5. Available separately for \$39.95 with demo software, or order with Voice Master for only \$119.95 (saves \$10 when ordered separately).

For telephone demo, additional information, or prompt service for credit card orders,



Call or write today for FREE audio demo cassette tape and brochure.



We will beat any price. Anywhere.

Atari ST Hardware	Atari 8-Bit Hardware	Atari 8-Bit Software
Atari 1040STCall	Atari 130XECall	Action! \$42.00
Atari 520ST RGBCall	Atari 65XE Call	Basic XE\$42.00
Atari 520ST MonoCall	Atari 1050 Call	B/Graph\$24.95
Atari SF354Call	Indus GT 189.00	Battle of Antietam \$32.00
Atari SF314Call		Computer Baseball \$24.95
Atari SM124Call	Modems	Gemstone Warrior \$22.00
Atari SC1224Call	2120 30220	War in Russia \$48.00
Atari SC1424Call	Atari XM301 Cheap	Crusade in Europe \$24.95
	MPP 1000E\$45.00	Dec. In the Desert\$24.95
Atari ST Software	Supra 1200AT\$185.00	Kennedy Approach \$19.50
	Supra 1200ST \$185.00	Solo Flight\$19.50
Borrowed Time\$31.00	Hayes 1200 Call	The Learning Phone Call
Chat\$13.00	Hayes 300 Call	Syncalc 130XE \$29.95
Final Word\$79.00		Megafont II+ \$17.00
H & D Forth\$35.00	Printers	Rubber Stamp\$18.00
Haba SoftwareCheap		Paperclip 130XE/800 \$37.00
Hacker\$28.00	Panasonic 1080Call	Mac/65\$43.00
PC Intercomm\$69.00	Panasonic 1091Call	Print Shop \$26.00
Personal DiskitCall	Panasonic 1092Call	Karateka \$18.50
Sundog\$22.00	Panasonic 1592Call	Lode Runner \$22.00
VIP ProfessionalCall	Panasonic 3131Call	Atariwriter Plus \$37.50
Silent Service\$24.00	Panasonic 3151Call	Basic XL
Flight Simulator Call		Battalion Command \$24.95
Micro C ShellCall	Interfaces	Broadsides \$24.95
Mindshadow\$31.00	DD 0 .: 6 55.00	Computer QB \$24.95
BrattacusCall	P:R: Connection\$55.00	Panzer Grenadier \$24.95
Degas\$24.95	Supra Microprint\$29.00	Acrojet
H & D Base\$59.00	Supra 1150\$39.00	Conflict in Vietnam \$24.95
H & D Toolbox\$25.00	Supra Micronet \$149.0	F-15 Strike Eagle \$19.00
Hex\$24.00	Supra Microstuffer \$57.00	Slient Service\$19.50
Personal PascalCall	U-Print\$48.00	Gunship
ST Talk	Apeface\$39.00 Atari 850	Synfile 130XE \$29.95
Typesetter ST\$24.00	ST Printer Cable\$9.00	Page Designer
Zoomracks\$49.95	51 I I I I I Cable 45.00	Typesetter\$21.00
Modula-2Call	May Special	HomePak
Personal PrologCall	may Special	· · · · · · · · · · · · · · · · · · ·
Kings Quest IICall	Teknika MJ-10 \$178.00	Printshop Lib. 1/2/3 \$15.95 Champ. Lode Runner \$18.50
	QMI 1200 Modem \$149.00	Ultima IV\$41.00
Toad Services	·	O101111a 1 V
	Rlack Patch Systems	

Black Patch Systems

TO ORDER (Visa, MasterCard): Call TOLL FREE 1-800-ATARI-02

For technical information, order inquiries, or for MD orders call 301-757-1329, or write Black Patch Systems, P.O. Box 501, Arnold, MD 21012

Risk Free Policy: In-stock items shipped within 24 hours of order. No deposit on C.O.D. orders. Free shipping on prepaid cash orders within the continental U.S. Volume discounts available. MD residents add sales tax. APO. FPO. and international orders and \$5.00 plus 3% for priority mail service. Advestised prices show 4% discount for cash, add 4% for MasterCard or Visa. Personal checks require 4 weeks clearance before shipping. Ask about UPS Blue and Red label shipping. All merchandise carried under manufacturer's warranty. Free catalog with order. All items subject to change without notice.

Dealer inquiries invited

Bonsai continued

COA TE BUYUNUANIANIANIANIANIANIANIANIANIANIANIANIANIA
620 IF DX*VCX+DY*VCY+DZ*VCZ>0 THEN RET
630 VIS(I)=0:RETURN
640 REM XXXXXXXXXXXXXXXXXXXXXXXXXXX
650 REM * NOW CALC PLOT COORDS * 660 REM ***********************************
670 K=D0/(VCX*CX+VCY*CY+VCZ*CZ)
680 AX=0X+K*VCX:AY=0Y+K*VCY:AZ=0Z+K*VC
Z 690 IF 53=0 THEN 720
700 P(I,1)=((AX-QX)*CY-(AY-QY)*CX)/53
710 P(I,2)=(AZ-QZ)/53:RETURN
720 P(I,1)=((QX-AX)*CZ+(AZ-QZ)*CX)/52 730 P(I,2)=(AY-QY)/52:RETURN
740 REM XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
750 REM * SCALE THE IMAGE *
760 REM ***********************************
780 P(I,1)=P(I,1)*T
790 P(I,2)=P(I,2)*T
800 NEXT I 810_XAD=160-P(0,1):YAD=96-P(0,2):FOR I
=1 TO PS:P(I,1)=P(I,1)+XAD:P(I,2)=P(I,
2) +YAD: NEXT I
820 REM ***********************************
838 REM * NOW DRAW THE IMAGE! * 840 REM ***********************************
845 SETCOLOR 2,0,0:COLOR 1:TRAP OFF:GR
APHICS 56
870 FOR I=1 TO LS:TU=VIS(LN(I,0))+VIS(LN(I,1)):IF TU=0 THEN 1010
880 IF TV=2 THEN 980
890 QT=0:ISAVE=I:IF VIS(LN(I,0))=0 THE
N I1=LN(I,0):I2=LN(I,1):I=LN(I,0):GOTO
900 I1=LN(I,1):I2=LN(I,0):I=LN(I,1)
910 XT1=X(I1)*5CL+X5:YT1=Y(I1)*5CL+Y5:
ZT1=Z(I1)*SCL+ZS 911 XT2=X(I2)*SCL+XS:YT2=Y(I2)*SCL+YS:
ZT2=Z(I2)*5CL+Z5:FV=0:FH=0
920 XM=(XT1+XT2)/2:YM=(YT1+YT2)/2:ZW=(
ZT1+ZT2)/2:GOSUB 610 930 IF VI5(I)>0 THEN XT2=XW:YT2=YW:ZT2
=ZW:GOTO 950
940 XT1=XM:YT1=YM;ZT1=ZW
950 QT=QT+1:IF QT<15 THEN 920 960 XW=XT2:YW=YT2:ZW=ZT2:GOSUB 610
970 GOSUB 670:P(I.1)=P(I.1)*T+XAD:P(I.
2)=P(I,2)*T+YAD:VIS(I)=0:I=ISAVE
980 X1=P(LN(I,0),1):Y1=191-P(LN(I,0),2):X2=P(LN(I,1),1):Y2=191-P(LN(I,1),2)
981 W=LN(I.2):XC=X1:YC=Y1:X=X2:Y=Y2
982 KK=((X(I1)+X(I2))/2+X5-0X)^2+((Y(T
1)+Y(I2))/2+Y5-0Y)^2+((Z(I1)+Z(I2))/2+ Z5-0Z)^2
983 W=6*W*KK^-0.5:G05UB 3000
1010 NEXT I
1011 IF 0\$="Y" THEN ? #3;"H"
1030 FOR X=15 TO 0 STEP -1:SOUND 0,120 ,10,X:NEXT X
1040 RETURN
1190 ? :? "MI/O ERROR - "; PEEK(195):GO TO 1210
1210 ? :? "PRESS RAFTEL":INPUT IN\$:STO
P
1550 REM ******************
1560 REM * GRAPHICS CLIP ROUTINE *
1560 REM * GRAPHICS CLIP ROUTINE * 1570 REM ***********************************
1560 REM * GRAPHICS CLIP ROUTINE * 1570 REM ***********************************
1560 REM * GRAPHICS CLIP ROUTINE * 1570 REM ***********************************
1560 REM * GRAPHICS CLIP ROUTINE * 1570 REM ***********************************
1560 REM * GRAPHICS CLIP ROUTINE * 1570 REM ***********************************
1560 REM * GRAPHICS CLIP ROUTINE * 1570 REM ***********************************
1560 REM * GRAPHICS CLIP ROUTINE * 1570 REM ***********************************

```
1660 IF Y2(YT THEN T2=1
1670 IF L1+L2=2 OR R1+G(10)=2 OR T1+T2
=2 OR G(9)+G(8)=2 THEN RETURN
1680 G(4)=X1:G(3)=Y1:G(2)=X2:G(1)=Y2:G
 05UB 1730
1690 L1=L2:R1=G(10):T1=T2:G(9)=G(8)
1700 X1=XW:Y1=YW:G(4)=X2:G(3)=Y2:G(2)=
X1:G(1)=Y1:G05UB 1730
1710 IF X1(G(7) OR X1)G(6) OR Y1(YT OR
Y1)G(5) OR XW(G(7) OR XW)G(6) OR YW(Y
T OR YW)G(5) THEN RETURN
1720 PLOT X1,SCY*Y1:DRAWTO XW,SCY*YW:P
 OK=1:RETURN
 1730 IF L1+T1+G(9)+R1=0 THEN XW=G(4):Y
 W=G(3):RETURN
1740 IF L1 THEN XW=G(7):YW=G(3)+(G(1)-G(3))*(G(7)-G(4))/(G(2)-G(4)):G(4)=XW:
 G(3) = YW
1742 IF L1 AND G(3)>=YT AND G(3) <=G(5)
THEN RETURN
1750 IF R1 THEN XW=G(5):YW=G(3)+(G(1)-
 G(3))*(G(6)-G(4))/(G(2)-G(4)):G(4)=XW:
 1752 IF R1 AND G(3)>=YT AND G(3) (=G(5)
  THEN RETURN
1760 IF G(9) THEN YW=G(5):XW=G(4)+(G(2
)-G(4))*(G(5)-G(3))/(G(1)-G(3)):G(4)=X
W:G(3)=YW
1762 IF G(9) AND G(4)>=G(6) AND G(4) (=
G(7) THEN RETURN
1770 IF T1 THEN YW=YT:XW=G(4)+(G(2)-G(
4))*(YT-G(3))/(G(1)-G(3)):G(4)=XW:G(3)
1780 RETURN
=F$
2060 F$(LEN(F$)+1)=".PNT":CLOSE #1:OPE
N #1,4,0,F$:INPUT #1;P5
2080 TRAP 2100:DIM X(P5),Y(P5),Z(P5),P
(P5,2),VI5(P5)
2100 FOR X=1 TO P5:INPUT #1,Q1:X(X)=Q1
 : NEXT X
2110 FOR X=1 TO PS: INPUT #1, 01: Y(X)=01
 : NEXT X
2120 FOR X=1 TO PS:INPUT #1,01:Z(X)=01
:NEXT X:CLOSE #1
2170 F$=FF$:F$(LEN(F$)+1)=".LIN":CLOSE
#1:0PEN #1,4,0,F$:INPUT #1;L5
2190 TRAP 2210:DIM LN(L5,2)
2210 FOR X=1 TO L5:INPUT #1,01:LN(X,0)
:? "MFILE FORMAT ERROR - "; PEEK
(195):GOTO 1210
3100
2740 X(J)=XC+R*COS(THETA+PHI)
2750 Y(J)=YC+R*SIN(THETA+PHI)
2760 NEXT J
2770 RETURN
2999 REM ***************
2777 KEN ASSOCIATION (Y=YC) THEN RETURN 3010 GOSUB 3070 3040 IF ABS(X50) ABS(Y50) THEN X50=-SI
N(PHI)/COS(PHI):Y50=1:GOTO 3060
```

Bonsai continued

3050 Y50=C05(PHI)/SIN(PHI):X50=-1 3051 IF (W(0.4) OR (SD\$="N") THEN GOSU B 1550:FOR J=1 TO 1:GOTO 3061 3060 FOR J=-W/2 TO W/2 STEP 0.4:X1=XC+ J*X50:Y1=YC+J*Y50:X2=XC+J*X50+R*CO5(PH I):Y2=YC+J*Y50+R*SIN(PHI):G05UB 1550 3061 IF OS="N" OR POK=0 THEN NEXT J:RE TURN 3062 IF SD\$="Y" THEN 3064 3063 ? #3;"M";X1*1.5;",";(191-Y1)*1.5; "*D";XW*1.5;",";(191-YW)*1.5:PC=PC+1:R ETURN 3064 ? #3;"M";2.5*(191-Y1);",";-2.5*X1;"*D";2.5*(191-YW);",";-2.5*XW:PC=PC+13065 NEXT J:RETURN 3080 REM * ATAN 3090 REM ************** 3100 DEG :XS0=X-XC:YS0=Y-YC:R=(XS0*XS0 +Y50*Y50) ^0.5:PH=180 X50=0 THEN PHI=PH/2+(5GN(Y50) < 3110 IF >1)*PH:RETURN 3120 PHI=ATN(Y50/X50):IF SGN(X50)=1 TH EN PHI=2*PH*(SGN(Y50)=-1)+PHI:RETURN 3130 PHI=PH+PHI:RETURN 3200 REM **************** 3201 REM * PLOTTER CONTROL 3202 REM ****************** 3210 O\$="Y" 3220 CLOSE #3:OPEN #3,8,0,"P:":? #3;EG 5:PC=0 \$:PC=0
3240 RETURN
3245 0\$="N":CLOSE #3:RETURN
3250 ? #3;"C1":RETURN
3251 ? #3;"C2":RETURN
3253 ? #3;"C3":RETURN
3254 ? #3;"C0":RETURN
3260 IF 0\${\cappa" THEN RETURN
3261 IF SD\$="Y" THEN ? #3;"H*M0,-900*I ":RETURN 3262 ? #3;"H*M0,-480*I":RETURN 3271 IF 0\$="Y" AND SD\$="Y" THEN ? #3;" M0,0*D480,0*D480,-800*D0,-800*D0,0":RE 3280 IF 0\$="Y" THEN ? #3;"M0,0*D480,0* D480,288*D0,288*D0,0" 3290 RETURN 4000 REM ********EPSON DUMP********** 4010 SCREEN=PEEK(88)+PEEK(89)*256:TRAP 4040:CLOSE #1:OPEN #1,8,0,"P:":? #1;" EA"; CHR\$ (8) %A"; CHR\$ (8)
4020 FOR I=SCREEN TO SCREEN+39:? #1;"
K"; CHR\$ (192); CHR\$ (0);
4030 FOR J=I+7640 TO I STEP -40:PUT #1
, PEEK (J):NEXT J:? #1:NEXT I:CLOSE #1
4035 STOP
4040 RETURN
5000 F\$=DRIVE\$:F\$ (LEN(F\$)+1)=FILE\$:FF\$ =F\$ 5010 CLOSE #1:OPEN #1,4,0,F\$:INPUT #1: 5020 TRAP 5030:DIM X(P5),Y(P5),Z(P5),P 3020 TRHP 3030:DIM X(P5),Y(P5),Z(P5),P (P5,2),VIS(P5) 5030 FOR X=1 TO P5:INPUT #1,Q1:X(X)=Q1:NEXT X 5040 FOR X=1 TO P5:INPUT #1,01:Y(X)=01 : NEXT :NEXT X 5050 FOR X=1 TO PS:INPUT #1,Q1:Z(X)=Q1 :NEXT X:CLOSE #1 5060 INPUT #1;LS 5070 TRAP 5080:DIM LN(LS,2) 5080 FOR X=1 TO LS:INPUT #1,Q1:LN(X,0) =Q1:INPUT #1,Q1:LN(X,1)=Q1:LN(X,2)=WID TH: NEXT X 5090 CLOSE #1:TRAP OFF:RETURN 5100 SD\$="Y":GOSUB PLOTON:RETURN 5200 SD\$="N":GOSUB PLOTON:RETURN

CHECKSUM DATA.

(see page 12)

5 DATA 250,243,942,410,89,263,984,187,482,189,119,463,809,470,216,6036
520 DATA 489,389,63,13,815,871,225,868,374,466,352,181,844,719,364,7033
650 DATA 318,370,435,571,501,848,937,854,936,366,889,372,935,581,587,9500
800 DATA 742,548,362,193,368,254,258,560,857,273,263,680,727,815,679,7579
950 DATA 764,109,918,763,710,55,821,485,287,217,783,269,956,563,746,8446
1570 DATA 565,763,184,262,676,833,194,487,685,840,902,608,32,216,742,7989
1720 DATA 990,575,213,323,217,330,780,610,435,808,96,224,98,779,286,6764
2080 DATA 31,953,957,48,999,365,174,79,748,533,301,451,305,389,899,7142
2740 DATA 902,916,516,809,328,212,334,714,948,943,384,25,438,758,223,8450
3063 DATA 270,292,888,289,237,291,785,762,651,207,540,352,544,296,102,6506
3240 DATA 793,795,803,807,813,809,839,534,797,11,177,798,209,186,93,8464
4030 DATA 115,598,789,773,984,45,959,963,54,331,387,247,84,641,611,7581
20000 DATA 283,512,266,8,971,190,774,937,177,202,4320

Listing 4. BASIC listing.

30000 ? "DRIVE?-IN THE FORM 'D1: " ":IN PUT DRIVE\$:? :? "FILENAME?":INPUT FILE \$:TRAP 30010:DIM \$\$ (6) 30010 ? "BUT OR SUMMU PICTURE, OR SUMB ONLY?":INPUT \$\$ 30020 IF \$\$="BIG" THEN GOSUB BIG:GOTO 30050 30025 IF \$\$="SCREEN" THEN GOSUB PLOTOF F:GOTO 30085 30030 IF \$\$="SMALL" THEN GOSUB SMALL:GOTO 30050 30040 ? "INVALID INPUT-TRY AGAIN":GOTO 30010 30050 ? "COLOUR?-BLACK=1":? :? " GREEN=3":? ED=4":INPUT C

30060 COLOUR=(BLACK*(C=1))+(BLUE*(C=2))+(GREEN*(C=3))+(RED*(C=4))
30080 GOSUB PAGE:GOSUB COLOUR:GOSUB FR
AME
30085 SCL=1:ZOOM=1:OX=0:OY=10:OZ=0:VX=
0:VY=0:VZ=2.5:X5=0:Y5=0:Z5=0
30090 GRAPHICS 24:TRAP 30100:GOSUB GET
FILE:GOSUB GO:STOP
30100 ? "NO SUCH FILE":GOTO 30000

CHECKSUM DATA.

(see page 12)

30000 DATA 200,149,509,474,11,721,970,632,808,975,767,154,6370

Listing 5. BASIC listing.

30000 SCL=1:Z00M=1:0X=0:0Y=20:0Z=0:VX=
0:VY=0:VZ=2
30006 GRAPHICS 24:G0SUB BIG:G0SUB BLAC
K:G0SUB FRAME
30010 DRIVE\$="D1:"
30020 FOR JKK=1 TO 7:FILE\$="NO":FILE\$(
3)=STR\$(JKK):XS=-5+10*RND(0):YS=-5+10*RND(0):ZS=0:G0SUB GETFILE:G0SUB G0
30030 NEXT JKK

CHECKSUM DATA.

(see page 12)

30000 DATA 878,129,346,891,891,3135

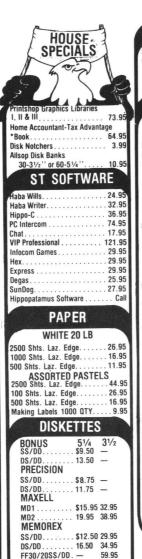
Attention Programmers!

ANALOG Computing is interested in programs, articles, and software review submissions dealing with the Atari 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.

All submissions for publication, both program listings and text, should be provided in printed and magnetic form. Typed or printed copy of text is mandatory and should be in upper and lower case with double spacing. By submitting articles to **ANALOG Computing**, authors acknowledge that such materials, upon acceptance for publication, become the exclusive property of **ANALOG Computing**. 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, **ANALOG Computing** P.O. Box 23, Worcester, MA 01603.



FF50/20DS/DD . 36.95 —

All Diskettes Carry a Lifetime Warranty

THE R. P. LEWIS CO., LANSING, MICH. LANSING, MICH.		AND DESCRIPTION OF THE PERSON
COMPUTERS	1	
70.05	П	
800XL79.95	П	MJ-10
65XE Call	П	MJ-22
130XE139.95	П	M13-22
520ST (RGB) Call	П	
52UST (MUNU)		ZVM 1
PRINTERS Call		ZVM 1
STAR MICRONICS		300G.
SG-10210.95	П	300A.
SG-15	П	310A.
SD-10	П	Color 3
SD-15	П	Color 6
SR-10	П	Color 7
SR-15582.00	П	Color 7
SB-10	П	00.0.
Powertype	П	
LEGEND	П	SM124
	П	SC122
808 154.95	П	
1080205.95	П	
1380259.95	П	1201
1385295.00	П	1205.
OKIDATA	П	1260
Okimate 10170.95	П	
Okimate 20210.00	П	SC100
182219.95	П	
192349.95	П	CM365
PANASONIC	П	14" RC
KX-P1080209.00	П	Green
KX-P1091231.95	П	CM366
KX-P1092369.00	П	14'' Co
KX-P1592Call	П	14 00
KX-P1595	П	4
KX-P3131259.95	Н	
KX-P3151425.00	П	1
CITIZEN	П	
MSP10259.00	П	XMM3
MSP15439.00	П	MPP10
MSP20439.00	П	MPP12
MSP25549.00	П	Volks 1
SEIKOSHA	Н	Volks 3
SP-1000179.95	П	Hayes :
FPSON	П	Hayes 1
	П	Team
Call for current pricing on all Epson	П	(100%
models.	П	Micro S
PRINTER RIBBONS	П	
THINTEN HIDDUNG	п	U-Call.

DUST COVERS AVAILABLE

MONITORS
TEKNIKA
MJ-10189.95
MJ-22254.95 ZENITH
ZENTH ZVM 12274.95
ZVM 123
AMDEK
300G117.00
300A
Color 300
Color 600 289.95
Color 700
ATARI
ATAKI SM*124174.95
SC1224
NEC
1201139.00
1205139.00
1260
SC100159.00
THOMPSON
CM365289.95 14'' RGB Color Composite Amber &
Green Switch
CM366189.95
14" Color Composite
MODEMO
MODEMS
XMM301 39.95
MPP1000E
MPP1200 199.95 Volks 12
Volks 300 59.95
Hayes 300
Team Modem199.00
(100% Hayes Compatible)
Micro Stuffer89.95
U-Call
Compuserve 17.95

1	SOFTWARE
	BATTERIES INCLUDED
1	Homepak
ı	Paper Clip
ı	BRODERBUND
ı	Bank Street Writer 32.95
ı	Karateka18.95
ı	Lode Runner
	Print Shop 27.95
	Print Shop Companion Call
ı	Graphics Libraries I, II, & III ea.16.95
ı	CONTINENTAL
ı	Tax Advantage34.95
ı	Home Accountant 32.95
ı	Home Accountant32.95 MICROPROSE
ı	F-15 Strike Eagle 20.50
	Silent Service
ı	Kennedy Approach 20.50
ı	Kennedy Approach
ı	MAC 65 48 95
	Action
ı	Basic XL
ш	Basic XE
ı	
ı	Tool Kits
П	Flight Simulator II31.95
ш	JetCall
ı	Night Mission Pinball 20.50
ı	SYNAPSE
ı	Synfile
П	Syncalc
ı	
ŀ	DISK DRIVES
П	CONTRACTOR OF STREET
	1050149.95
	Нарру 1050299.95
	Happy Enhancer139.95
	U.S. Doublers
1	DT Duplicator149.95
	DT Doubler54.95
П	
	Indus GT 198.00
	SF314215.95
П	SF354169.95
I	Haba 10 Meg Hard
1	INTERFACES
I	INTERFACES
	MPP115045.95
1	U-Print/Port49.95
П	U-Print/16K69.95
П	U-Print/64K79.95
	PR Connection 64.95

WHITE HOUSE COMPUTER

P.O. Box 4025 Williamsport, PA 17701

"Where Prices are Born, Not Raised."

Ordering and Terms

Place orders Monday-Friday 9am-7pm. Customer service calls taken Monday-Friday 10 a.m. 4pm. No deposit on C.O.D. orders. Free freight on all prepaid cash orders over \$300 in the continental U.S.A. APO & FPO orders add \$5 per hundred. Priority mail add \$10 per hundred. All foreign orders add \$6 for shipping. UPS shipping add \$4 per hundred (East Coast) \$5 per hundred. All foreign orders add 86 for shipping. UPS shipping add \$4 per hundred (East Coast) \$5 per hundred. Priority for shipping for PA residents. Orders by company and personal checks held 3 weeks. Defective products require prior return authorization. Defective products will be replaced or repaired according to warranty. No used or reconditioned products sold. Prices and availability are subject to change without notice.

ORDER TOLL FREE 1-800-351-3442

ALL CUSTOMER SERVICE CALLS AND PA RESIDENTS CALL

1-717-322-7700 VISA 4%, MASTER CARD 4%, AMERICAN EXPRESS 5%

CIRCLE #114 ON READER SERVICE CARD



M/L Editor

Makes machine language entry a snap.

by Clayton Walnum

M/L Editor provides an easy, foolproof method for the entry of ANALOG Computing's machine language listings. Since machine language files are extremely fussy creatures, M/L Editor keeps a constant guard on your fumbling fingers. It won't allow you to skip lines or enter bad data.

For your convenience, you may enter listings in multiple sittings (this gives you a chance to soak your calluses), continuing them at your leisure. When you're through typing a listing with the **M/L Editor**, you'll have a complete, runnable object file on your disk. No more slow BASIC file creators.

There is, however, one hitch. **M/L Editor** is for disk users only. My apologies to those readers with cassette systems.

Typing it in.

Listing 1 is the BASIC listing for **M/L Editor**. Type it in, then validate your work with **Unicheck** (see page 12). When you're sure the program is free of typos, save a copy to disk, then run it.

Getting started.

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

You'll then be asked for a filename. If you're start-

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

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

Entering data.

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

M/L Editor will display, at the top of the screen, the number of the line you're currently working on. As you make your way through the line, you'll be prompted for each entry.

Simply type the number and press RETURN. If you press RETURN without a number, the default is the last value entered.

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



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

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

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

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

Ending a session.

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

Running M/L Editor files.

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

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

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

Listing 1. BASIC listing.

10 DIM BF(16),N\$(4),A\$(1),B\$(1),F\$(15),F1\$(15)
20 LINE=1000:RETRN=155:BACKSP=126:CHKS
UM=0:EDIT=0
30 GOSUB 450:POSITION 10,6:? "Start or
Gontinue? ";:GOSUB 500:? CHR\$(A)
40 POSITION 10,8:? "FILENAME"::INPUT F
\$:POKE 752,1:? ""
50 IF LEN(F\$) <3 THEN POSITION 20,10:?
"":GOTO 40
60 IF F\$(1,2) <> "D:" THEN F1\$="D:":F1\$(
3)=F\$:GOTO 80
70 F1\$=F\$
80 IF CHR\$(A)="S" THEN 120
90 TRAP 430:OPEN #2,4,0,F1\$:TRAP 110
100 FOR X=1 TO 16:GET #2,A:NEXT X:LINE
LINE+10:GOTO 100
110 CLOSE #2:OPEN #2,9,0,F1\$:GOTO 170
120 TRAP 160:OPEN #2,4,0,F1\$:GOSUB 440
:POSITION 10,10:? "FILE ALREADY EXISTS
!!":POKE 752,0
130 POSITION 10,12:? "ERASE IT? ";:GOS
UB 500:POKE 752,1:? CHR\$(A)

;X;": ";:GOSUB 310 190 IF EDIT AND L=0 THEN BYTE=BF(X):GO TO 210 200 BYTE=VAL(N\$)
210 POSITION 22,X+2:? BYTE;" "
220 BF(X)=BYTE:CHKSUM=CHKSUM+BYTE*X:IF
CHKSUM>9999 THEN CHKSUM=CHKSUM-10000
230 NEXT X:CHKSUM=CHKSUM+LINE:IF CHKSU 230 NEXT X:CHKSUM=CHKSUM+LINE:IF CHKSUM
M>9999 THEN CHKSUM=CHKSUM-10000
240 POSITION 12,X+2:POKE 752,0:? "CHEC KSUM: ";:L1=4:GOSUB 310
250 IF EDIT AND L=0 THEN 270
260 C=VAL(N\$)
270 POSITION 22,X+2:? C;" "
280 IF C=CHKSUM THEN 300
290 GOSUB 440:EDIT=1:CHKSUM=0:GOTO 180
300 FOR X=1 TO 16:PUT #2,BF(X):NEXT X: INF=LINF+10:EDIT=0:GOTO 170 LINE=LINE+10:EDIT=0:GOTO 170 LINE=LINE=10:EDII=0:GUIO 1/0
310 L=0
320 GOSUB 500:IF A=ASC("Q") AND X=1 AN
D NOT EDIT THEN 420
330 IF A<>RETRN AND A<>BACKSP AND (A<4
8 OR A>57) THEN 320
335 IF A=RETRN AND L=0 AND X>1 THEN 35 340 IF ACK5P) 350 IF NOT EDIT) OR A=B CCA=RETRN AND AND L=0 THEN 320 A=RETRN THEN POKE 752,1:? " ":R ETURN 360 IF A<>BACKSP THEN 400
370 IF L>1 THEN N\$=N\$(1,L-1):GOTO 390
380 N\$=""
390 ? CHR\$(BACKSP);:L=L-1:GOTO 320
400 L=L+1:IF L>L1 THEN A=RETRN:GOTO 35 410 M\$(L)=CHR\$(A):? CHR\$(A)::GOTO 320 420 GRAPHICS 0:END 430 GOSUB 440:POSITION 10.10:? "NO SUC H FILE!":FOR X=1 TO 1000:NEXT X:CLOSE H FILE!":FOR X=1 TO 1000:NEXT X:CLOSE #2:GOTO 30 440 POKE 710,48:SOUND 0,100,12,8:FOR X =1 TO 50:NEXT X:SOUND 0,0,0;RETURN 450 GRAPHICS 23:POKE 16,112:POKE 53774,112:POKE 559,0:POKE 710,4 460 DL=PEEK(560)+256*PEEK(561)+4:POKE DL-1,70:POKE DL+2,6 470 FOR X=3 TO 39 STEP 2:POKE DL+X,2:NEXT X:FOR X=4 TO 40 STEP 2:POKE DL+X,0:NEXT X :NEXT X 480 POKE DL+41,65:POKE DL+42,PEEK(560) :POKE DL+43,PEEK(561):POKE 87,0 490 POSITION 2,0:? "analog ml editor": POKE 559,34:RETURN 500 OPEN #1,4,0,"K:":GET #1,A:CLOSE #1 : RETURN

CHECKSUM DATA.

(see page 12)

10 DATA 844,818,581,931,199,876,287,11
7,473,99,704,154,808,977,435,8303
160 DATA 621,391,292,619,419,118,385,6
62,900,749,976,463,314,963,673,8545
310 DATA 211,144,187,122,650,545,411,7
13,220,572,232,711,768,635,394,6515
450 DATA 25,972,926,303,454,760,3440



D&D Character Generator II Part 2.

by Bob Curtin

I trust you've all gotten last month's **D&D Character Generator II** up and running. Excellent. Here's part 2.

Aside from generating the character proper, the most arduous task facing the Dungeon Master in character generation is overseeing the outfitting of the upstart delver. It's often necessary to check equipment lists for "creative" buying or inept arithmetic or even outright shoplifting. (No! The deuce, you say!)

No more. This program allows the player to browse through lists of equipment, armor, weapons, live-stock, clothing, provisions, religious items and camping gear, then, at the touch of a button, purchase those items desired. The gold pieces generated in our last month's program are brought forward and used by the player to outfit his character.

As each item is purchased, the correct amount of "money" is deducted from the character's total. Note that change is made automatically. That is, if an item costs only a copper piece, the computer will (if no copper pieces are available) take the next highest coin, change it into copper pieces and deduct the correct amount from the total.

Once an item is purchased, it may not be returned, although there's nothing to stop the player from selling it back to the store after the game starts. For this reason, I included the "browse" feature. You can call up and read any menu desired—without buying anything.

Essentially, I designed **DCG2** to be used without supervision by a Dungeon Master. The time can be used by the DM to prepare other players to generate their characters (or any such detail work), leaving the player alone to outfit his character as he sees fit.

Again, I advise keeping reference material handy to the player, to explain what some of the more exotic weapons are. (Do you know what a Khopesh sword looks like?) This preparation will pay off in the long run.

The program is simple and straightforward to use. When the main menu appears, press the category of items you want to look at. A list of items will appear, along with the price of each. To return to the main menu, press the ESCAPE key.

To "buy" an item, once in a particular category, simply press the letter corresponding to the item you want. Once an item is chosen, the category heading is printed on the character sheet and the item itself is stored.

After three items have been chosen, they will be printed under the heading. (I did this for no other reason than to keep the printout neat.) After all items have been chosen in a particular category, simply press ESCAPE, and you'll be returned to the main menu. Any items which had not yet been printed will be dumped to the printer.

At the top of the screen is a display showing the character's available money (in gold, silver and copper pieces) and the character's current encumbrance

D&D Character Generator II continued

level. As each item is purchased, this display is updated (money deducted, encumbrance added).

When all desired items have been purchased, return to the main menu and press Q. The character's remaining money will be printed on the sheet, along with the final encumbrance level.

Borrowing money.

If a player tries to buy an item which costs more than his available money, a bell will sound and he'll be informed of the oversight. At this point, said player will also be asked if he would like to add money. If the answer is yes (Y), the computer will ask for the password. The following procedure must be followed.

- (1) Type the three-character code which has been assigned to CODE\$ in Line 25 and press RETURN. You may change this code to anything you wish when you type in the program, or anytime afterward. I suggest changing it often.
- (2) When GOLD PIECES TO ADD? appears, enter the amount of money, in gold pieces, that you're adding to the player's total and press RETURN.

If the correct code is not typed in, the money will not be added. Note that, by adding a negative amount to the player's total, you can also subtract gold from his stash.

I provided this lockout so that players couldn't add money while the DM's back was turned. Again, I wanted to make this program as self-sufficient as possible, to free up the DM for more creative chores.

Save this program on the same disk as DDC9.2 and use the filename D:EQUIPMNT. Also, remember to delete Line 1395 in the character generation program (DDC9.2).

For those who are interested, I'd like to point out a very powerful feature of Atari BASIC: the "restore" command. You're allowed to use expressions to point to line numbers when using the restore command. This brings up all sorts of interesting possibilities. You can randomly choose data elements, using combinations of RESTORE, READ and RND. Individual parts of the data can also be accessed, by loading the data into strings and using the usual SVAR(x,y) methods documented elsewhere.

Try to think of DATA as more than just something to be used to load tables or machine-language subroutines. With a little imagination and experimentation, it can be used for all kinds of interesting chores.

More D&D coming up!

Next month, look for the part 3—the Spell Generator. With that in place, your players can choose their

spells (the computer never lets them have too many) and make their qualifying rolls automatically. It, too, has a browse feature, enabling the player to find out what's available before making any hard choices.

Bob Curtin is a machinist who got into computing in 1982 when he bought an Atari 800. He uses it for writing, programming and telecommunications. He prefers the more cerebral computer games.

Listing 1. BASIC listing.

```
10 OPEN #1,4,0,"D:CHARACTR.DTA"
20 DIM AT(30,10),COST(80),A$(4),B$(40),C$(40),TEMP$(80),HEAD$(31),ENC(80),AB$(31),LNAM$(165),NAM$(20),X$(3)
25 DIM CODE$(3):CODE$="QHE"
30 GOSUB 8500:GOTO 50

40 FOR E=1 TO LEN(HEAD$):AB$(E,E)=CHR$

(ASC(HEAD$(E,E))-128):NEXT E:RETURN

50 INPUT #1;CHAR:INPUT #1;NAM$:CLOSE #

1:OPEN #1,4,0,NAM$:FOR E=1 TO 30:FOR J
1:OPEN #1,4,0,NAMS:FOR E=1 TO 30:FOR J

=1 TO CHAR

60 INPUT #1;A:AT(E,J)=A

70 NEXT J:NEXT E:INPUT #1;LNAM$:CLOSE

#1:N=AT(22,1)

80 IF LNAM$="" THEN LNAM$=" ":LNAM$(16

5)=LNAM$:LNAM$(2)=LNAM$

90 GP=AT(18,N):MONEY=GP*200:OPEN #2,8,

0,"P:":? #2;"
100 X=1:Y=20:GOSUB 330:GOTO 340
110 GP=INT(MONEY/200):A=GP*200:B=INT(M
ONEY-A):SP=INT(B/10):A=SP*10:COP=B-A
120 POSITION 2,0
170 ? HEAD$
 180 RESTORE LINE
 198 FOR E=1 TO NI
200 READ A$,B$,C$,COST,EN:COST(E)=COST
 :ENC(E)=EN
210 ? A$;" ";B$;C$
220 NEXT E

230 OPEN #1,4,0,"K:":GET #1,CMD:CLOSE

#1:IF CMD=27 THEN IF TEMP$(1,1) \\ \}" "

HEN ? #2;CHR$(15);TEMP$
HEN ? #2;CHR$(15);TEMP$
240 IF CMD=27 THEN GOTO 320
250 IF CMD=42 THEN GOSUB 9000
260 IF CMD<65 OR CMD>NI+64 THEN 230
270 MONEY=MONEY-COST(CMD-64):IF MONEY
0 THEN MONEY=MONEY+COST(CMD-64):GOSUB
610:GOTO 230
280 FLAG=FLAG+1:GOSUB 9000:ENC=ENC+ENC
CCMD-64):GOSUR 110
200 FERG-FERG-1:GOSUB 7000:ENC-ENC-ENC-CNC-(CMD-64):GOSUB 110
290 RESTORE LIN2+CMD:READ A$,B$:TEMP$(
X,Y)=B$:X=X+20:Y=Y+20:IF X>60 THEN ? #
2;CHR$(15);TEMP$:X=1:Y=20
300 IF X=1 THEN GOSUB 330
310 GOTO 230
320 RETURN
```

330 TEMP\$=" ":TEMP\$(80)=TEMP\$:TEMP\$(2) =TEMP\$:RETURN	HEN MONEY=MONEY+(LN*200):GP=GP+LN
340 GRAPHICS 0:POKE 752.1:POKE 710.120	625 POSITION 2,0:GOSUB 130 630 POSITION 2,21:?"
:GOSUB 8500 350 TRAP 8000:POKE 709,0:POSITION 2,2:	
G05UB 10000:P05ITION 2,4:? " 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	1000 POSITION 2,21:? " +":RETURN
QUIPMENT MENU 360 ? "GP=";GP;" ";"SP=";SP;" ";"CP=	A11
";COP;" ";"ENC=";INT(ENC+MONEY/2000) 370 ? :? "A ARMOR":? "B BLADED WEAPONS	1005 POSITION 2.22:? "PASSWORD"::TNPHT
":? "C HAND WEAPONS":? "D MISSILE WEAP	X\$:IF X\$=CODE\$ THEN RETURN ":? "+W
ONS":? "E POLE ARMS" 380 ? "F MISCELLANFOUS FOUTPMENT"	RONG PASSWORD! +": FOR E=1 TO 100: NEXT E: GOTO 630
380 ? "F MISCELLANEOUS EQUIPMENT" 390 ? "G TACK & CAMPING EQUIPMENT":? "	1020 NEXT E:CLOSE #4:RETURN
H RELIGIOUS ITEMS":? "I LIVESTOCK":? " J_PROVISIONS":? "K CLOTHING"	2065 DATA A),Belt, 3 5P,30,0
400 ? "L ADD MONEY":? "Q QUIT" 410 OPEN #1,4,0,"K:":GET #1,CMD:CLOSE	2066 DATA B), High hard boots, 2
#1:IF CMD=81 THEN GOTO 12000	GP,400,1 2067 DATA C),High soft boots, 1
420 IF CMD 65 OR CMD 76 THEN 418 438 ON CMD-64 GOTO 450,598,468,478,688	GP,200,0 2068 DATA D),Low hard boots, 1
,480,490,500,510,520,440,530 440 FLAG=0:Z=246:LIN2=2000:HEAD\$="(NEG)	GP,200,0
HING ":NT=12:LT	2069 DATA E),Low soft boots, 1 5P,80,0
NE=2065:GOSUB 330:GOSUB 140:GOTO 340 450 FLAG=0:Z=8:LIN2=2100:HEAD\$="@RMOR"	2070 DÁTA F),Cap, 1 5P,10,0
":NI=18:LIN	2071 DATA G), Cloak, 5
E=2165:GOSUB 330:GOSUB 140:GOTO 340 460 FLAG=0:Z=200:LIN2=2900:HEAD\$="HAND	SP,50,0 2072 DATA H),Broad girdle, 2
HEAPONS ":NI=15:L INE=2965:GOSUB 330:GOSUB 140:GOTO 340	GP,480,0
470 FLAG=0:Z=58:LIN2=2300:HEAD\$="\1456"	2073 DATA I),Normal girdle, 10 5P,100,0
LE WEAPONS INE=2365:GOSUB 330:GOSUB 140:GOTO 340	2074 DATA J),Hat, 7 5P,70,0
480 FLAG=0:Z=24:LIN2=2400:HEAD\$="TISGE LLANEOUS EQUIPMENT":NI=17:L	2075 DATA K), Robe, 6
INE=2465:GOSUB 330:GOSUB 140:GOTO 340	SP,60,0 2076 DATA L),Leather breeches, 20
490 FLAG=0:Z=248:LIN2=2500:HEAD\$="TACK & CAMPING EQUIPMENT ":NI=15:	GP,4000,0
LINE=2565:GOSUB 330:GOSUB 140:GOTO 340 500 FLAG=0:Z=92:LIN2=2600:HEAD\$="(344)G	U GP,18000,35
IOUS ITEMS	2166 DATA B), Chain armor, 7 5 GP, 15000, 30
LINE=2665:GOSUB 330:GOSUB 140:GOTO 340 510 FLAG=0:Z=26:LIN2=2700:HEAD\$="\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	2167 DATA C),Great helmet, 1 5 GP,3000,3
TOCK ":NI=15: LINE=2765:GOSUB 330:GOSUB 140:GOTO 340	2168 DATA D).Small belmet.
520 FLAG=0:Z=184:LIN2=2800:HEAD\$="PROU	0 GP,2000,0 2169 DATA E),Leather armor,
ISIONS ": NI=9: LINE=2865:GOSUB 330:GOSUB 140:GOTO 340	5 GP,1000,15 2170 DATA F),Padded armor,
530 POSITION 2.22:? "PASSWORD"::TNPHT	4 GP,800,10
X\$:IF X\$=CODE\$ THEN 560 540 ? "† ":? "	2171 DATA G),Plate armor, 40 0 GP,80000,45
THRONG PASSWORD!!":FOR E=1 TO 100:NEXT	2172 DATA H),Ring armor, 3 0 GP,6000,25
550 GOTO 410	2173 DATA I),Scale armor, 4
560 TRAP 8000:POSITION 2,22:? "GOLD PI ECES TO ADD";	5 GP,9000,40 2174 DATA J),Large shield, 1
570 INPUT LN:GOSUB 585:IF X\$=CODE\$ THE N MONEY=MONEY+(LN*200):GP=GP+LN	5 GP,3000,10
575 POSITION 2,5:GOSUB 130	0 GP.2000.5
580 POSITION 2,22:? " ":GOTO 410	2176 DATA L),Small wooden shield, 1 GP,200,3
585 IF LN>10000 THEN LN=10000 586 RETURN	2177 DATA M), Splinted armor, 8
590 FLAG=0:Z=186:LIN2=2200:HEAD\$="3140	0 GP,16000,40 2178 DATA NJ,5tudded armor, 1
ED WEAPONS ":NI=11: LINE=2265:GOSUB 330:GOSUB 140:GOTO 340	5 GP,3000,20 2179 DATA O),Bronze Plate, 10
600 FLAG=0:Z=22:LIN2=3000:HEAD\$="POLE ARMS":NI=15:L	9 GP,20000,55
INE=3065:GOSUB 330:GOSUB 140:GOTO 340	2180 DATA P), Field Plate, 200 0 GP, 400000, 75
610 POSITION 2,21:? "GYOU DON'T HAVE E NOUGH MONEY!!":? "DO YOU WANT TO ADD?"	2181 DATA Q),Full Plate, 400 0 GP,800000,100
:OPEN #1,4,0,"K:":GET #1,LNN:CLOSE #1 615 IF LNN=89 THEN TRAP 8000:GOSUB 100	2182 DATA R).Buckler Shield.
0:IF X5<>CODES THEN RETURN	5 GP,1000,3 2265 DATA A),Bastard sword, 2
620 IF LNN=89 THEN ? "+GOLD PIECES TO ADD";:INPUT LN:GOSUB 585:IF X\$=CODE\$ T	5 GP,5000,10 2266 DATA B),Broad sword, 1
	T

T D&D Character Generator II continued

0 GP,2000,7.5	_	2565 DATA A), Small tent,	5
2267 DATA C),Long sword, 5 GP,3000,6	1	0 GP,10000,40 2566 DATA B),Blanket,	
2268 DATA D),Short sword,		2 5P,20,1	
8 GP,1600,3.5 2269 DATA E),5cimitar,	1	2567 DATA C),Cooking utensiles, 2 GP,400,3	
5 GP. 3000.4		2568 DATA D),Mess kit,	
2270 DATA F), Falchion Sword, 0 GP, 2000, 10	1	1 GP,200,1 2569 DATA E),Hunting knife,	1
2271 DATA G),Khopesh sword,	1	5 SP,150,0	
0 GP,2000,10.5		5 5P,150,0 2570 DATA F),Bit & bridle, 5 5P,150,0	1
5 GP,1000,7.5		2571 DATA G).Saddle.	1
2273 DATA I),Hand axe, 1 GP.200.5		0 GP,2000,0 2572 DOTO H) Saddle bags.	
0 GP,2000,10.5 2272 DATA H),Battle axe, 5 GP,1000,7.5 2273 DATA I),Hand axe, 1 GP,200,5 2274 DATA J),Dagger & Scabbard, 2 GP,400,1		0 GP,2000,0 2572 DATA H),Saddle bags, 4 GP,800,0 2573 DATA I),Saddle blanket, 3 SP,30,0 2574 DATA J),Candle, 1 SP.10.0	
2 GP,400,1 2275 DATA K),Knife & Scabbard,		2573 DAIA 13,5addle blanket, 3 SP.3A.A	
2 GP.600.15	_	2574 DATA J), Candle,	
2365 DATA A), Composite short bow, 5 GP, 15000, 5	7	1 5P,10,0 2575 DATA K),Large wooden chest,	1
2366 DATA B).Composite long bow,	10	7 5P,170,50 2576 DATA L),Large iron box,	
0 GP,20000,8 2367 DATA C),Short bow,	1	2576 DATA L),Large iron box, 8 GP,5600,50	2
5 GP,3000,5 2368 DATA D),Long bow,	_	2577 DOTA MD.Small iron box.	
2368 DATA D),LONG bOW, A GP.12888.18	6	9 GP,1800,100 2578 DATA N),Tarpaulin,	
0 GP,12000,10 2369 DATA E),Light crossbow,	1	4 GP,800,10 2579 DATA O),Hammock,	
	2	2579 DATA O),Hammock, 5_GP,1000,5_	
0 GP,4000,8	-	2665 DATA A), Prayer beads,	
2371 DATA GJ,Arrows (dozen), 1 GP.200.2		1 GP,200,0 2666 DATA R).Thrense stick.	
2372 DATA H), Quiver (24 capacity),		2665 DATA A),Prayer beads, 1 GP,200,0 2666 DATA B),Incense stick, 1 GP,200,0 2667 DATA C),Wooden holy Symbol, 7 SP,70,0 2668 DATA D),Iron holy symbol, 2 GP,400,0 2669 DATA E),Silver holy symbol, 8 GP.10000.0	
5 GP,1000,3 2373 DATA TI.Arrow (1 silver).		2667 DATA C),Wooden holy Symbol, 7 Sp.70.8	
1 GP,200,0		2668 DATA D), Iron holy symbol,	
2374 DATA J),Quarrel (20), 2 GP.400.3		2 GP,400,0 2669 DATA Fl.Silver halu sumbal.	5
	1		
0 5P,100,0 2376 DATA L),Dart,		2670 DATA F),Gold holy symbol, 0 GP,40000,0	20
		2671 DATA G),Holy water,	2
2465 DAIA AJ,Leather backpack, 2 GP.488.2		5 GP,5000,0 2672 DATA H),Garlic bud,	
5 5P,50,0 2465 DATA A),Leather backpack, 2 GP,400,2 2466 DATA B),Large belt pouch, 1 GP.200.1		5 CP.5.0	
1 GP,200,1 2467 DATA_C),Small belt pouch,	1	2673 DATA I),Metal mirror, 0 GP,2000,0	1
5 SP.150.5			2
2468 DATA D),Bone map case, 5 GP,1000,5		0 GP,4000,0 2765 DATA A),Chicken,	
2469 DATA E), Leather map case,	1	3 CP.3.0	_
5 SP,150,5 2470 DATA F),Large sack,	1	2766 ĎÁTA B),Guard dog, 5 GP,5000,0	2
6 CP, 16, 2		2767 DATA C).Hunting dog.	1
2471 DATA G),Small sack, 0 CP,10,5	1	7 GP,3400,0 2768 DATA D),Donkey,	
2472 DATA H),Water(wine)skin,	1	0 GP,1000,0	
5 SP,150,5 2473 DATA I),50' rope,		2769 DATA E),Large hawk, 0 GP,8000,0	4
4 5P,40,2		2770 DATA F),Small hawk,	1
2474 DATA J), Tinderbox w/F&5, 1 GP, 200, 0		8 GP,3600,0 2771 DATA G),Heavy war horse,	30
2475 DATA K),Thieves' tools,	3	0 GP,60000,0	
0 GP,6000,0 2476 DATA L),Torch,		2772 DATA H),Medium war horse, 5 GP,45000,0	22
1 CP,1,6		2773 DATA I),Light war horse,	15
2477 DATA M),Hooded lantern, 7 GP,1400,6		0 GP,30000,0 2774 DATA J),Riding horse,	2
2478 DATA N),Bullseye lantern, 2 GP,2400,6	1	5 GP,5000,0	2
2479 DATA O).Flask of oil.		2775 DATA K), Mule, 0 GP,4000,0	
1 GP,200,2 2480 DATA P),Iron spike,		2776 DATA L),Pigeon,	2
1 CP,1,1		CP,2,8 2777 DATA M),Pony,	1
2481 DATA Q),10' Pole, 3 CP,3,10		5 GP,3000,0 2778 DATA N),Sheep,	
u u u 1u 1u		TILO MAIN MY SHEEK!	

PAGE 40 / MAY 1986 ANALOG COMPUTING

```
2 GP,400,0
2779 DATA 0),Songbird,
4 CP,4,0
 2865 DATA A), Ale (pint),
 1 5P,10,1
2866 DATA B),Beer (pint),
 5 CP,5,1
2867 DATA C),Merchant's meal,
 3 5P,30,0
2868 DATA D),Rich meal,
 1 GP,200,0
2869 DATA E),Grain (1 day),
 1 5P,18,1
2870 DATA F),Rations (1 week),
 3 GP,600,5
2871 DATA G),Iron Rations,
 5 GP,1000,7
2872 DATA H),Good wine,
                                                                                        1
 0 5P,100,1
2873 DATA I),Watered wine,
 5 SP,50,1
2965 DATA A),Axe (hand or throwing),
 1 GP,200,5
2966 DATA B),Battle Axe,
25 GP, 1000, 7.5
2967 DATA C), Bo Stick,
2 SP, 40,1.5
2968 DATA D), Club,
1 SP, 20,3
2969 DATA E), Mace (Footman'S),
8 GP, 1600, 10
 2970 DATA F), Mace (Horseman's),
4 GP,800,5
2971 DATA G),Morning Star,
5 GP,1000,12.5
2972 DATA H),5ap,
1 GP,200,1
2973 DATA I),Quarter Staff,
2 GP,400,2
2974 DATA J),Lasso,
2774 DATH 37,L8550,

5 5P,100,1

2975 DATA K),Whip,

5 GP,1000,2

2976 DATA L),Military Pick,

8 GP,1600,6

2977 DATA M),War hammer,
29// DATH MY, No. 10 MMR., 1 GP,200,5
2978 DATA N), Lucern hammer,
7 GP,1400,15
2979 DATA O), Trident & net,
4 GP,800,5
3065 DATA A), Bardiche,
7 GP 1400,12.5
7 GP,1400,12.5
3066 DATA B),Bec de Corbin,
6 GP,1200,10
3067 DATA C),Bill-Guisarme,
3067 DATA C), Bill-Guisarme,
6 GP, 1200, 15
3068 DATA D), Fauchard,
3 GP, 600, 6
3069 DATA E), Fork Fouchard,
8 GP, 1600, 8
3070 DATA F), Military Fork,
4 GP, 800, 7.5
3071 DATA G), Glaive-Guisarme,
0 GP, 2000, 10
3072 DATA H), Guisarme,
5 GP, 1000, 8
3073 DATA I), Guisarme-Voulge,
7 GP, 1400, 15
3074 DATA J), Halberd,
9 GP, 1800, 17.5
                                                                                       1
9 GP,1800,17.5
3075 DATA K),Hook Fauchard,
9 GP,1800,8
3076 DATA L),Lance,
6 GP,1200,10
3077 DATA M),AW1 Pike,
3 GP,600,8
```

3078 DATA N),Ranseur,
4 GP,800,5
3079 DATA O),Spetum,
3 GP,600,5
8000 ERLN=PEEK(186)+256*PEEK(187):ERR=
PEEK(195)
8010 IF PEEK(195)=8 THEN POSITION 2,22
:? "GINPUT ERROR! TRY AGAIN.";
FOR E=1 TO 150:NEXT E
8015 ? "1

8020 TRAP 8000:IF ERLN=570 THEN GOTO 5
60
8030 GOTO 615
8500 CMD=PEEK(16):IF CMD>127 THEN CMD=
CMD-128:POKE 16,CMD:POKE 53774,CMD:RET
URN
9000 IF FLAG=1 THEN ? #2,CHR\$(18):GOSU
B 40:? #2;CHR\$(14);AB\$:? #2;CHR\$(20):A
B\$="";X=1:Y=20
9010 FLAG=FLAG+1:RETURN
10000 REM
10010 RETURN
12000 ? #2:? #2:? #2;"TOTAL ENCUMBRANC
E = ";INT (ENC+MONEY/2000)
12005 ? #2;"GOLD PIECE5 = ";GP:? #2;"5
ILVER PIECES = ";SP:? #2;"COPPER PIECE
5 = ";COP;CHR\$(12)
12006 ? "\$":POSITION 2,12:? "SAVING DA
TA; PLEASE WAIT..."

RAMCHARGE RAMCHA

- Enhanced memory capabilities
- Simple plug-in installation
- 100% Axlon® compatibility
- 288K available with Synfile+™/Syncalc™
- Up to 1 million bytes on a single board
- Up to 8000 sectors available as a Ramdisk
- Perfect for B.B.S.'s
- MYDOS™ Ramdisk software included

RAMCHARGER 256K			•						.\$149.95
RAMCHARGER 512 K									.\$199.95
RAMCHARGER 1MEG	,					•	•		.\$299.95

Magna Systems

"We build power."

Terms: Check, Money Order, COD Add \$4.50 shipping & handling. New York Residents add 8½ % sales tax.

MAIL TO:
MAGNA SYSTEMS

Phone: 718-939-0084

147-05 Sanford Ave. Suite 4E Flushing, N.Y. 11355

CIRCLE #115 ON READER SERVICE CARD

__ D&D Character Generator II continued

12010 OPEN #1,8,0,"D:CHARACTR.DTA":PRI NT #1;CHAR:PRINT #1;NAM\$:CLOSE #1:OPEN #1; CHAR: PRINT #1; NAMS: CLUSE #1: OPEN #1,8,0, NAMS 12020 FOR E=1 TO 30: FOR J=1 TO CHAR 12030 PRINT #1; AT(E, J) 12040 NEXT J: NEXT E 12050 PRINT #1; LNAMS 12060 ? "†NOW RELOADING CHARACTER GENE RATOR": ? "PLEASE WAIT...": RUN "D:DDC9.

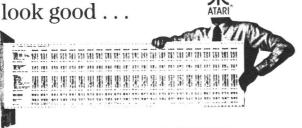
CHECKSUM DATA.

(see page 12)

10 DATA 203,460,525,870,994,797,23,569,507,26,183,443,428,213,540,6781
140 DATA 86,484,796,411,645,267,290,92,728,440,490,603,273,84,104,5793
290 DATA 525,415,701,591,755,267,903,787,284,704,385,823,787,853,119,8899440 DATA 4,790,302,720,507,720,457,6,70,901,916,715,592,965,416,8081

580 DATA 393,581,619,960,193,171,196,8
,393,352,343,803,304,985,12,6313
2066 DATA 93,172,933,163,787,79,755,28
,860,51,791,172,75,206,245,5410
2169 DATA 355,88,186,973,944,60,252,82
9,634,407,217,328,204,484,385,6346
2266 DATA 120,124,190,803,271,873,906,377,202,418,976,811,859,756,567,8253
2370 DATA 581,46,858,57,554,255,809,59
3,489,612,234,562,513,536,504,7203
2473 DATA 864,1,568,25,420,2,827,765,7
75,96,193,792,440,312,656,6736
2571 DATA 456,653,919,968,987,360,518,0,669,856,191,438,541,872,658,9086
2671 DATA 135,552,297,511,281,772,190,469,25,22,420,653,413,217,274,5231
2776 DATA 23,350,61,504,159,641,155,53
9,347,154,261,640,885,679,884,6282
2967 DATA 523,762,214,333,588,771,227,119,270,373,686,205,974,936,827,7808
3067 DATA 229,440,395,167,414,757,489,916,367,97,228,504,283,753,193,6232
8015 DATA 189,228,905,122,286,350,539,42,734,699,440,74,365,82,847,5902

We've gone to great lengths to make you look good ...



Introducing SIDEPRINT®!

Sideways has always been the best way to print nearly everything that's too wide for a printer.

It's quick It's easy!

And it makes clear one piece print-outs as wide as

So you get spreadsheets that really spread out. Pert charts that go far into the future. All kinds of extra wide reports without staples, glue or tape. ONLY

For all ATARI home computers (requires disk drive and EPSON, PROWRITER or compatible dot matrix printer)

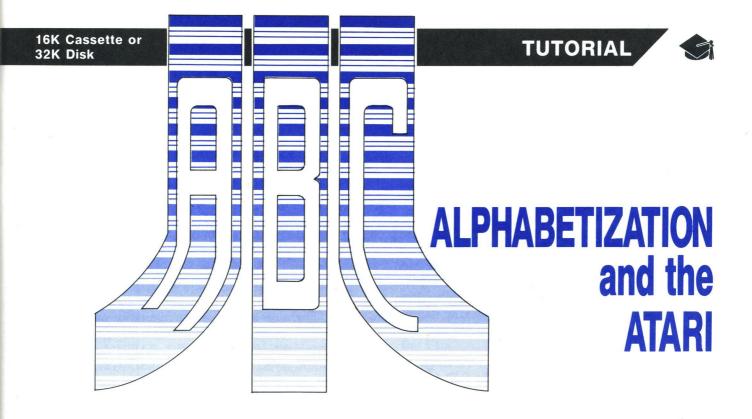
Send check or money order to

\$2995

86 Ridgedale Avenue, Cedar Knolls, NJ 07927 DEALER INQUIRIES INVITED

CIRCLE #116 ON READER SERVICE CARD





by Brian Schwartz

It's often necessary (or at least desirable) to alphabetize lists. Business files are alphabetized, and so are names in a telephone directory. Many computer programs also have a need for alphabetization. Why, then, are there so few amateur-written programs that can alphabetize items quickly? The answer lies in the fact that alphabetization routines are very complicated for computers and a major undertaking for programmers.

With this in mind, I developed a set of subroutines which can be incorporated into virtually any Atari BASIC program. The subroutines not only alphabetize items very quickly, but provide a method for storing lists of strings, as well.

This article contains material which may seem very technical. If you wish to skip the technical information and just use the subroutines, go straight to the section, "Using the subroutines."

Sorting.

Alphabetization routines fall under the general group of algorithms known as "sorts." Sorting is the ordering of a list. One example would be taking the list of numbers, 3, 1, 2, 6, 5, and sorting it into the order, 1, 2, 3, 5, 6.

Alphabetization is the ordering of strings based on the ATASCII values of their characters. Thus, a string with a first character having an ATASCII value of 42 (the asterisk) would come before one with a first character having a value of 67 (the capital letter C) in an alphabetized list. Note that all capital letters have lower ATASCII values than all lowercase letters, and a capital letter Z would appear before a lowercase letter A.

Sorting algorithms vary greatly in technique and efficiency. The time required for different sorts to order the same list can differ immensely. Faster sorts are therefore more desirable, though they're much more complicated. The sort I used is called the "quicksort." As the name implies, it's very fast: in a test I prepared, it sorted three hundred items in under three minutes. Another sort I've worked with in the past, the "bubblesort," used to take more than an hour.

The quicksort.

The quicksort is a recursive algorithm. Recursion is a technique whereby a problem (in this case, an unordered list) is broken down into smaller problems of the same type (in this case, smaller unordered lists), in such a way that the problem is solved as it's broken down.

The quicksort starts with a single list. First it checks its length. If the list consists of only one item, then it's already sorted, and the quicksort is finished. If not, it chooses the first item in the list as a pivot.

It uses two pointers, UP and DOWN. The up pointer moves from the beginning of the list toward the

Alphabetization continued

end, until it finds an item greater (comes afterward in alphabetical order) than the pivot. The down pointer starts at the end of the list and moves toward the beginning, until it finds an item less (comes earlier in alphabetical order) than the pivot. The items pointed to are then exchanged.

The cycle continues (the two pointers continue in their respective directions, and items are exchanged) until UP and DOWN point to the same item. (A pointer, incidentally, is a variable that holds the location of something—in this case, an item in the list.) The pivot item is then exchanged with either the item pointed to by UP or the item before, placing the pivot in the location it should occupy in the alphabetized list.

As a result of the quicksort's action, the single list is broken down into two "sublists." The first consists of those items above the pivot, and the second consists of those below the pivot.

The procedure is repeated for each of the two (hence the recursion). Should the pivot be placed in either the first or last position in the list, only one sublist will be created and worked on. A stack is maintained to store the starting and ending positions of the sublists created by the quicksort.

The subroutines.

Atari BASIC is somewhat weak in its handling of strings (specifically, there are no arrays of strings). Therefore, a whole system had to be devised, which would both allow lists of strings and be easy to use.

The entire list of strings is stored in one string variable, STORAGE\$. Pointers are used to identify the individual items in STORAGE\$. In fact, the quicksort routine never exchanges any actual items—only their pointers. As an example of how the storage system works, the expression, STORAGE\$(POINTERS (N.1). POINTERS(N.2)), would be used to refer to the nth item in the list.

Five subroutines are provided to handle string storage and alphabetization: (1) the first (Lines 30100-30150) handles initialization: (2) the second (Lines 30200-30220) erases all items from the current list; (3) the third (Lines 30300-30380) adds an item to the end of the current list; (4) the fourth (Lines 30400-30430) returns a particular string requested; and (5) the fifth (Lines 30500-30950) performs the alphabetization.

Using the subroutines.

Type the subroutine package into memory and LIST it to either cassette or disk. To enter a pro-

gram which will use the subroutines (either one you've written or one of the two demonstration programs) type it in and SAVE it. To run a program which uses the subroutines, LOAD the program, then ENTER the subroutines.

Saving the program in this manner will save storage space, for the subroutine package is stored only once, not with each program using it. If you prefer to not have to enter the subroutine package each time you load a program, save the program after the subroutines have been entered.

There are a few requirements for a program using the subroutines. It must have an "end" statement. Otherwise, the BASIC interpreter would try to run the subroutines, which are appended to the end of the program, resulting in an error. The program must also avoid using the following variables, which are used by the subroutine package:

DS DOWN INIT PIVOT\$ POINTERS() SP STACK() STORAGE\$ TEMP

Additionally, the program should use those variables which pass information from program to subroutine, or from subroutine to program, only as directed.

The five subroutines and functions are those shown here.

Initialization—Before any of the other four functions can be used, you must use the initialization routine:

- (1) Set the variable MAXNO (LET MAX-NO=) equal to the maximum number of items on the list.
- (2) Set the variable MAXSIZE equal to the length of the longest string the program will add to the list.
- (3) Set the variable MEMALLOCATION equal to the total number of characters of all the strings which may be added to the list. If you are unsure of what that will be, set it equal to MAXNO*MAXSIZE.
- (4) Execute the initialization routine with a GOSUB 30100.

Initialization need only be done once. If a second attempt is made, the initialization routine will ignore it. It's advisable to set all variables slightly higher than needed. BASIC error number 2 (out of memory) will result if the dimensions you set are too high for the memory of your machine.

Clearing workspace—If, at any time, you wish to begin with a new list, execute a GOSUB 30200. Clearing isn't necessary before the first list is created.

Item addition—When a program is first run and after the workspace is cleared, the list is empty. To add an item to the list:

(1) Set the variable ITEM\$ equal to the string you wish added to the list.

(2) Execute a GOSUB 30300.

Each time an item's added, the variable NUM-ITEMS is set by the subroutine to the number of items on the list. Never change the value of this variable. A null string will be ignored. If the item list is already full, the error message ITEM LIST FILLED will appear on the screen. If the item's length would extend beyond the storage space, the error message MME will appear on the screen. In either case, the item will not be added to the list.

Item retrieval — After an item has been added to the list, it can be retrieved. To do that:

- (1) Set the variable ITEMNO equal to the number of the item you want (e.g., 3 for the third item).
 - (2) Execute a GOSUB 30400.

The variable ITEM\$ will then contain the specified item in the list. If the item requested doesn't exist, error message NO SUCH ITEM will appear on the screen. To access all of the items on the list, use a loop in the form: FOR ITEM NO=1 TO NUMITEMS.

Alphabetization—To alphabetize the list, just execute a GOSUB 30500. Even though the quicksort routine I used is fast, you can make it even faster by replacing GOSUB 30500 with HOLD = PEEK(559):POKE 559,0:GOSUB 30500:POKE 559, HOLD — which will turn off the display while the quicksort is working.

For a better understanding of how to use the subroutine package, see Listing 1.

The demonstration programs.

Included in this article are two demonstration programs which use the subroutines. Type them in as described in the previous section. Listing 1 was written as a guide for using the subroutines. It asks for ten names, lets you choose a name number for retrieval, alphabetizes the list of names and prints the alphabetized list both forward and backward. Listing 2 was written as a utility. It takes items from a

file you specify, alphabetizes them, and then outputs the alphabetized list to another file you specify.

The subroutine package takes up 3754 bytes of memory (1936 for the subroutines and 1818 for the stack), plus the memory required for the dimensions you set at initialization. This includes 18*(MAX-NUM+1) bytes for the number of items you specify, 2*MAXSIZE bytes for the length of the largest item you specify, and MEMALLOCATION bytes for the size of the total list.

Because the subroutines can require a lot of memory for large lists, you may want to design your programs to output lists of strings to disk, then use a separate program, such as Listing 2, to alphabetize the lists.

I hope you'll find these subroutines as useful as I have.

Brian Schwartz is a first-year student at Harvard. where he's concentrating in chemistry and physics. He has owned his Atari 800 for four years and has been programming for seven years. His computer interests include algorithms and graphics.

Listing 1. BASIC listing.

```
100 REM *** BRIAN SCHWARTZ ***
110 REM *** ANALOG MAGAZINE ***
120 REM SUBROUTINES DEMONSTRATION 1
130 REM INITIALIZATION
140 MAXNO=20
     MAXSIZE=40
150
     MEMALLOCATION=MAXNO*MAXSIZE
     G05UB 30100
     REM ADD TEN NAMES TO LIST
GRAPHICS 0
180
185
     PRINT "ENTER 10 NAMES:"
     FOR N=1 TO 18
PRINT "NAME #
INPUT ITEM$
210
230
     GOSUB 30300
     REM RETRIEVE ONE ITEM FROM LIST
     PRINT
     PRINT
              "WHAT ITEM # DO YOU WANT":
     TNPIIT
              ITEMNO
     GOSUB 30400
PRINT "IT IS: ";ITEM$
REM_ALPHABETIZE LIST
290
300
     G05UB 30500
     REM PRINT ENTIRE LIST
325
     PRINT "HERE IS THE LIST ALPHABETIZ
ED:"
     FOR ITEMNO=1 TO NUMITEMS
330
     GOSUB 30400
PRINT ITEMNO;"- ";ITEM$
NEXT_ITEMNO
350
     REM PRINT LIST FROM END TO START
     PRINT
     PRINT "HERE IT IS BACKWARDS:"
FOR ITEMNO=NUMITEMS TO 1 STEP -1
     G05UB 30400
```



COMPUTER PALACE WE KNOW ATAR

Help Calc ST

HELPMATE ST

ONLY 39.95

ST CALC

ONLY 49.95

FEATURES for VIP PROFES-SIONAL users only:

- · 2-key macro ability for com mon function; such as saving and printing.
- Several templates use special macros to ease the use of graphing and copying func-

VIP PROFESSIONAL is a trademark of VIP TECHNOLOGIES

FEATURES for ST CALC and other spreadsheet programs

- · Easy-to-use just load and go ST CALC menus and help
- Fast and easy data entry
- 11 templates that take the work out of tedious spread sheet setup.
- ST CALC gives full use of GEM

Four function 10 key calculator for use with mouse or ten key

- Appointment Calendar with 90 vear variable span.
- Telephone/Name Index also with telephone dialer
- . Set alarm functions for any day in the year

In the future you'll be able to use your computer to organize your desk without having the clutter of the Calculator, Telephone / Name Index, Appointment Calender, Alarm Clock, all over your desk. The future is here! With Helpmate ST you can use your mouse to organize your desk top, leaving extra room for more important tasks. All those desk accessories are hidden away until you need them. Use the pull down menus with many ST programs or by themselves

On-line help facility

GEM implemented windows. • Uses less memory than other spreadsheets which means more room for spreadsheet templates

ST CALC is a fully implemented GEM based spreadsheet program for home and small business use. If you are looking for a powerful, easyto-use spreadsheet to do any calculation from balancing your check book to 'What if' estimates on Cost/profit analysis, this is it. Why buy a program that costs 3 times as much and is not as easy-to-use. ST Calc has all the functions you need to get results, at an affordable

allemane The City

Only \$34.90

This is a role-playing/adventure game that surpasses any you have ever played before. Alternate Reality incorporates the ultimate in 3D graphics with original music that weaves through the game to establish the illusion, an Alternate Reality. The whole adventure begins when you captured by aliens and transported to another planet. The sun rises and sets, rain falls, and secret doors lead you into unexpected perils and delights. Improve yourself physically mentally, morally, financially to reach your ultimate goal: Either return to Earth or seek revenge on your abductors.



Super Maile

One of the most versatile data-base programs available

800. XL. XE 39.95

Features Includes:

- · Lighting fast retrieval
- · Fast Sorts on any field
- · Supports up to 4 drives · Single or double density
- . Store about 1100 records per disk side in double density
- · On-screen prompts
- · Help-screens
- · State abbreviation table

- Redefinable fields
- Print labels 1, 2, or 3-up
- · View records on screen
- · Search on any field (Fast sort on name field - 1 sec. to find a name out of 1000)
- · Much more!

Iltima



Quest of the Avatar Only \$49.90

INCLUDED WITH PACKAGE:

- 16 times larger than Ultima III
 1 (Metal) Ankh, cloth map,
- · 2 disks full, 4 sides

No commands to memorize

menus and mouse control.

Fully meets home and small

business needs

- reference card.
 - · Book of Magic and History of Britannia

The long-awaited Ultima III sequel is finally here! Ultima IV is the latest in a series of epic fantasy role-playing adventure. You are in quest to become the perfect mortal by becoming enlightened in the eight virtues, Valor, Honor, Justice, Humility, Sacrifice, Spirituality, and Honesty. Of course there are still many Monsters which must be fought, but your main goal is to become an **Avatar**. This game will take a lot of reading from — The History of Brittania and The Book of Magic Spells — included with the Ultima IV, before you are ready to make the most exciting journey of your mortal life.

SPECIALS

ı						
l	DONKEY KONG					9.95 0
١	PACMAN/QIX					
l	METEOR STORM	M				.4.95 D
ı	DIGGER BONK					.7.95 D
	VISICALC					.9.95 D
	GORF					
	INV. TO PRG. 3					
	LETTER WIZARI	D				29.95 D
	SANDS EGYPT					14.95 D
	P00L 400					14.95 C
	XL BOSS					
	10 PRECISION [).				.9.95 D
	MUSIC MAJOR					.7.95 D
	MINER 2049ER					5.95 C
	PFC CST HWY					. 9.95 T
						A 4

BIG

99¢

No Documintation Tapes Only FANCY FONTS

SALE MATHS FOR FUN SPACE GAMES INSTEDIT BRAIN BOGGLERT MINI WORD PROC MUSIC MAJOR DIGGERBONK DATA BASE DIALER GUESS WHO'S COMING TO DINNER MARATHON BOB'S BUSINESS PROTO'S GAME GRADE BOOK MEMORY MAR DISPLAY LISTS

ONLY 7.95 Each

#1 DISPLAY LISTS #2 SCROLLING #3 PAGE FLIPPING #4 BASICS OF ANIMATION #5 PLAYER MISSILE GRAPHICS #6 SOUND & MUSIC **#7 DISK UTILITIES** #8 CHARACTER GRAPHICS #9 GTIA GRAPHICS 9-11 #10 SOUND EFFECTS #11 MEMORY MAP TUTORIAL #12 S.A.M. TUTORIAL INSTEDIT THE GRAPHICS MACHINE MUSIC MAJOR MINI DATABASE/DIALER MINI WORDPROCESSER KID'S GAMES #1 KID'S GAMES #2 BOWLERS DATABASE ATARI GRADE BOOK MATHS FOR FUN BRAIN BOGGLER THE ADVENTURES OF PROTO PROTO'S FAVORITE GAMES TRICKY TUTORIALS #1-#6 \$24.95 TRICKY TUTORIALS #7-12 \$24.95



The best machine language book available for the Atari 800, XL

DISK

7.95 EA.	\$7.95 EA.	\$7.95 EA
GAMES DISK #1	EDUC DISK #4	BEST OF ACE #2
GAMES DISK #2	EDUC DISK #5	BEST OF ACE #3
GAMES DISK #3	EDUC DISK #6	BEST OF ACE #4
GAMES DISK #4	EDUC. DISK #7	BEST OF ACE #5
DEMOS DISK #1	EDUC DISK #8	BEST OF ACE #6
DEMOS DISK #2	EDUC DISK #9	BEST OF ACE #7
DEMOS DISK#3	EDUC DISK #10	BEST OF ACE #8
UTILITIES #1		BEST OF ACE #9
UTILITIES #2	BEST OF ACE #1	BEST OF ACE #10
UTILITIES #3		BEST OF ACE #11
ACTION DISK #1	\$5.95 each	BEST OF ACE #12
ACTION DISK #2	WIZ OF WOR C	BEST OF ACE #13
ACTION DISK #3	DELUXE INVADERS C	BEST OF ACE #14
EDUC. DISK #1	GORF (Not for XL) C	l
EDITO DICK #0	doni (Not 101 AL) C	I .

PROTECT YOUR INVESTMENT

MINER 2049ER C

DELUXE DUST COVERS

EDUC DISK #2

FDUC DISK #3



Custom fitted, attractive leather brown color

- ATARI NEW 130/65XE & 520/1040ST, 400,800,600/800/1200XL,410, 810, 1050, 1025,
- ST, EPSON, GEMINI, PROWRITER printers
- . ST. INDUS, RANA, PERCOM, TRAK, disk drives Additional covers

ONLY \$8.95 EACH ONLY \$7.95 EACH

1	SIPNU
	VIP PROFESSIO
	HELP CALC ST
ONLY	ST CALC
0.05	OSS PASCAL
9.95	H&D FORTH

DISK NOTCHER

JON WOTOTILIT
IARDWARE
EGEND 808 199.00
ANASONIC 1091 299.95
ANASONIC 1092 399.50
KIMATE 10 179.50
PSON LX-80 249.95
050 DISK DRIVE 149.95
NDUS GT 249.95
0 MEG.H.D.DRIVE(XL) .829.95
WIVEL BASE STAND 29.95
AK MONITOR STAND 39.95
M 301 MODEM 44.90
MPP 1000E MODEM 59.95
CALL POCKET MODEM . 129.95
MPP1150 PRINTER INTF 59.95
6K RAM (800 only) 17 95

TIME BANDITS

51	(i F	ł	N	1	t	=	ì))		
												24.50
SUNI	000	ì										.33.90
ULTI	MA	11.										49.50
BRAT	TAC	CU	S									.39.50
												.39.95
BORF	ROV	VED	T	IN	A E	=						44.90
TRAN	ISY	LV	41	11/	4							34.95
MUD	PIE	S.										26.90
WIN	NIE	THI	E	0	0	Н						39.50
BACH	(GA	MN	10	N								31.50
WISH	HBR	INC	ŝΕ	R								.34.90
PERF	Y N	MAS	0	N								39.50

7	ST	PROGR	AMS
	VIP PI	ROFESSIONAL .	138.50

VIP PROFESSIONAL 138.50
HELP CALC ST 24.95
ST CALC
OSS PASCAL 67.50
H&D FORTH 44.90
PHILON BASIC 69.90
HABA C
CP/M EMULATOR 39.90
THE FINAL WD 109.50
REGENT SPELL 39.50
DEGAS
EASY DRAW 129.50
DB MASTER 39.90
H&D BASE79.90
ZOOMRACKS
ST TALK 17.95
PC INTERCOM 97.50
CT DOOKO

ST BOOKS

ST MACH. LANG.				
ST INTERNALS				.19.95
ST GUIDE				.16.95
PROG. THE 68000				. 22.95
ST APPLICATIONS	;			. 5.00
ST L0G0				17.95
BASIC TO C				.16.95
COMMON C FUNC				17.95
ADV. C TECH				19.95
C PROGRAMMING				. 29.95



Beautifully finished stand to hold your ST monitor, 2 disk drives, a modem, etc



USE YOUR CREDIT CARD & CALL Toll Free 1-800-452-8013 **★ ORDERS ONLY. PLEASE ★**

There's never a penalty for using your credit card! For Information, Call (503) 683-5361 Prices subject to change without notice

SHIPPING INFO: Minimum \$2 90 Ground. \$4 75 Air Actual Cost depends on weight Call (503) 683-5361 for information WARRANTY INFO: Everything that we sell is warrantied by the manufacturer. If any item purchased from us fails to per-form properly when you receive it. call us at (503) 683-5361 so that we can assist you. No retrurned merchandise accepted without authorization. Defective software will be replaced with another copy of the same program, otherwise, no software is returnable.

• 2 Day Air Shipping AVAILABLE •

410 PRINT ITEMNO;"- ";ITEM\$
420 NEXT ITEMNO
430 REM REM CLEAR WORKSPACE IF NEEDED
440 PRINT "RUN AGAIN ((1) YES (2) NO]
";
450 INPUT AGAIN
450 IF AGAIN=2 THEN 490
470 GOSUB 30200
480 GOTO 185
490 REM REQUIRED END STATEMENT
500 END

CHECKSUM DATA.

(see page 12)

100 DATA 191,112,941,445,781,14,848,19,973,913,572,118,743,240,13,6923
240 DATA 752,840,691,712,610,30,424,42
5,13,774,682,727,62,20,698,7460
360 DATA 383,83,699,493,30,10,688,373,360,243,238,898,27,742,355,5622
500 DATA 34,34

Listing 2. BASIC listing.

100 REM *** BRIAN SCHWARTZ ***
110 REM *** ANALOG MAGAZINE ***
120 REM SUBROUTINES DEMONSTRATION 2
130 DIM INFILE\$(20), OUTFILE\$(20)
140 MAXNO=400
150 MAXSIZE=250
160 MEMALLOCATION=19000
170 GOSUB 30100
180 GRAPHIC\$ 0
190 PRINT "INPUT FILE";
200 INPUT INFILE\$
210 PRINT "OUTPUT FILE";
220 INPUT OUTFILE\$
230 OPEN #1,4,0,INFILE\$
240 OPEN #2,8,0,OUTFILE\$
250 TRAP 290
260 INPUT #1,ITEM\$
270 GOSUB 30300
280 GOTO 260
290 GOSUB 30500
300 FOR ITEMNO=1 TO NUMITEMS
310 GOSUB 30400
320 PRINT #2;ITEM\$
330 NEXT ITEMNO

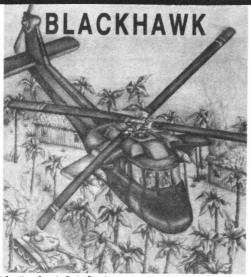
CHECKSUM DATA.

(see page 12)

100 DATA 191,112,944,919,38,228,173,19,908,64,349,390,700,852,211,6098
250 DATA 736,494,25,729,35,53,11,505,3
74,42,3004

Listing 3. BASIC listing.

30000 REM *** BRIAN SCHWARTZ ***
30010 REM ALPHABETIZATION ROUTINE 30020 REM AND SUPPORTING ROUTINES 30030 REM FOR THE ATARI COMPUTERS 30040 REM *** ANALOG MAGAZINE *** 30100 REM INITIALIZATION ROUTINE 30110 IF INIT=1 THEN RETURN 30120 INIT=1 30130 DIM STORAGE\$(MEMALLOCATION),ITEM \$(MAXSIZE),PIVOT\$(MAXSIZE) 30140 DIM STACK(100,2),POINTERS(MAXNO, 30145 LET POINTER5(0,2)=0 30150 RETURN 30200 REM CLEAR WORKSPACE ROUTINE 30210 NUMITEMS=0 30220 RETURN 30300 REM ADD ITEM TO LIST ROUTINE 30310 IF LEN(ITEM\$)=0 THEN RETURN 30320 IF NUMITEMS=MAXNO THEN PRINT "IT EM LIST FILLED": RETURN 30330 IF POINTERS (NUMITEMS, 2) +LENCITEM \$)>MEMALLOCATION THEN PRINT "MME":RETU RN 30340 NUMITEMS=NUMITEMS+1 30350 LET POINTERS(NUMITEMS,1)=POINTER 30350 LET POINTERS (NUMITEMS,1)=POINTER S (NUMITEMS-1,2)+1
30360 LET POINTERS (NUMITEMS,2)=POINTER S (NUMITEMS-1,2)+LEN (ITEM\$)
30370 STORAGE\$ (POINTERS (NUMITEMS,1),POINTERS (NUMITEMS,2))=ITEM\$
30380 RETURN
30400 REM RETRIEVE ITEM ROUTINE
30410 IF ITEMNO>NUMITEMS OR ITEMNO<1 THEN PRINT "NO SUCH ITEM":RETURN 30420 ITEM\$=STORAGE\$ (POINTERS (ITEMNO,1),POINTERS (ITEMNO,2))
30430 RETURN
30500 REM QUICKSORT ROUTINE
30510 IF NUMITEMS (2 THEN RETURN 30520 SP=1
30530 STACK (1,1)=1 30520 SP=1 30530 STACK(1,1)=1 30540 STACK(1,2)=NUMITEMS 30550 IF SP=0 THEN RETURN 30560 UP=STACK(SP,1) 30570 DOWN=STACK(SP,2) 30580 SP=SP-1 30590 IF UP=DOWN THEN 30550 30600 PIVOTS=STORAGE\$(POINTERS(UP,1),P 30600 PIVOTS=STORAGE\$(POINTERS(UP,1),POINTERS(UP,2))
30610 US=UP
30620 DS=DOWN
30630 UP=UP+1
30640 IF STORAGE\$(POINTERS(UP,1),POINTERS(UP,2))>PIVOT\$ THEN 30680
30650 IF UP=DOWN THEN 30790
30660 UP=UP+1
30660 CP=UP+1 30670 GOTO 30640 30680 IF STORAGE\$(POINTERS(DOWN,1),POI NTERS(DOWN,2)) (PIVOT\$ THEN 30720 30690 IF UP=DOWN THEN 30790 30700 DOWN=DOWN-1 30710 GOTO 30680 30720 TEMP=POINTERS(UP,1) 30730 LET POINTERS(UP,1)=POINTERS(DOWN 30740 LET POINTERS(DOWN,1)=TEMP 30750 TEMP=POINTERS(UP,2) 30760 LET POINTERS(UP,2)=POINTERS(DOWN ,2)
30770 LET POINTERS(DOWN,2)=TEMP
30780 GOTO 30660
30790 IF STORAGE\$(POINTERS(UP,1),POINTERS(UP,2))>PIVOT\$ THEN UP=UP-1



- * 3-D Scrolling Arcade Style Graphics
- Select your own difficulty level
- Choose from Color or Black/White display options.
- * Pause Feature allows you to freeze the game.
- * EXTENSIVE FIREPOWER WITH 30mm Automatic Cannon and 2.75in Rockets.

MISSION OBJECTIVE: Fly from your aircraft carrier across hostile enemy territory. Land at the embassy to rescue the hostages, then fly back to the carrier. Beware of surface to air missles and enemy aircraft.

To order. Send check or money order for \$15.00 (TX res. add 15%)

C.O.D.'s accepted. Call (713) 454-5285

ORION SOFTWARE

17303 Glenhew Rd. CIRCLE #119 ON READER SERVICE CARD

Humble, Texas 77396



Alphabetization continued

30800 TEMP=POINTERS(UP,1) 30810 LET POINTERS(UP,1)=POINTERS(US,1 30820 LET POINTERS(US,1)=TEMP 30830 TEMP=POINTERS(UP,2) 30840 LET POINTERS(UP,2)=POINTERS(US,2 30850 LET POINTERS(US,2)=TEMP 30860 IF US>UP-1 THEN 30900 30870 5P=5P+1 30880 STACK(SP,1)=US 30890 STACK(SP,2)=UP-1 30900 IF UP+1)05 THEN 30560 30910 SP=SP+1 30920 STACK(SP,1)=UP+1 30930 STACK(SP,2)=DS 30940 GOTO 30560 30950 RETURN

CHECKSUM DATA.

(see page 12)

30000 DATA 42,752,739,686,179,600,80,7
34,175,291,460,55,642,550,50,6035
30300 DATA 865,767,628,231,960,710,924
,69,63,671,961,55,54,920,379,8257
30520 DATA 605,362,641,432,762,139,68,561,392,619,103,65,928,570,71,6318
30670 DATA 225,483,578,329,218,623,590
,512,630,601,520,230,288,620,400,6847
30820 DATA 21,627,412,30,498,67,778,22
6,434,56,209,737,221,63,4379

GIGANTIC SALE!!!

CENTURIAN ENTERPRISES

Atari Hardware & Parts		
enturian/Atari 810 Disk Drive	\$ 199	(7)
tari 1050 Disk Drive	\$ 169	(6)
050 Double Density Kit (US Doubler)	\$ 54	(3)
appy Enhancement (1050 or 810)	\$ 157	(3)
1 100VE C 100V	100	

Atari 520ST Computer System, Includes Disk Drive, Computer wl512K, Monitor, + FREE SOFTWARE!!!!!! Color System \$ 929 [12] Monochrome System \$ 749 [10] Add a Star SG-10 Printer wlNLQ \$ 249 [7] Free Cable!

Atari Numeric Keypad w/Driver program	\$ 17	(3)
Atari 400 48K RAM Expansion, Complete	\$ 35	(2)
400/800 GTIA CPU Board	\$ 18	(2)
800 'OS' ROM version B Board	\$ 17	(2)
400/800/810/850/1050/1020 Power Adapter	\$ 15	(3)
13 pin I/O Plug, Cable end or Port type	\$ 3	(1)
I/O Data Cable, 6 foot length	\$ 12	(2)
Atari Joysticks, \$ 5 (1) each - Paddles \$ 8 (2)		
Comrex Commander Joystick, Super deal -	\$ 8	(2)

omrex commander Joyatok, super deal 5 6 (2 VIRTUALLY EVERY TYPE OF ATARI RELATED PRO-DUCT IS AVAILABLE AT CENTURIAN. CALL OR WRITE FOR FREE SPECIALS FLYER, OR SEND \$1 FOR A FULL CATALOG! Dealer pricing available!!!

Atari Software & Etc.

Atari Writer \$ 29 (2) Atari Logo Package \$ 35 (2)
Atari Microsoft Basic II, cart. wiref. guide \$ 25 (3)
Atari Pilot \$ 20 (3) Atari Basic cart. Kit \$ 15 (3)
Atari Assembler/Editor cart. Kit \$ 15 (3)
Atari Assembler/Editor cart. Kit \$ 15 (3)
Atari Conversational Spanish or Italian \$ 12 (3)
Atari Inv. to Programming 1, 2, or 3 \$ 10 (2)
Atari Inv. to Programming 1, 2, or 3 \$ 10 (2)
Atari E.T. Phone Home (cart.) \$ 5 (1) Graph-it \$ 7 (1) Atari Touch Typing \$ 5 (2) Star League Baseball \$ 7 (1)
DE RE Atari book \$ 12 (3)
We have much, much more available. 520ST software and
peripherals. Disk Drives, Hard disks and more.
CENTURIAN DISKETTES, DSDD 5¹/₄*, Lifetime bx/10 \$8.90 (1)

Ordering Information: UPS shipping charges are shown in brackets next to the price of the item. Shipping charges must be included with all orders. You may call in your order or mail it in. We accept checks. money order, MC & Visa, and COD. Order now, some

supplies are limited.

CENTURIAN ENTERPRISES P.O. BOX 3233 SAN LUIS OBISPO, CA 93401-(805)544-6616-Office: 890 Monterey St., SLO.

(805) 544-6616

CIRCLE #120 ON READER SERVICE CARD

NEWELL INDUSTRIES NEW PRICE REDUCTION

256KXL **NOW ONLY \$69.95**

Get 256k RAM for your 800XL at this unheard of new low price. This even includes the MYDOS DOS and MANUAL.

SYNSOFT GENERAL LEDGER \$99.95

> **DEMO DISK** \$5.00

Contact your dealer or Newell Industries (214) 442-6612 602 E. HWY. 78 Wylie, Texas 75098 Contact Newell Industries for a complete list of products for the Atari computers. Dealer and distributor inquiries welcome.

CIRCLE #121 ON READER SERVICE CARD

YOU CAN ACTUALLY SAVE HOURS EACH MONTH BY LETTING YOUR COMPUTER PRINT YOUR CHECKS WHILE IT AUTOMATICALLY BALANCES YOUR CHECKBOOK.

PRINTING
PRINTS COMPLETE CUSTOM FORMATTED CHECKS ON TYPE OF CONTINUOUS CHECK FORM WITH FAST SIMPLE ENTRIES.

AUTOMATICALLY CONVERTS AND PRINTS A DIALOG VERSION OF THE NUMERICAL CHECK AMOUNT. PRINTS ADDRESS LABELS PRESELECTED DURING CHECK

PRINTS DETAILED ACCOUNT STATUS AND LIST OF CHECKS.

ALPHABETICAL LIST OF VENDORS AND PRINTS CREDITORS.

ADDRESS LIST AN ON-LINE DATABASE MAINTAINS AN ON-LINE DATABASE OF ADDRESSES AND TELEPHONE NUMBERS (VENDORS AND CREDITORS. TYPE NAMES AND ADDRESSES ONLY ONCE OF NAMES, OF YOUR

FOREVER !!

EASILY ADD, DELETE, CHANGE AND SAVE ADDRESS RECORDS.

ACCOUNT BALANCING
AUTOMATICALLY UPDATE YOUR CHECKING ACCOUNT
BALANCE WITH EACH CHECK YOU ENTER.
ENTER DEPOSITS AND MISCELLANEOUS WITHDRAWALS. DISPLAY THE BANK NAME AND YOUR ACCOUNT NUMBER.
COMPLETE ELECTRONIC FILING SYSTEM SAVES AND
RETRIEVES ALL DATA GENERATED DURING ANY
PREVIOUS ENTRY SESSION.

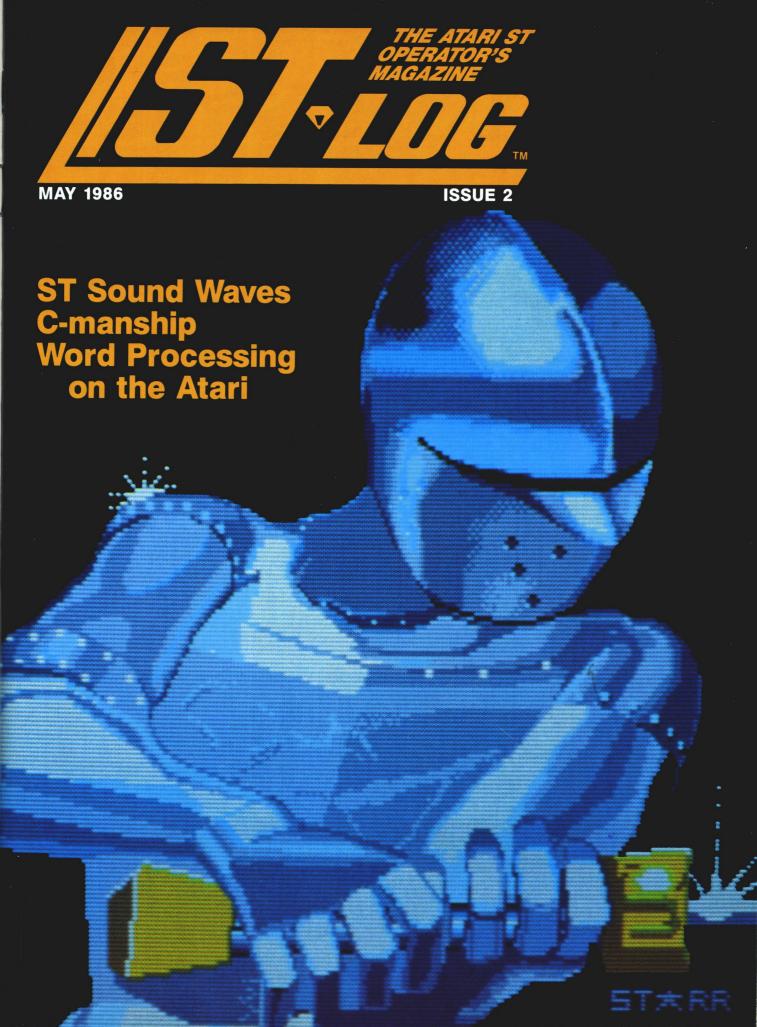
FOR THE INCREDIBLE PRICE OF \$ 24.77
PLUS \$2.50 SHIPPING & HANDELING

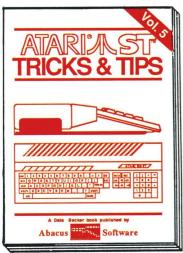
REQUIRES ATARI 400, 800, XL or XE WITH 48K, 80 COLUMN PRINTER, DISK DRIVE AND ANY CONTINUOUS CHECK FORMS

SEND CHECK OR MONEY ORDER TO

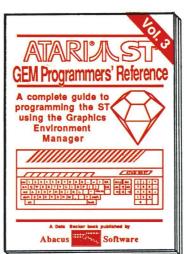
XENTECH P.O. BOX 220218, EL PASO, TX 79913 VISA OR MASTERCARD CALL 24 HOURS/DAY, SEVEN DAYS/WEEK 915/541-6854

CIRCLE #122 ON READER SERVICE CARD





A fantastic collection of useful programs and information for the ST. Complete programs include: super-fast RAM disk; time-saving printer spooler; color print hardcopy; plotter output hardcopy. Explains BASIC commands to access GEM using VDISYS and **GEMSYS** and describes resource files with examples. Manipulate text output (size, rotation, bold, etc.) Change line types (thickness, endpoints, etc.) Mixing machine language with BASIC or C programs. Save software dollars with these tricks and 200 pages \$19.95



For the serious programmer in need of detailed information on the GEM operating system. Written especially for the Atari ST with an easy-tounderstand format that even beginners will be able to follow. All GEM routines and examples are written in C and 68000 assembly language. Covers working with the mouse, icons, Virtual Device Interface (VDI), Application Environment Services (AES) and the Graphics Device Operating System. Required reading for the serious programmer intrested in understanding the ST. 450 pages. \$19.95



MACHINE LANGUAGE Program in the fastest language for your Atari ST. Learn the 68000 assembly language, its numbering system, use of registers, the structure & important details of the instruction set, and use of the internal system routines. 280pp \$19.95

ST INTERNALS Essential guide to learn-

ing the inside information on the ST. Detailed descriptions of the sound & graphic chips, internal hardware, the I/O ports, system addresses, more Fully documented BIOS assembly listing. An indispensable guide. \$19.95 **GRAPHICS & SOUND**

A comprehensive handbook showing you how to create fascinating graphics and suprising music and sound from the ATARI ST. See and hear what sights and sounds that you're capable of producing from ATARIST.

LOGO

Take control of your ATARI ST by learning LOGO-the easy-to-use, yet powerful language. Topics covered include structured programming, graphic movement, file handling and more. An excellent book for kids as

PEEKS & POKES

Enhance your programs with the examples found within this book. Explores using the different langs BASIC, C, LOGO and machine language, using various interfaces, memory usage, reading and saving from and to **PRESENTING THE ST**

Gives you an in-depth look at this sensational new computer. Discusses the architecture of the ST, working with GEM, the mouse, operating system, all the various interfaces, the 68000 chip and its instructions,

The ATARI logo and ATARI ST are trademarks of Atari Corp.



Abacus Software

P.O. Box 7219 Grand Rapids, MI 49510 - Telex 709-101 - Phone (616) 241-5510

Optional diskettes are available for all book titles at \$14.95

Call now for the name of your nearest dealer. Or order directly from ABACUS with your MasterCard, VISA, or Amex card. Add \$4.00 per order for postage and handling. Foreign add \$10.00 per book. Other software and books coming soon. Call or write for free catalog. Dealer inquiries welcome-over 1400 dealers nationwide.



ISSUE 2 MAY 1986

FEATURES

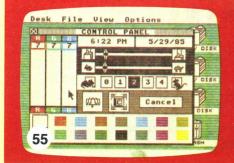
REVIEWS

Word Processing

on the Atari 520ST Arthur Leyenberger 75ST Six ST word processors are examined and compared. Take your pick.

COLUMNS

News on recent releases for the ST. Make your shopping list.







Graphic Arts

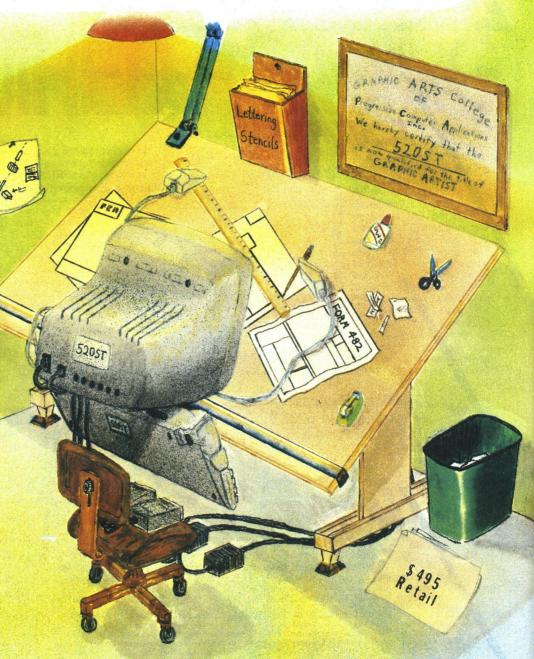
The Next Step in the Evolution of Software

Imagine combining the functions of Computer Aided Design (CAD), Business Graphics, free-hand drawing, and tupesetting programs into age package. Include functions of a simple spreadsheet for data many ipulation. Add abilities of a simple word processor for text annotation in various fonts, sizes, and rotations. Mix all these features into a single package instead of "integrating" separate packages. The result is a new breed of software: Graphic Arts. The only graphic arts program available: The Graphic Artist.

The Graphic Artist is menu, macro, command, and language driven. You read correctly. Menus for beginners, commands and macros for experts. And an optional language interpreter for creating custom applications.

Support for dot matrix printers, color plotters, and laser printers is standard, of course.

Impressed? Wait until you see a demo at a dealer near you!



The Graphic Artist

Graphic Arts has finally arrived.

PROGRESSIVE COMPUTER APPLICATIONS
2002 McAuliffe Drive

2002 McAuliffe Drive Rockville, Maryland 20851

(301) 340-8398

★Language \$245 additional

The Graphic Artist is a trademark of Progressive Computer Applications, Inc. 520ST is a trademark of Atari Corp.

CIRCLE #124 ON READER SERVICE CARD



TDI SOFTWARE INC. 10410 Markison Road Dallas, TX 75238 (214) 340-4942 520ST \$79.95

by Sol Guber

A good computer needs good languages in order to utilize all of its capabilities. The Atari 520ST is one of the newest and best computers on the market today, and TDI, has brought out a fine example of what a good language should be, Modula-2.

First, let me explain what Modula-2 is, for those who haven't heard of it yet. Niklaus Wirth, the inventor of Pascal. created Modula-2. The language is an enhancement and extension of Pascal and has five added features: (1) the module concept, in particular, the facility to split a module into its definition and implementation portions; (2) a more systematic syntax, which facilitates the learning process—every structure starting with a keyword also ends with one (i.e., is properly bracketed); (3) the concept of process as the key to multiprogramming facilities; (4) so-called low-level facilities, which make it possible to breach the rigid type consistency rules and allow you to map data with Modula-2 structure onto a store with inherent structure; and (5) the procedure type, which allows procedures to be dynamically assigned to variables.

TDI's **Modula-2** compiler implements the full language as described by Dr. Wirth. It includes separate compilation, opaque types, co-routines (pseudo-concurrent processes) and floating-point routines. It is integrated into the GEM environment and will support all the GEM routines. It also promises to generate compact code.

As in all high-level languages, the

Modula-2 package comes in three parts: an editor, a compiler and a linker in a two-disk package. There's no copy protection on any of the disks, and you can arrange the system to fit your needs.

Also included is a nice demonstration of the power of **Modula-2**. Since most programmers don't spend much time with either the compiler or the linker, the editor is the most important part of the package. This editor is very, very nice and quite powerful.

Modula-2's is a full-screen editor which uses both the mouse and function keys. You can point the mouse to the spot where you want to work and click it. This will be the new spot where writing begins. Using the function keys, you can move one word right or left, page up and down, and move a line up and down.

The arrow keys are also used to move around the screen. The deletion function works like the movement functions, with the ability to delete a character right or left, a word right or left, or a line right or left. You can undelete with the undo function.

For large insertions or deletions, you can mark, then cut or paste text into the proper spot. These capabilities are usable both with the mouse and drop-down menus, as are the function keys.

There's one more function unique to this editor, one that I've never seen on another editor. After a program is written, it is compiled. Most of the time, there are errors in the compilation. With **Modula-2**'s compiler, the errors are written to a file on the disk. When you return to the editing mode, the error file

and your original file are combined, so there are little @s where the errors occurred.

All errors in the program are examined. There's even a special function key to look for the next @. When the cursor is moved to this spot, a message will be shown at the bottom of the screen, with the error message. The message is further explained in the table of the Modula-2 book. There are four pages of possible errors, and they're defined well enough that it's easy to correct them and continue.

This listing of the messages in a file that's merged into your own is one sign of the time and effort invested in this fine package. The editor, of course, was written in **Modula-2**.

Figure 1 shows a sample program in Modula-2. You can see the various differences between it and Pascal. The first is that there are two parts to the program —a definition module and an implementation module. There's a difference between what a procedure does and what the outside world sees of the program. You must define what will come out of the module. In this case, a cardinal number will be "exported" from the module.

A second difference can be seen in the third-to-last line. The language uses very strong typing. To return a cardinal number from a function that uses a division between "longcards," you must specify that the cardinal number is returned. All procedures and parameters must be typed, so the program will know what kind of variable it's handling.

There are also several subtle points in the example module shown in Figure 1. One that isn't seen is what can be done with this module. It can be compiled and, when needed by any other program, it can be "imported" into that program. Modula-2, unlike Pascal, can link together compiled code via the linker. This means that a library can be put together, then used just as any other function would be.

A second subtle point is the interface between parts of the programs. The definition module explains exactly what another part of the program will "see" of the implementation module. The only thing visible to the outside environment is the procedure "random," since it's the only thing exported out. Variables, variable types and other procedures can be exported out, too. Objects declared in other modules can be referenced in module M, if they're explicitly made to be known in M (i.e., if they're "imported" into M).

The major strength of **Modula-2** is that many of its parts are hidden from the other portions. It's very easy to write and debug parts of programs, since you know exactly how they'll fit together; this has to be specified in the definition section of the module.

Also, the fine details of a system need not be known at any higher level. The same program can be written for two different machines, and each will have specific I/O that will be imported when needed.

In terms of I/O, you may wish to have them available, but don't need to know—or, rather, don't want to bother to learn—how this works in detail. In many cases, you may even wish to hide parts away from access, to guarantee that they'll work correctly.

There are several extensions to Modula-2 that were proposed by N. Wirth. They include a change in the case syntax, a new variable type called "string," and two new variables for 32-bit machines called "longcard" and "longint." There is optimization for Boolean constants. The "set" type is supported by several new features, and you're allowed to have open array parameters.

The most exciting part of the language is its having both high-level and low-level implementation. For the low-level portion, there's a procedure "code," which allows for the insertion of machine language into the object code. There's "setreg," to put values into one of the 68000 processor's registers, as well as "register," to return values.

On the high-level end, there's the

"type process," as well as procedure "newprocess." "Iotransfer" moves to different peripheral devices as needed, and procedure "listen" services the interrupts. The "newprocess" is used to have concurrent programming.

I've started using this language and have found no bugs at all. There are some typos in the documentation, but none of these are significant. I've typed in several of the programs from N. Wirth's book Programming in Modula-2, and they've worked perfectly.

The major weakness of the package is in the documentation of the GEM routines. You're expected to have read the GEM manuals. Without them, many GEM routines cannot be used properly. Except for this flaw, I have no qualms recommending this language to anyone. It's a good way to move away from DRI's C.

Sol Guber is a Chemical Engineer with a large petroleum servicing company in the Midwest. He has a seven-year-old daughter who corrects both his articles and games—now that her writing skills have improved. He's been programming the Atari 800 for four years and now has an 520 ST, which his daughter lets him use once in a while.

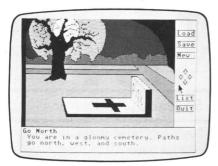
Figure 1.

```
DEFINITION MODULE RandomNumbers ;
   (c) Copyright 1985 1985 TDI Ltd.
                                       All Rights Reserved
EXPORT Random ;
PROCEDURE Random(MaxValue : LONGCARD) : CARDINAL ;
END RandomNumbers.
IMPLEMENTATION MODULE RandomNumbers;
CONST
   M = 10000000;
   m1 = 10000
   b = 31415821
VAR seed : LONGCARD;
PROCEDURE Random(MaxValue : LONGCARD) : CARDINAL ;
    PROCEDURE Multiply(p, q : LONGCARD) : LONGCARD ;
    VAR p0, q0, q1, p1 : LONGCARD ;
    BEGIN
        pi := p DIV mi ;
         p0 := p MOD m1 ;
         q1 := q DIV m1 ;
         RETURN (((p0*q1 + p1 * q0) MOD m1) * m11 + p0*q0) MOD M;
    END Multiply:
BEGIN
    seed := (Multiply (seed,b) + 1) MOD M ;
    RETURN CARDINAL (((seed DIV m1) * MaxValue) DIV m1) ;
END Random ;
BEGIN (* MODULE *)
   seed := 349887 ;
END RandomNumbers.
```

ST NEWS!

POLARWARE

Penguin Software adds to their Comprehend Interactive Novel series with **The Coveted Mirror**, **Frank and Ernest** and **Oo-Topos**. Pictured below is **Transylvania**, an earlier series offering.



Transylvania.

In **Mirror**, the evil King Voar has taken control of Starbury and its residents, and seeks the last piece of the magical, broken mirror which would make him invincible. It's up to you to stop him. The second new title is a cartoon novel based on the **Frank and Ernest** comic strip, while **Oo-Topos** is a science fiction novel.

Another Penguin game, **Sword of Kadash**, is a fantasy adventure with over 200 rooms, each having its own puzzles.

These adventures retail for \$39.95 each, from Polarware/Penguin Software, 2600 Keslinger Road, P.O. Box 311, Geneva, IL 60134 — (312) 232-1984.

CIRCLE #172 ON READER SERVICE CARD

SUPRADRIVE

The **SupraDrive** hard disk for the 520ST and 1040ST is available in 10-, 20-, 30- and 60-megabyte formats, ranging in price from \$799 to \$1995. The drives are said to be compatible with TOS and all applications software.

The drive comes ready for connection to the ST and improves disk transfer rates 300% to 1000% over the stock drives. The ST is also capable of booting directly from the **SupraDrive** upon initialization. The hard disk comes complete with a utilities disk containing backup, formatting and partitioning programs.

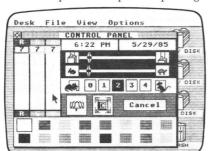
For additional information, please contact Supra Corporation, 1133 Commercial Way, Albany, NY 97321 — (503) 967-9075.

CIRCLE #173 ON READER SERVICE CARD



GRAPHIC COLOR PRINTER

Shanner is marketing the **SPC-700CI**, a 7-color graphic printer. Some of the printer's features include: color mixing without smudging, pin- or friction-feed, parallel interface and low noise. The printer is capable of printing at 38 or 50 characters/second, on normal paper.



CIRCLE #129 ON READER SERVICE CARD

on a special ribbon. When intermingled, this produces up to seven colors.

The SPC-700CI retails for \$299.95. Contact Shapper International Corp. 453 Revendale

Black, yellow, magenta and cyan are combined

The **SPC-700CI** retails for \$299.95. Contact Shanner International Corp., 453 Ravendale Drive, Mountain View, CA 94043.

Technologies, Forecasting and Time-Series, Decision Analysis Techniques, Linear & Non-linear Programming and Optimization. The programs are in machine language, to run at optimum speed. Easy to use, with menus at every stage, they're sophisticated and professional.

Example data assists learning. The manuals are touted as full books, with illustrations, indexes and practical examples (the **Experimental Statistics** book is over 200 pages).

Lionheart, P.O. Box 379, Alburg, VT 05440 — (514) 933-4918. CIRCLE #174 ON READER SERVICE CARD.

OTHER NEWS

Batteries Included will shortly be releasing I*S TALK, a telecommunications program with plenty of power and ease of use. A 50,000-word spelling checker and three levels of macros are also featured.

Also due is **I*S TIME**, a time management and billing system for professionals. From Batteries Included, 30 Mural Street, Richmond Hill, Ontario, Canada L4B 1B5 — (416) 881-9941. CIRCLE #175 ON READER SERVICE CARD

Lamar Micro offers a 1-megabyte 520ST upgrade for \$300, giving the user over 750K or RAM. In conjunction with their RAM Overdrive, the upgrade lets you set aside the upper 512K of RAM as a ramdisk. RAM Overdrive retails for \$34.95, from Lamar Micro, 2107 Artesia Boulevard, Redondo Beach, CA 90278.

Commnet Systems specializes in telecommunications software and currently offers **ST-Term**. Their newest release is **FoReM ST**, an ST BBS. Some of the many highlights include: a feature-packed message and file system, E-Mail capability and Sysop commands. For additional information, contact Commnet Systems, 7348 Green Oak Terrace, Lanham, MD 20706 — (301) 552-2517.

CIRCLE #132 ON READER SERVICE CARD

Infocom is now a subsidiary of Activision. While the consumer probably won't notice any changes in the near future, one thing to look for may be the release of **Cornerstone**, the powerful IBM productivity package that never quite made it in the marketplace. The original \$495 price may dwindle down to \$100-\$150 if ported to the ST.

BUSINESS & STATISTICAL SOFTWARE

Lionheart has advanced software ST packages, including: Business Statistics, Sales and Market Forecast, Experimental Statistics, Multivariate Analysis, Quality Control & Industrial Experiments, Pert and Critical Path

VIP Professional

Finally – A Business Program that Brings Lotus 1-2-3 $^{\circ}$ Functionality to Your $Atari\ ST^{\text{m}}$!

VIP Professional is a state-of-the-art, integrated spreadsheet program which brings together a spreadsheet, a database and graphing capabilities. Professional was modeled after the powerful and best-selling Lotus 1-2-3* program which dominates the business world

Worksheet Magic

Nothing is left out of the workings of the worksheet. Ranges of cells can be named for convenience; column widths are variable; the screen can be split into two windows; titles can be frozen; contents of cells may be copied or moved; the worksheet may be altered as a whole or only partially; the list goes on and on. Perhaps most important, Professional can use and save Lotus 1-2-3 files for transfer between computers.

The worksheet includes over 45 special functions to simplify commonly used formulas, including powerful financial functions for the internal rate of return, present value, and future value. Of course Professional also has all mathematical, trigonometric, table, conditional and logical functions.

Database Power

The built-in database can handle up to 8192 records, with a possibility of up to 256 fields. The records can be searched, sorted and analyzed to find your best salesperson or your rarest stamp. Sorts can be done using multiple criteria, in ascending and descending order. And database functions can be used to do up to seven different kinds of statistical analyses of your database.

Graphs

The graphing capabilities of Professional are astounding. Not only are there six completely different types of graphs available, there are tens of ways to manipulate the data, titles, grids, colors, legends, keys, and scaling of the size of the graph.

Macros

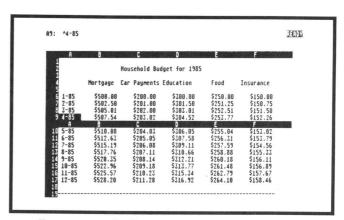
Professional also includes sophisticated macro programming commands. With several special macro commands, the user can actually *program* Professional to be dedicated to a specific task such as accounting.

Just Minutes to Learn

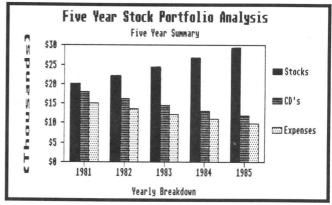
Professional is as easy to use as it is powerful. It comes with a user-sensitive tutorial for the newcomer. And help is built right into the program. With the handy tutorial, you will be able to create professional worksheets in just minutes.

Introducing Professional LITE™

For those of you who do not need the full power of Professional, we offer Professional LITE™. Though without the macros and the database features, and having a smaller sheet size (256 columns by 2048 rows, LITE still packs a powerful punch for only \$99.95!



Integrated Spreadsheet Power



Easy-to-Use Graphs

The Power of Professional
Only \$179.95
Or the Power of LITE
Only \$99.95

If your dealer is out of stock, order direct. Send your check or money order to the address below, together with \$3 for shipping and handling. In California add 6% sales tax. COD's and purchase orders not accepted. Personal checks will be held for three weeks to clear. All prices are subject to change without notice.



132 Aero Camino Santa Barbara California 93117

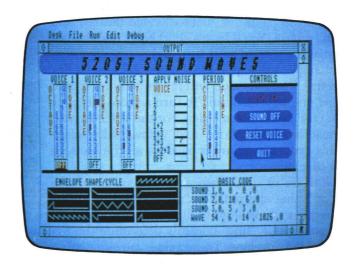
(805) 968-9567

SYSTEM REQUIREMENTS: Amiga with 512K; One disk drive; Monochrome or color monitor; Works with printers supported by the Workbench.

VIP Professional, Professional, Professional LITE and LITE are trademarks of VIP Technologies Corporation; 1-2-3 and Lotus 1-2-3 are registered trademarks of Lotus Development Corp.; Alan, ST, 520ST; and 1040ST are trademarkts of Alan Corporation.

Copyright @ 1986 by VIP Technologies Corporation

Sound Waves



by James Luczak

The one thing that stands out most about demos and programs available for the Atari 520ST is the silence surrounding the machine. I've owned an Atari since 1979 and have watched sound routines progress, from simple one-voice melodies to the truly amazing sound productions now possible on the Atari 8-bit line of computers.

It may seem hard to believe, but the 520ST is capable of producing sound as good as, if not better than the 8-bit computers. However, there's one problem—a lack of information concerning the 520ST's sound capabilities. As you may have noticed, there are two commands in ST BASIC that can be used to produce sounds. These are "sound" and "wave." The sound command is well documented and more or less self-explanatory. The wave command is another sotry. There's almost no useful information in the ST BASIC Sourcebook on how to use the wave command.

ST Sound Waves has two purposes: to demonstrate how to use the sound capabilities of the 520ST and to let you get a feel for programming in ST BASIC.

About the program.

Sound Waves is written in a modular fashion. This means that everything, from drawing different parts of the display to producing a sound, is contained in its own module. Each module is accessed via GOSUB as it's needed. I chose this method because it's very easy to follow what each part of the program is doing.

VDISYS() and GEMSYS().

The VDISYS() and GEMSYS() commands are very powerful tools in ST BASIC. The VDISYS() command gives you full access to the GEM VDI (Virtual Display Interface) library. This, in effect, gives you an additional 120+ functions available in the VDI library. The GEMSYS() command gives you full access to GEM's AES (Application Environment Services) library and an additional 60+ functions. Unfortunately, an explanation of how to use the VDISYS() and GEMSYS() commands is beyond the scope of this article. However, once you get the program running, you can bypass one of the modules and see what shows up missing. Using this method, you can determine what the various VDISYS() or GEMSYS() calls are doing.

Using Sound Waves.

Sound Waves is meant to be run in medium resolution. By applying a modifier to all vertical references (the variable *MODY*), I tried to make provisions to run the program in high resolution, but, since I don't have a monochrome monitor, I haven't been able to test the program. If you're going to use high resolution, you may have to make some adjustments to get the display to show up correctly.

Before loading **Sound Waves**, Listing 1, turn buffered graphics off. Now you're ready to use the program.

The display screen is divided into eight sections: one for each of the three "voices," and sections for

ST Sound Waves continued

noise, period, controls, wave shape, and BASIC code display. To activate a voice, simply move the mouse pointer to the "tone" or "octave" value desired and click the mouse. You'll hear a short beep, and the value that you selected will turn red.

To change a value, point to the new value and click the mouse. The old value will return to normal, and the new one will turn red. To turn a voice off, click on the OFF box for that voice. For the voice to play. you must have both a "tone" and "octave" value selected. This same procedure is used for all the sections of the display.

To activate or deactivate a section, click on the "box" or "value" desired. The "period" section ("envelope frequency") is slightly different. The values in the "coarse" and "fine" controls determine the frequency of the envelope. These values are cumulative.

For example, if you click on coarse 1, then on fine 7. both values will turn red. The values will add together to produce a longer period. To deactivate a period value, click on the value that is active (red). The value will return to normal. You can have all (or any combination) of the values in the coarse and fine controls active at once.

As you select different values, the BASIC code required to produce the tone is displayed in the BA-SIC section of the display. This section is automatically updated each time you make a change. If you create a sound you want to reproduce in your own program, simply jot down the code that appears in the BASIC code section.

Using the mouse.

Since this program is written entirely in BASIC, the mouse click is probably slightly slower than you're used to. Hold the mouse button (left) a little longer than usual. After you click the mouse and hear the beep, move the mouse pointer away from the area that you clicked on.

The wave command.

Table 1 breaks down the "wave" command and its parameters. The first parameter ("enable") can have

Megamax C

Atari ST

Featuring

- One pass Compile In-Line Assembly Smart Linker
- Full Access to GEM routines Register Variable Support • Position Independent Code • and much more...

System Includes:

- Full K&R C Compiler (with common extensions)
- Linker Librarian Disassembler C Specific Editor
- Code Improver Documentation Graphical Shell

	Benchmark	Compile Time	Execute Time	Size
	Sieve	70	2.78	5095
	"Hello, world"	63	N/A	4691
*Times in seconds. Sieve with register variables.				

\$199.95 For more information, call or write:

Megamax, Inc

Box 851521 Richardson, TX 75085 (214) 987-4931

VISA, MC, COD ACCEPTED

CIRCLE #125 ON READER SERVICE CARD

WHAT IS ST-CHECK?

Most program listings in ST-Log are followed by a table of numbers appearing as DATA statements, called "ST CHECKSUM DATA." These numbers are to be used in conjunction with ST-Check (which appeared in ANALOG Computing/ST-Log issue 41.

ST-Log (written by Clayton Walnum) is designed to find and correct typing errors when readers are entering programs from the magazine. For those readers who would like copies of these articles, you may send for back issue 41 (\$4.00).

ANALOG Computing/ST-Log

P.O. Box 625, Holmes, PA 19045

a value from 1 to 63, depending on what combination of voices and noise you select. The values in the chart are typical. The enable parameter is a 6-bit word that enables the "tone" and "noise" channels. Table 2 shows a breakdown of the "enable word." The envelope, shape, period and delay parameters shown in Listing 1 are the actual values to use.

First impressions of ST BASIC.

One of the reasons I wrote this program was to get a feel for programming in ST BASIC. The language itself has a nice variety of powerful and versatile commands from which to choose.

The label option (the ability to name a line) is quite useful for making program listings easier to read. As I previously described, the VDISYS() and GEMSYS() commands give you full access to the VDI and AES libraries. These two commands more than double the number of functions available from ST BASIC—if you know how to use them. And, as far as pure number crunching is concerned, ST BASIC is very fast.

It does have some serious drawbacks that will keep it from being a very useful language. The biggest problem is with its windows. Windows have no place in a computer language. They make it cumbersome. at best, to write a program of any length (for me, it's impossible). They also slow any output to the screen to such a degree that the 68000's speed advantages are totally defeated.

The editor is a disgrace. Once you have the lines you want to work on in the edit window, you can move the cursor to the area you want to edit. Then, as soon as you press a key, the line you're editing turns a very light shade of grey! If this isn't bad enough, the text in the line being edited becomes slightly skewed. On top of all of this, the symbols in the line being edited change. For instance, the plus sign turns into an arrow that points to the left. All of this makes it next to impossible to read the line you're trying to edit.

Fortunately, there's a way around this mess. Apparently, the team that wrote ST BASIC was aware of these problems. ST BASIC programs are written to disk as text files. This being the case, you can use any text or word processor that produces standard text files to write your program. That's the method I used to write this program. Text processors such as MicroEMACS, Mince or Letter Express work just fine. (ST Writer will not work; the files it produces are nonstandard files.)

When ST BASIC loads a saved program, it checks each line for syntax errors. If it finds one, it prints the number of the line containing the error and a

	Ta	ble 1.		
THE WAVE COMMAND SYNTAX: WAVE enable,envelope,shape,period,delay				
ENABLE — En	ables VOICE	or NOISE, or	VOICE with	NOISE
CHANNEL	TONE VALUE	NOISE VALUE	NOISE with	
1	1	8	9	
2	2	16	18	
3	4	32	36	
1+2	3	24	27	
1+3	5	40	45	
2+3	6	48	54	
1+2+3	7	56	63	
ENVELOPE —		ELOPE for V	OICES	
VOICE	VALUE			
1	1			
2	2			
1+2	3			
1+3	5			
2+3	6			
1+2+3	7			
SHAPE SHA	DESCRI			
	alter			
	attac		old	
	cont	,		
9	cont	inue,hold		
10	cont	inue,alternate		
11	cont	inue,alternate,	hold	
	cont			
	conti			
	cont		,	
15	conti	nue,attack,alt	ernate,hold	
PERIOD — Cor			'ELOPE	
VALUE	DESCRI			
001-128		tune value		
256-32768 .	COA	RSE tune val	ue	
DELAY — Sets			nents before	
BASIC resumes execution				
Use any desired value. If your WAVE command doesn't seem to be working the way you think it should, try increasing this value.				

HOW TO USE THE WAVE COMMAND.

First, use the SOUND command to select the voice or voices desired, and set the NOTE and OCTAVE values. Set the VOL-UME and DURATION to 0. When using the WAVE command, the VOLUME and DURATION values in the SOUND command are disabled. Next, set the values for the WAVE command. As your program runs, the SOUND command will take on the parameters set in the WAVE command.

Table 2.

	1	THE ENABLE PARAMETER
BIT	FUNCTION	DECIMAL VALUE
0	Tone	Channel 1
1	Tone	Channel 2
3	Tone	Channel 3
4	Noise	Channel 1
5	Noise	Channel 2
6	Noise	Channel 3

description of the error, then continues to load the rest of the program.

This undocumented feature makes it even easier to use an external text processor to write programs. All you have to do is write down the line numbers and use ST BASIC's editor to correct the errors. This reduces your exposure to ST BASIC's editor.

Like any programming language, ST BASIC has its share of bugs. Most of those I encountered were minor and could be worked around. However, there's one that's very serious.

After your program grows larger than about 10K, this program killer shows up. When you try to save your program (SAVE AS / REPLACE), ST BASIC will erase any previous copy with the same name of your program on disk, then lock up.

There's no way out. You have to press the RESET key. If you haven't taken the precaution of saving your program under a different name, or on another disk, you'll lose your entire program.

There's a way to avoid this nasty little bug: before saving your program, type CLEARW 2 (Clear window 2), then SAVE your program. This seems to eliminate the bug, but I like to stay on the safe side when writing large programs, and always keep a copy of the program on another disk—just in case.

Jim Luczak maintains and operates electronic telephone switching and processing equipment. He's been writing computer programs since 1979, having bought his first Atari in 1980, and has written in BASIC, C, LOGO, FORTH, Action!, and 6502 assembly. He enjoys writing dedicated database programs.

Listing 1. ST BASIC listing.

```
100 '5205T SOUND MAVES Revision 1.0
110 '****** by JIM LUCZAK ******
120 sy=peek(systab)
130 if sy=1 then 150
140 if sy=2 then 170
150 filcol=1:filcol1=1:mody=2
160 goto 240
170 filcol=2:filcol1=3:mody=1
180 poke contrl,26:poke contrl+2,0:pok
e contrl+6,2:poke intin,3
190 poke intin+2,1:vdisys(1)
200 ri=peek(intout+2):gi=peek(intout+4):bi=peek(intout+6)
210 poke contrl,14:poke contrl+2,0:pok
e contrl+6,4:poke intin,3
220 poke intin+2,0:poke intin+4,0:poke
intin+6,1000:vdisys(1)
230 '--- PROGRAM INITIALIZATION ---
240 coorx=605:coory=40*mody:coorx1=3:c
oory1=22*mody:cellh=8
250 a#=gb:gintout=peek(a#+12):gintin=p
eek(a#+8)
260 dim vvl(13),vpl(8),hpl(2),mhl(26),
mvl(58),vld(26),vc(3),vn(3),vo(3)
```

```
270 dim nvl(8),pc(8),pc1(8),pf(8),pf1(8),pvo1(6),pvo2(8),pvn1(6),pvn2(12)
280 dim cvl(4),nc(3),en1(24),ev1(3),ev
2(3),ev3(3)
290 for x=1 to 26:read mhl(x):next x:m
v1(1)=132:mv1(2)=123
300 for x=1 to 26:read vld(x):next x
310 read nhl:for x=1 to 8:read nvl(x):
next x
320 for x=0 to 23:read en1(x):next x
330 for x=1 to 8:read pc(x),pf(x):next
340
       for x=1 to 4:read cvl(x):next x
'----- DRAW SCREEN -----
fullw 2:clearw 2
350
360
370
       gosub DOHEADER:wm=2:gosub WRITEHEA
DER
380 x1=50:x2=80:x3=2:x4=1:gosub DOVBAR
390 wm=4:gosub SETWRITEMODE:gosub DOOF
F:WM=2:gosub SETWRITEMODE
400 x2=6:gosub DOVBARTEXT
410 x3=6:x4=1:mv=3:gosub DOVBARNUM
420
       gosub DONOISE
430 gosub DOPERIOD
440 gosub DOCONTR
450 gosub DOSHAPE
       gosub DOCONTROLS
       color 1,1,1:gotoxy 47,13*mody:?"BA
460
SIC CODE";
470 gosub DOLINES
470 gosub DULINES
480 wm=1:gosub SETWRITEMODE
490 '---- MAIN PROGRAM LOOP -----
500 poke gintin,257:gemsys(78)
505 poke systab+24,1
510 while mkey <> 2:gemsys(79)
520 mx=peek(gintout+2):my=peek(gintout
+4):mkey=peek(gintout+6)
530 if mkey=1 then gosub CHECKKEY
540 wend
545 poke systab+24,0
550 poke gintin,256:gemsys(78):clearw
560 poke contrl,14:poke contrl+2,0:pok
e contrl+6,4:poke intin,3
570 poke intin+2,ri:poke intin+4,gi:po
ke intin+6,bi:vdisys(1)
580 clear:end
600 CHECKKEY:
       gosub CHECKMOUSEHLOC
610
620 if hc1=14 then return
630 if hc1=16 and hc2=1 then 650
640 sound 1,0,5,7,0:wave 1,1,1,256,0
650 gosub DOPARAMETERS
660 gosub DOCHANGE
670 gosub DOBASICCODE
680 return
700 DOHEADER:
710 poke contrl,23:poke contrl+2,0:pok
e contrl+6,1:poke intin,2:vdisys(1)
720 poke contrl,24:poke contrl+2,0:pok
e contrl+6,1:poke intin,5:vdisys(1)
730 poke contrl,25:poke contrl+2,0:pok
e contrl+6,1:poke intin,filcol1:vdisys
(1)
740 poke contrl,11:poke contrl+2,2:pok
e contrl+6,0:poke contrl+10,9
750 poke ptsin,coorx:poke ptsin+2,coor
y:poke ptsin+4,coorx1
760 poke ptsin+6,coory1:vdisys(1):retu
780 WRITEHEADER:
790 gosub SETWRITEMODE
800 poke contrl,12:poke contrl+2,1:pok
e contrl+6,0
810 poke ptsin,0:poke ptsin+2,10:vdisy
820 poke contrl,106:poke contrl+2,0:po
ke contrl+6.1:poke intin.5:vdisys(1)
```

830 color 1,1,1 840 read tnum,x,y:poke contrl,8:poke contrl+2,1:poke contrl+6,tnum 850 for tx=0 to tnum-1:read ascii:poke intin+(tx*2),ascii:next tx 860 poke ptsin,x:poke ptsin+2,y:vdisys (1)870 poke contrl,12:poke contrl+2,1:pok e contrl+6,0 880 poke ptsin,0:poke ptsin+2,6:vdisys 890 poke contrl,106:poke contrl+2,0:poke contrl+6,1:poke intin,0:vdisys(1) 900 return 920 DOVBARS: 930 poke contrl,23:poke contrl+2,0:pok e contrl+6,1:poke intin,0:vdisys(1) 940 bary=122*mody:bary1=50*mody 950 for x=x1 to (x2*x3)+x1 step x2 960 poke contrl,11:poke contrl+2,2:pok e contrl+6,0:poke contrl+10,1 970 poke ptsin,x:poke ptsin+2,bary:pok e ptsin+4,x-15:poke ptsin+6,bary1 980 vdisys(1) 980 vdisys(1) 990 poke ptsin,x+15:poke ptsin+2,bary: poke ptsin+4,x:poke ptsin+6,bary1 1000 vdisys(1):if x4=1 then gosub OFFB OX 1010 next x:return 1020 OFFBOX: 1030 poke ptsin,x+15:poke ptsin+2,bary +(10*mody) 1040 poke ptsin+4,x-15:poke ptsin+6,ba 1050 vdisys(1) 1060 return 1080 DOVBARTEXT: 1000 DOVDHRIEAT: 1090 DOVDHRIEAT: 1090 gotoxy 3,2*mody:?"VOICE 1":gotoxy 12,2*mody:?"VOICE 2" 1100 gotoxy 21,2*mody:?"VOICE 3" 1110 DOVTEXT: 1120 poke contrl,8:poke contrl+2,1:pok e contrl+6,1 1130 color filcol,1,1:for tx=1 to x2 1140 read tnum:read x:for x1=1 to tnum :read ascii 1150 poke intin,ascii:poke ptsin,x:pok e ptsin+2,bary1+(cellh*x1) 1160 vdisys(1):next x1,tx:color 1,1,1: return 1180 DOVBARNUM:color filcol1,1,1 1190 poke contrl,12:poke contrl+2,1:po ke contrl+6,2:poke ptsin,0 1200 poke ptsin+2,4:vdisys(1):cellh=pe ek(ptsout+6) 1210 Poke contrl,8:poke contrl+2,1 1220 for x2=1 to x3:tnum=1:read x1,x:g osub SAVEHLOC 1230 for tx=0 to x1-1:read ascii:if tx >=9 then tnum=2 1240 poke contrl+6,tnum:poke intin,asc 1250 if tnum=2 then read ascii:poke in tin+2,ascii 1260 poke ptsin,x:poke ptsin+2,bary-(c ellh*tx) 1270 vdisys(1):if x2=2 then gosub SAVE VLOC 1280 next tx,x2 1290 poke contrl,12:poke contrl+2,1:po ke contrl+6,0 1300 poke ptsin,0:poke ptsin+2,6:vdisy 1319 cellh=8:color 1,1,1:return 1330 DONOISE:mod1=10:x4=2 1340 gotoxy 30,2*mody:?"APPLY NOISE":c 0lor filcol,1,1 1350 gotoxy 30,3*mody:?"VOICE":color 1

,1,1 1360 read x:for x1=1 to 8:poke contrl, 1370 poke contrl+2,1:read tnum:poke co ntrl+6, tnum 1380 for tx=0 to tnum-1:read ascii:pok e intin+(tx*2),ascii:next tx 1390 poke ptsin,x:poke ptsin+2,bary1+(cellh*x1)+mod1:vdisys(1) 1400 poke contrl,11:poke contrl+2,2:po ke contrl+6,0:poke contrl+10,1 1410 poke ptsin,x+80:poke ptsin+2,bary 1+(cellh*x1)+mod1 1420 gosub SAVEVLOC 1430 poke ptsin+4,x+50:poke ptsin+6,(b ary1+(cellh*x1))+(mod1-7):vdisys(1) 1440 next x1:x=nhl:npl=8:ascii=8:tnum= 1450 y=nvl(npl):gosub MAKECHANGE:retur 1470 DOLINES: 1480 poke contrl,16:poke contrl+2,1:po ke contrl+6,0:poke ptsin,6 1490 poke ptsin+2,0:vdisys(1) 1500 linef coorx1,112,coorx,112:linef 450,29,605,29 450,27,005,27 1510 poke ptsin,3:vdisys(1) 1520 linef 90,coory1-3,90,112:linef 17 0,coory1-3,170,112 1530 linef 255,coory1-3,255,112:linef 365,coory1-3,365,112 1540 linef 450,coory1-3,450,112:linef 332,112,332,190 1550 linef 332,126,605,126 1560 poke ptsin,1:vdisus(1):return 1560 poke ptsiń,1:vdisýs(1):return 1580 DOPERIOD: 1590 gotoxy 43,2*mody:?"PERIOD" 1600 x1=412:x2=1:x3=0:x4=0:gosub DOVBA R5 1610 x2=2:gosub DOVTEXT 1620 x3=2:x4=3:gosub DOVBARNUM 1630 return 1650 DOCONTROLS: 1660 gotoxy 55,2*mody:?"CONTROLS" 1670 poke contrl,23:poke contrl+2,0:poke contrl+6,1:poke intin,2:vdisys(1) ne contrito,1:poke intin,2:vd15y5(1)
1680 poke contrl,24:poke contrl+2,0:po
ke contrl+6,1:poke intin,4:vdisy5(1)
1690 poke contrl,25:poke contrl+2,0:po
ke contrl+6,1:poke intin,filcol1
1700 vdisy5(1)
1710 poke contrl 114:poke contrl+2,2:poke 1710 poke contrl,114:poke contrl+2,2:p oke contrl+6,0:poke ptsin,605
1720 poke ptsin+2,132*mody:poke ptsin+
4,453:poke ptsin+6,52*mody:vdisys(1)
1730 poke contrl,23:poke contrl+2,0:poke contrl+6,1:poke intin,1:vdisys(1) 1740 poke contrl,11:poke contrl+2,2:poke contrl+6,0:poke contrl+10,9 1750 x1=68*mody:x2=0:x3=18*mody:x4=4:x 1760 for y1=x1 to x1+(x3*3) step x3:x2 =x2+1

1770 poke ptsin,595:poke ptsin+2,y1:poke ptsin+4,460:poke ptsin+6,y1-10

1780 vdisys(1):gosub 5AVEVLOC:next y1
1790 a\$(1)="50UND ON":a\$(2)="50UND OFF":a\$(3)="RESET VOICE":a\$(4)="QUIT"

1800 color 0,1,1:x1=55:for x=0 to 3:if x=3 then x1=57

1810 if x=2 then x1=54
1820 gotoxy x1,(4*mody)+(x*2):?a\$(x+1):next x:color 1,1,1:return

1840 DOSHAPE:
1850 x4=5:gotoxy 4,13*mody:?"ENVELOPE SHAPE/CYCLE"

1860 poke contrl,11:poke contrl+2.2:po =x2+1 1860 poke contrl,11:poke contrl+2,2:po ke contrl+6,0:poke contrl+10,1

ST Sound Waves continued

1870 read x:for tx=1 to x:read x1,y1:x 2=x1-100:y2=y1-10*mody:y1=y1*mody 1880 Poke Ptsin,x1:poke ptsin+2,y1:pok e ptsin+4,x2:poke ptsin+6,y2 1890 vdisys(1):if tx>6 then gosub SAVE VLOC 1900 next tx 1910 poke contrl,6:poke contrl+6,0 1920 color 1,1,0:read tnum:for tx1=1 t o thum 1930 gosub MAKESHAPE 1940 next tx1:return 1960 DOBASICCODE: 1768 DOBASICCODE:
1978 gotoxy 40,14*mody:?"SOUND 1,0,"vn
(1)","vo(1)",0
1980 gotoxy 40,15*mody:?"SOUND 2,0,"vn
(2)","vo(2)",0
1990 gotoxy 40,16*mody:?"SOUND 3,0,"vn
(3)","vo(3)",0
2000 gotoxy 40,17*mody:?"WAVE "en","ev
","Sh","pd",0
2010 return 2010 return 2030 CHECKMOUSEHLOC: 2040 MC=0:hC=1:hC1=1:hCt=20 2050 if my>137 then hc=21:hc1=11:hct=2 2060 while mc=0 2070 if mx >= mhl(hc) and mx <= mhl(hc +1) then MC=1 2080 if Mc=0 then hc1=hc1+1 2090 hc=hc+2:if hc>hct then mc=1 2100 wend:if hc1>10 and hct=20 then hc 1=14 2110 if hc1 <=6 then hc2=0 else hc2=1 2130 CHECKMOUSEVLOC: 2140 if hc1=14 then hc2=-1:return 2150 mc=0:mc1=0:hc=vld((hc1*2)-1):hct= v1d(hc1*2) 2160 while Mc=0 2170 if My <=Mvl(hc) and My >= Mvl(hc +1) then Mc=1:Mc1=1 2180 if Mc=0 then hc2=hc2+1 2190 hc=hc+2:if hc>hct then mc=1 2200 wend: if Mc1=0 then hc1=14:hc2=-1 2210 return 2230 DOPARAMETERS: 2240 if hc1 < 7 then gosub SETSOUND 2250 if hc1=7 then gosub SETNOISE 2260 if hc1=8 or hc1=9 then gosub SETP ERIOD 2270 if hc1=10 then gosub SETCONTROLS 2280 if hc1>10 then gosub SETSHAPE 2290 return 2310 DOCHANGE: 2315 Poke gintin,256:gemsys(78) 2320 if hc1<7 then gosub CHANGEVOICE 2330 if hc1=7 then gosub CHANGENOISE 2340 if hc1=8 or hc1=9 then gosub CHAN **GEPERIOD** 2350 if hc1=10 then gosub CHANGECONTRO 2360 if hc1>10 then gosub CHANGESHAPE 2365 poke gintin,257:gemsys(78) 2370 return 2390 SETSOUND: 2400 on hc1 goto 2410,2440,2470,2500,2 530,2560 2410 if hc2=0 then vc(1)=0:vn(1)=0:vo(1)=0:ev1(1)=0:goto 2580 17=0:ev1(1)=0:goto 2580 2420 vc(1)=1:vo(1)=hc2:ev1(1)=1:if vn(1)=0 then vn(1)=1 2430 goto 2580 2440 if hc2=0 then vc(1)=0:vn(1)=0:vo(1)=0:ev1(1)=0:goto 2580 2450 vc(1)=1:vn(1)=hc2:ev1(1)=1:if vo(1)=0 then vo(1)=1 2460 goto 2580

2470 if hc2=0 then vc(2)=0:vn(2)=0:vo(2)=0:ev1(2)=0:goto 2580 2480 vc(2)=2:vo(2)=hc2:ev1(2)=1:if vn(2)=0 then vn(2)=1 2490 ento 2580 2490 goto 2580 2500 if hc2=0 then vc(2)=0:vn(2)=0:vo(2)=0:ev1(2)=0:goto 2580 2510 vc(2)=2:vn(2)=hc2:ev1(2)=1:if vo(2)=0 then vo(2)=1 2520 goto 2580 2530 if hc2=0 then vc(3)=0:vn(3)=0:vo(3)=0:ev1(3)=0:goto 2580 2540 vc(3)=0:goto 2580 2540 vc(3)=4:vo(3)=hc2:ev1(3)=1:if vn(3)=0 then vn(3)=1 2550 goto 2580 2560 if hc2=0 then vc(3)=0:vn(3)=0:vo(3)=0:ev1(3)=0:goto 2580 2570 vc(3)=4:vn(3)=hc2:ev1(3)=1:if vo(3)=0 then vo(3)=1 2580 en=vc(1)+vc(2)+vc(3)+nc(1)+nc(2)+ nc (3) 2590 gosub ENABLEENV:return 2610 SETNOISE: 2620 e=(hc2-1)*3:for x=0 to 2 2630 nc(x+1)=en1(x+e):if nc(x+1)>0 the n ev2(x+1)=1 else ev2(x+1)=0 2640 next x:en=vc(1)+vc(2)+vc(3)+nc(1) +nc (2) +nc (3) 2650 gosub ENABLEENV:return 2670 SETPERIOD: 2680 on (hc1-7) goto 2690,2720 2690 if pc1(hc2)=0 then pd=pd+pc(hc2): pc1(hc2)=1:goto 2710 2700 if pc1(hc2)=1 then pd=pd-pc(hc2): pc1(hc2)=0 2710 goto 2740 2720 if pf1(hc2)=0 then pd=pd+pf(hc2): pf1(hc2)=1:goto 2740 2730 if pf1(hc2)=1 then pd=pd-pf(hc2): pf1(hc2)=0 2740 if pd(0 then pd=0 2750 return 2770 SETCONTROLS: 2770 SETCONTROLS:
2780 on hc2 goto 2790,2840,2860,2980
2790 sound 1,0,vn(1),vo(1),0
2800 sound 2,0,vn(2),vo(2),0
2810 sound 3,0,vn(3),vo(3),0
2820 wave en,ev,sh,pd,0
2830 goto 2990
2840 for sx=1 to 3:sound sx,0,0,0,0:ne xt sx xt sx 2850 wave 0,0,0,0,0;goto 2990 2860 poke gintin,256;gemsys(78) 2865 gosub CHANGECONTROLS 2870 hc2=0;for hc1=2 to 6 step 2:gosub CHANGEVOICE:next hc1 2880 hc2=8:gosub CHANGENOISE 2890 restore 5220:x3=2:x4=3:gosub DOVB ARNUM 2900 sh3=1:gosub CHANGESHAPE 2910 for x=1 to 3:vc(x)=0:vn(x)=0:vo(x)=0:ev1(x)=0 2920 ev2(x)=0:ev3(x)=0:nc(x)=0:next x 2930 for x=1 to 8:pc1(x)=0:pf1(x)=0:pv 02(x)=0:next x 2940 for x=1 to 6:pv01(x)=0:pvn1(x)=0: next x 2950 for x=1 to 12:pvn2(x)=0:next x 2960 en=0:ev=0:pd=0:sh=0:sh1=0:sh2=0:s h3=0:np1=0 2965 Poke gintin,257:gemsys(78) 2970 goto 2990 2980 mkey=2 2990 return 3010 SETSHAPE: 3020 on (hc1-10) goto 3030,3050,3060 3030 sh1=hc2:if hc2=1 then sh=1 else i

```
f hc2=2 then sh=4 else sh=8
 3040 goto 3070
3050 sh=hc2+8:sh1=hc2+3:goto 3070
 3060 sh=hc2+11:sh1=hc2+6
 3070 return
 3090 ENABLEENU:
 3100 if (ev1(1)+ev2(1))>0 then ev3(1)=
1 else ev3(1)=0
3110 if (ev1(2)+ev2(2))>0 then ev3(2)=
2 else ev3(2)=0
3120 if (ev1(3)+ev2(3))>0 then ev3(3)=
    else ev3(3)=0
3130 ev=ev3(1)+ev3(2)+ev3(3):return
3150 CHANGEVOICE:px=0
3160 on hc1 goto 3170,3250,3340,3420,3
510,3590
 3170 if pvo2(1)=0 then wm=1:cl=1
3180 sx=38:gosub SETOFF:if pvo2(1)=0 t
 hen goto 3230
3190 if px=1 then px=2;hc1=hc1-1
3200 x=hvl(pvo1(1));y=vvl(pvo2(1));asc
ii=pvo2(1)+48:tnum=1;c1=filcol1;wm=1
 3210 gosub SETMODE:gosub MAKECHANGE
3220 if px=2 then px=0:hc1=hc1+1:goto
 3670
3230 pvo1(1)=hc1:pvo2(1)=hc2:if hc2=0
then px=1:goto 3270
3240 goto 3670
3250 if pvn2(1)=0 then wm=1:cl=1
3260 sx=38:gosub SETOFF:if pvn2(1)=0 t
hen goto 3320
hen goto 3320
3270 if px=1 then px=2:hc1=hc1+1
3280 x=hv1(pvn1(1)):y=vv1(pvn2(1)):asc
ii=pvn2(1)+48:tnum=1:c1=filcol1:wm=1
3290 if pvn2(1)>9 then tnum=2:ascii=49
:ascii1=38+pvn2(1)
3300 gosub SETMODE:gosub MAKECHANGE
 3310
          if px=2 then px=0:hc1=hc1-1:goto
 3670
3320 pvn1(1)=hc1:pvn2(1)=hc2:if hc2=0
then px=1:goto 3190
3330 goto 3670
3340 if pvo2(2)=0 then wm=1:c1=1
3350 sx=118:gosub SETOFF:if pvo2(2)=0
then goto 3400
3360 if px=1 then px=2:hc1=hc1-1
3370 x=hv1(pvo1(2));y=vv1(pvo2(2));asc
ii=pvo2(2)+48:tnum=1:cl=filcol1:wm=1
3380 gosub SETMODE:gosub MAKECHANGE
3390 if px=2 then px=0:hc1=hc1+1:goto
3670
3400 pvo1(2)=hc1:pvo2(2)=hc2:if hc2=0
then px=1:goto 3440
3410 goto 3670
3420 if pvn2(2)=0 then wm=1:c1=1
3430 sx=118:gosub SETOFF:if pvn2(2)=0 then goto 3490
3440 if px=1 then px=2:hc1=hc1+1
3450 x=hv1(pvn1(2)):y=vv1(pvn2(2)):asc
ii=pvn2(2)+48:tnum=1:c1=filcol1:wm=1
3460 if pvn2(2)>9 then tnum=2:ascii=49
:ascii1=38+pvn2(2)
3470 gosub SETMODE:gosub MAKECHANGE
3480 if px=2 then px=0:hc1=hc1-1:goto
3670
3490
         PVN1(2)=hc1:pvn2(2)=hc2:if hc2=0
then px=1:goto 3360
3500 goto 3670
3510 if pvo2(3)=0 then wm=1:cl=1
3520 sx=198:gosub SETOFF:if pvo2(3)=0
then goto 3570
3530 if px=1 then px=2:hc1=hc1-1
3540 x=hv1(pvo1(3)):y=vv1(pvo2(3)):asc
ii=pvo2(3)+48:tnum=1:cl=filcol1:wm=1
3550 gosub SETMODE:gosub MAKECHANGE
3560 if px=2 then px=0:hc1=hc1+1:goto
3670
```

4xFORTH "... offers the best support and documentation."

4xFORTH "... gives the user the least agony and smoothest operation."

4xFORTH "... the only language in the

"... the only language in the world that could claim to be fully expandable."

ST Applications, Jan., 1986

4xFORTH for the Atari ST

4xFORTH™ Level 1 \$99.95 Based on the 83 Forth Standard.

4xFORTH Level 2 \$149.95 Level 1 plus floating point mathematics and GEM.

Also Available

ST Coloring Book™, The Sampler \$34.95 Two diskettes of Neochrome clip art, The Sampler is a preview of future Coloring Books.



The Dragon Group, Inc. 148 Poca Fork Rd, Elkview, WV 25071 304/965-5517, TLX 5106012426

Atari 520 ST & Neochrome are trademarks of Atari Corp. 4xFDRTH, Forth Accelerator, & ST Coloring Book are trademarks of The Dragon Group, Inc.

CIRCLE #126 ON READER SERVICE CARD



MegaSoft LTD is the largest publisher of Commodore utilities in the U.S. and is currently expanding its lineup. We are looking for different and unusual utilities for the Atari system to be marketed on a national bases. Types of programs wanted would include copy utilities, printer goodies, bulletin boards, terminal packages, machine language helpers, and other unusual utilities. At this time ST software is preferred, however all submissions will receive an accurate evaluation. MegaSoft is interested in either an outright purchase or a royalty type based sale.

Thank you to first the first of

Robert G. Scheffler Software Development

MegaSoft

(206) 687-7176

P.O. Box 1080 Battle Ground, WA 98604 CIRCLE #127 ON READER SERVICE CARD

ST Sound Waves continued

3570 pvo1(3)=hc1:pvo2(3)=hc2:if hc2=0
then px=1:goto 3610
3580 goto 3670
3590 if pvn2(3)=0 then wm=1:cl=1
3600 sx=198:gosub SETOFF:if pvn2(3)=0
then goto 3660
3610 if px=1 then px=2:hc1=hc1+1
3620 x=hv1(pvn1(3)):y=vv1(pvn2(3)):asc
ii=pvn2(3)+48:tnum=1:cl=filcol1:wm=1
3630 if pvn2(3)>9 then tnum=2:ascii=49
:ascii1=38+pvn2(3)
3640 gosub SETMODE:gosub MAKECHANGE
3650 if px=2 then px=0:hc1=hc1-1:goto 3670 3670
3660 pvn1(3)=hc1:pvn2(3)=hc2:if hc2=0
then px=1:goto 3530
3670 if hc2=0 then wm=4:cl=filcol:gosu
b 5ETOFF:goto 3710
3680 x=hv1(hc1):y=vv1(hc2):ascii=hc2+4
8:tnum=1:cl=filcol:wm=4
3690 if hc2>9 then tnum=2:ascii=49:asc
ii1=38+hc2
3780 gosub SETMODE:gosub MAKECHANGE ii1=38+hc2
3700 gosub SETMODE:gosub MAKECHANGE
3710 cl=1:wm=1:gosub SETMODE:return
3730 SETOFF:
3740 gosub SETMRITEMODE:color cl,1,1
3750 poke contrl,8:poke contrl+2,1:pok
e contrl+6,3
3760 poke intin,79:poke intin+2,70:pok
e intin+4,70
3770 poke ptsin,sx:poke ptsin+2,bary+(
10*Mody)-2
3780 vdisys(1):return 10*Mody)-2
3780 vdisys(1):return
3880 MAKECHANGE:
3810 poke contrl,12:poke contrl+2,1:poke contrl+6,2:poke ptsin,0
3820 poke ptsin+2,4:vdisys(1):poke contrl,8:poke contrl+2,1
3830 poke contrl+2,1
3830 poke contrl+6,tnum:poke intin,ascii:if tnum=2 then poke intin+2,ascii1
3840 poke ptsin,x:poke ptsin+2,y:vdisys(1) 3850 poke contrl,12:poke contrl+2,1:po ke contrl+6,0 3860 poke ptsin,0:poke ptsin+2,6:vdisy 5(1):return 3880 CHANGENOISE: 3890 wm=1:cl=1:x=nhl:tnum=1:ascii=0:go sub SETMODE 3900 y=nvl(npl):gosub MAKECHANGE 3910 ascii=8:y=nvl(hc2):gosub MAKECHAN GE 3920 npl=hc2:return 3940 CHANGEPERIOD: 3950 on (hc1-7) goto 3960,3980 3960 if pc1(hc2)=0 then wm=1:cl=filcol 1 else wm=4:cl=filcol 3970 goto 3990 3980 if pf1(hc2)=0 then wm=1:cl=filcol 1 else wm=4:cl=filcol 3990 ascii=hc2+48:tnum=1:x=hp1(hc1-7): 1 else wm=4:cl=filcol
3990 ascii=hc2+48:tnum=1:x=hpl(hc1-7):
y=vpl(hc2)
4000 gosub SETMODE:gosub MAKECHANGE:cl
=1:wm=1:gosub SETMODE:return
4020 CHANGECONTROLS:
4030 wm=2:gosub SETMRITEMODE
4040 if cpl=0 then 4060
4050 color 0,1,1:gotoxy cvl(cpl), (4*mo
dy)+((cpl-1)*2):?a\$(cpl) 4060 color filcol,1,1:gotoxy cvl(hc2), (4*mody)+((hc2-1)*2):?a\$(hc2) 4070 cpl=hc2:wm=1:cl=1:gosub 5ETMODE:r eturn
4090 CHANGESHAPE:
4100 wm=2:gosub SETWRITEMODE
4110 cl=0:if sh2=0 then 4250
4120 on sh2 goto 4130,4140,4150,4160,4
170,4180,4190,4200,4210,4220
4130 restore 5310:goto 4230
4140 restore 5350:goto 4230
4150 restore 5350:goto 4230
4160 restore 5400:goto 4230
4170 restore 5420:goto 4230 eturn

4180 restore 5450:goto 4230 4190 restore 5470:goto 4230 4200 restore 5520:goto 4230 4210 restore 5540:goto 4230 4220 restore 5570 4230 color 1,1,cl:gosub MAKESHAPE 4240 if sh3=1 then sh3=0:goto 4260 4250 sh2=sh1:sh3=1:cl=filcol:goto 4120 4260 color 1,1,1:cl=1:wm=1:gosub SETMO DE:return 4280 MAKESHAPE: 4290 poke contrl,6:poke contrl+6,0 4300 read x:poke contrl+2,x*2 4310 for tx=8 to (x*4)-1 step 2:read x 1,y1:y1=y1*mody
4320 poke ptsin+(tx*2),x1:poke ptsin+(
(tx*2)+2),y1:next tx
4330 ydisys(1):return
4350 SETHRITEMODE:
4360 poke contrl,32:poke contrl+2,0:po
ke contrl+6,1:poke intin,wm:vdisys(1)
4370 return
4390 DOOFF:
4400 color filcol,1,1
4410 read tnum:poke contrl,8:poke cont
rl+2,1:poke contrl+6,tnum
4420 for tx=0 to tnum-1:read ascii
4430 poke intin+(tx*2),ascii:next tx
4440 for tx=1 to tnum:read x
4450 poke ptsin,x:poke ptsin+2,bary+(1
0*mody)-2 1, y1: y1=y1*mody 0*mody)-2 4460 vdisys(1):next tx:color 1,1,1:ret urn 4480 SAVEHLOC: 4490 on x4 goto 4500,4520,4510,4520,45 20 4500 hvl(x2)=x:goto 4520 4510 hpl(x2)=x:goto 4520 4520 return 4540 5AVEVLOC: 4550 on x4 goto 4560,4580,4600,4610,46 4560 vvl(tx+1)=bary-(cellh*tx):mvl(mv)
=vvl(tx+1):mvl(mv+1)=vvl(tx+1)-5 4570 mv=mv+2:goto 4630 4580 mv1(mv+1)=bary1+(cellh*x1)+(mod1-7):mv1(mv)=bary1+(cellh*x1)+mod1 4590 mv=mv+2:goto 4630 4600 vp1(tx+1)=bary-(cellh*tx):goto 46 4610 NVI(NV+1)=y1-10:MVI(NV)=y1:MV=MV+
2:goto 4630
4620 NVI(MV+1)=y2:MVI(MV)=y1:MV=MV+
2:4630 return
4650 SETMODE:
4660 color 1,1,1:gosub SETMRITEMODE:co
1or cl,1,1:return
4680 MORKDATA:
4700 data 35,50,51,65,115,130,131,145,
195,210,211,225
4710 data 320,350
4720 data 320,350
4720 data 397,412,413,427
4730 data 460,595
4740 data 18,118,123,223,228,328
4750 data 1,18,1,26,1,18,1,26,1,18,1,2
6,27,42,3,18,3,18,43,50
4760 data 53,58,53,58,51,58
4770 data 333,66,74,82,90,98,106,114,1 30 22
4790 data 8,0,0,0,16,0,0,32,8,16,0,8,0,32,0,16,32,8,16,32,8,16,32,0,0,0
4800 data 256,1,512,2,1024,4,2048,8,40
96,16,8192,32,16384,64,32768,128
4810 data 55,55,54,57
4830 data 31,100,35,53,32,50,32,79,32,83,32,84,32,32,83,32,79
4840 data 32,85,32,78,32,68,32,32,87,3
2,65,32,86,32,69,32,83
4860 data 3,79,70,70,38,118,198
4880 data 6,23,79,67,84,65,86,69
4900 data 4,70,84,79,78,69
4920 data 6,104,79,67,84,65,86,69
4940 data 4,149,84,79,78,69

4960 data 6,184,79,67,84,65,86,69 4980 data 4,229,84,79,78,69 5000 data 8,39,49,50,51,52,53,54,55,56 5020 data 12,52,49,50,51,52,53,54,55,5 6,57,49,48,49,49,49,50 5040 data 8,119,49,50,51,52,53,54,55,5 5060 data 12,132,49,50,51,52,53,54,55, 56,57,49,48,49,49,50 5080 data 8,199,49,50,51,52,53,54,55,5 6
5100 data 12,212,49,50,51,52,53,54,55,
56,57,49,48,49,49,50
5120 data 270,1,49,1,50,1,51,3,49,43,5
0,3,49,43,51,3,50,43,51
5140 data 5,49,43,50,43,51
5160 data 3,79,70,70
5180 data 6,387,67,79,65,82,83,69
5200 data 4,430,70,73,78,69
5220 data 8,401,49,50,51,52,53,54,55,5 5240 data 8,416,49,50,51,52,53,54,55,5 5260 data 10,118,160,118,172,118,184 5270 data 223,160,223,172,223,184 5280 data 328,148,328,160,328,172,328, 184 5300 data 10 5310 data 2,20,152,32,156,32,156,114,1 56 56
5330 data 3,20,170,32,164,32,164,32,17
0,32,170,114,170
5350 data 15,20,177,32,181,32,181,32,1
77,32,177,44,181,44,181,44,177
5360 data 44,177,56,181,56,181,56,177,56,177,68,177
5370 data 80,181,80,181,80,177,80,177,92,181,92,181,92,177,92,177,104,181
5380 data 104,181,104,177,104,177,114, 181 5400 data 2,125,152,137,156,137,156,21 9,156 5420 data 8,125,164,137,170,137,170,14 9,164,149,164,161,170,161,170,173,164 5430 data 173,164,185,170,185,170,197,164,197,164,209,170,209,170,219,164 5450 data 3,125,177,137,182,137,182,137,177,137,177,219,177 5470 data 15,231,145,241,141,241,141,241,145,241,145,241,145,241,145,241,145,241,145,241,145,241,145,241,145,241,145,241,145,265,141,361,145,340,141,313,141,313,141,313,141,313,141,313,141,313,141,313,141,313,141,313,141,313,141,313,141,313,141,313,145,313,145,313,145,313,145,313,141,313,141,313,141,313,145,313,145,313,145,313,145,323,141,313,141,3 5400 data 2,125,152,137,156,137,156,21 data 2,231,158,241,153,241,153,32 3,153 3,153 5540 data 8,231,170,241,164,241,164,25 3,170,253,170,265,164,265,164,277,170 5550 data 277,170,289,164,289,164,301, 170,301,170,313,164,313,164,323,170 5570 data 3,231,182,241,176,241,176,24 1,182,241,182,323,182

ST-CHECKSUM DATA.

(see page 58ST)

100 data 279,481,559,359,369,731,405,7
39,226,600,4748
200 data 698,208,863,531,781,925,304,3
92,421,953,6076
300 data 363,642,287,105,365,872,518,7
17,18,913,4800
400 data 377,482,331,395,841,315,803,3
43,744,191,4822
500 data 858,543,872,452,243,64,552,99
9,229,976,5788
580 data 615,613,338,89,693,936,995,36
1,766,364,5770
700 data 606,553,560,457,701,261,502,1

5020 data 53,774,27,2,27,57,777,302,329,801,3273
5220 data 973,983,649,349,248,273,24,4
07,869,356,5131
5370 data 357,186,356,544,377,48,567,3
68,353,693,3849
5520 data 332,553,329,985,2199

STylish Software

No question about it, the new Atari 520 ST[™] is a remarkable computer. And nothing complements a great computer better than great software and great peripherals.

HabaWriter[™]. A full-function word processor, featuring windows for simultaneous multiple document editing as well as pull-down menus for fast access to program commands. Advantageous use of the mouse means never having to memorize cryptic commands again. **HabaWriter** is the word processor your 520 ST has been waiting for. If you do any writing at all, take a look at **HabaWriter**. Suggested Retail: \$74.95

Habadex PhoneBook[™] is the elegant way to store phone numbers. And it not only stores numbers, but it can dial them as well. It works and looks just like the flip-up phone book that you're used to. Long distance services like MCI and Sprint can be automatically dialed so you don't have to. The PhoneBook can sort on any field, is versatile enough to handle other types of information and can even print mailing labels. (Automatic dialing requires either a HabaModem[™] or any Hayes[™] compatible modem.) Suggested Retail: \$49.95

The new **HabaDisk**[™] **10 Mega byte** hard disk for the 520 ST is a Winchester plug-in hard disk that is capable of storing the equivalent of more than 12 dual-sided 800K diskettes and retrieves information in seconds (3 msec. track-to-track access time). It is self-powered and completely Atari ST compatible (including Atari Desktop and GEM[™] DOS). Suggested Retail: \$699.95

Also available for the 520 ST:

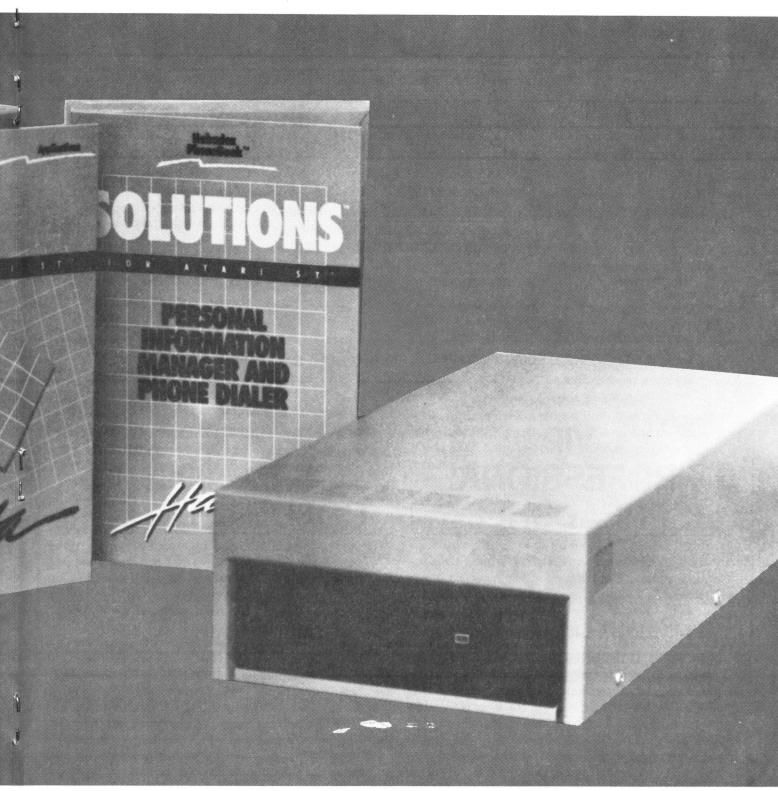
Haba Checkminder[™]—Suggested Retail: \$74.95 Haba Mail Room[™]—Suggested Retail: \$74.95 HabaMerge[™]—Suggested Retail: \$39.95

Solutions: Wills™—Suggested Retail: \$49.95

Solutions: Business Letters™—Suggested Retail: \$49.95



STupendous Storage



6711 Valjean Avenue

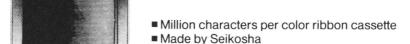
Van Nuys, CA 91406 (818) 989-5822 ● (800) HOT-HABA (USA) ● (800) FOR-HABA (CA)

HOW TO GET THE MOST OUT OF YOUR ATARI.

The powerful new Atari ST is capable of extraordinary color graphics. Right now, there is only one full size, commercially available color printer that can screen dump in over 120

colors off the Atari ST, and we've got it. The Shanner SPC 700Cl color printer. Other features include:

- Fast and quiet operation
- Uses standard paper—inexpensive to operate
- Centronics interface—compatible with many other computers



VIP Professional is our powerful new software for the Atari ST. Its program is identical in features and commands to Lotus 1-2-3 with Macros,

256 x 8092 columns, Data

Base capabilities with

Sort and Query Fields.

VIP Professional is a trademark of VIP Technologies, Lotus 1-2-3 is a trademark of Lotus Development Corporation. Atari ST is a trademark of Atari Corporation.



\$9990

SPC-700CI COLOR PRINTER

\$29995

Full-Blown Original Version

GUMBALL EXPRESS ORDER FORM • For FAST delivery use this order form or call TOLL FREE 800/423-9442

Product Description Price P&L TOTAL VIP Professional \$ 99.90 \$3.50 \$103.40 for Atari ST Shanner SPC-700CI \$299.95 \$7.50 \$307.45 ☐ Check here and add \$14.95 to \$399.95 All products will be shipped prepaid UPS ground. ☐ Check enclosed. (NOTE— order will be shipped when check clears).

Make check payable to:
Gumball Express
707 S.W. Washington Street Suite 200

Portland, Oregon 97205

☐ VISA ☐ MASTERCARD	☐ INTERBANK (MasterCard only)
Name on card	
SHIP TO:	
Name	
Address	
City	State Zip
COD's and purchase orders w	ill not be accepted by Gumball Express

C.O.D.'s and purchase orders will not be accepted by Gumball Express. Outside the USA add \$10. and make payment by bank draft, payable in U.S. dollars drawn on a U.S. bank.



by Clayton Walnum

Before we get started, I'd like to thank everyone who's sent me their comments on **C-manship**. When I first started this column, I was a little worried there might not be much interest. I'm pleased to report that all the feedback has been positive, so I feel this column has a secure future.

If you were thinking of writing, but haven't gotten around to it, please do. I want to hear from you. The only way I have of knowing that I'm on the right track is from the comments I receive from you, the readers.

While we're on this subject, I got one letter of particular interest from Donald Howes, who writes:

Don't use scanf()!...To make a long story short, scanf() can develop a life of its own. It will often present you with results completely at variance with what you might have expected. This is a problem for novice programmers especially. They might be a little unsure of what they're doing and could spend needless hours trying to debug a simple program, when the problem is inherent in scanf(). It's a much better idea to develop your own input routines...

So we've been warned. Keep that in mind during your experiments with C. As I said last month, we'll eventually construct our own input routines. But for now, we'll treat scanf() with suspicion.

Our current project.

Okay, fun's over. Let's get back to work. Listing 1 is this month's program. Type it in and compile it. If you need help, see the sidebar accompanying last issue's **C-manship** article.

Feeling lucky? Good. Get out all that green stuff that's been cluttering up your wallet and give Lady Luck a wink. This month, we're all going to learn how to play craps. (I know that was top priority on your things-I've-got-to-do-today list.)

Now I admit, this isn't the most stunning version that'll cross your eyeballs, but it's a good programming exercise and demonstrates a lot of new techniques.

If you already know the rules (that's where you've been all those late nights, huh?), skip ahead to the next section. For those who've led sheltered lives, craps is a dice game which has the dubious reputation for making and breaking many a fortune. In our case, we'll try to leave your savings intact—only the rules remain the same.

Step one is to roll the dice. If, on your first roll, you get a seven or an eleven, you win. A two, three or twelve, on the other hand, leaves you the loser. If you manage to avoid all lucky and unlucky combinations, you must roll again... and continue to do so, in an effort to attain one of two outcomes: if you reroll your original number, you win; if you get a seven or eleven first, you lose.

C-manship continued

The game's afoot (without toes).

Now that you know how to play, take a moment to try the program out. Have a little fun and get a general idea of what's going on.

Now let's take a look at the listing. You might want to number each line, so you can refer to them more easily as we go through the program. Remember, I don't count blank lines.

I don't think it's necessary to go through every line as we have in the past. I think you've had most of the basics pounded into your heads, right? Just notice that we've included a couple extra files (osbind.h and portab.h) this time around. You'll see why later on.

Let's skip ahead to Line 9. You've probably noticed that I usually use *ch* as a character variable. This time, I have it declared as an "int." Does that mean that I've abandoned our poor friend *ch* to a new and unknown fate? No, we're still going to use it to hold character information, because it just so happens that the only difference between a character variable and an integer is the number of bytes taken up in memory.

If you remember from a few months ago, a character is stored in 1 byte and an integer is in 2. For our purposes, the two are really interchangeable. What you should be aware of is that, in C, character variables are converted to integers for processing, then truncated back to a single byte.

By declaring them as integers in the first place, you'll always be reminded of what's going on in your machine's innards. And you may come across a time in your illustrious programming career where the difference will be critical.

Now skip ahead to Line 11. This is the beginning of the main game loop. You remember the "while" loop, right? The variable we're testing, play, was initialized to 1 (or true) in Line 10. As long as it retains this value, the game loop will repeat.

Notice that we aren't using the statement while (play = = 1). Any nonzero value is evaluated to true, therefore play = = 1 and play are really the same expression. The way to test for a false condition (0) is with the not operator: while (!play).

The game loop is another example of structured programming. Each major task of the program has been allotted to a function. First we roll the dice, then we check to see if the player won, lost, or has to roll again.

If the call to check_roll() leaves the variable win in its zero state, then the second while loop is executed. The dice are rolled until win changes to 1 (win) or -1 (lose).

The variable *win* is then tested in an "if" statement, and the appropriate message is relayed to the player. The percentage of games won is calculated, and the player is asked if he wishes to play again. If he answers with a *Y*, then play remains true and the game loop repeats. Otherwise, play becomes false, and the program returns you to the desktop.

Now the details. Start with Line 11. Here we initiate the main loop. As long as the expression in parentheses is true, the loop will repeat. Since we initialized play to 1, we enter the loop.

The first thing we have to do in the loop is initialize a couple more variables. This is important, since the values of first and roll are passed to the function that "rolls" our dice.

The variable first is used as a flag to indicate if it's the player's first roll. What roll we're on is important. For example, a seven on the first roll is a winner. A seven on the second roll is a loser. The variable roll will hold the value of the current roll (except the first one). Line 14 is to call the function roll_dice() and places the value returned in first_roll.

Line 15 calls check_roll() and places its return into win. In order to evaluate the player's roll, this function needs some information. We're passing the information by giving it the values of first, first_roll and roll.

Line 16 changes the flag first to its false condition. If the player neither won nor lost with his first roll, then the value of win will still be 0, and the second while loop, which begins on Line 17, will be performed.

See the win = 0? Why didn't I use the while (!win) construction as mentioned previously? There's really no reason, as far as the program goes. I used the former construction to make the program more readable. Using !win might make someone looking at the source code think that if win was 0 the player lost. This isn't true. A value of 0 means that the player hasn't won and he hasn't lost. It's a neutral state. If you want to use !win, go right ahead. It'll work just fine.

Line 19 calls roll_dice() a second time. This time, it assigns the value returned to the variable roll. We need this second variable, since we need to compare the first roll with all subsequent rolls.

Line 20 calls check_roll() again. If the value of win remains 0—meaning the player still hasn't either won or lost his turn—the loop repeats. Once the player has managed to make his roll—or has blown it, with a seven or eleven—we exit the loop.

PAGE 70ST / MAY 1986 ST-LOG

Line 22 will increment the game counter, num_games. We'll use this value to calculate the percentage of games won.

Lines 23 through 29 make up the body of an "if" statement. It uses the value contained in *win* to print the appropriate message to the player, as well as keep track of the number of wins.

If win is -1, the player has lost, and the program prints You lose—deep, huh? If win equals 1, the player has won the game, and a statement of equal profundity is printed (sigh).

Also, the counter *num_win* is incremented, keeping track of the number of games our lucky player has managed to be victorious in. We're also calling a new library function here, *puts()*. This function is going to print the string argument contained in the parentheses. The main difference between the two, puts() and printf(), is that the former has no formatting options.

Last month, we just touched on the format of the "if" statement. This month, we're going to look at some much more complex examples. The statement we're looking at now is a slight variation of the one we saw in the last installment. The difference is the addition of the *else* portion.

Thinking back, you'll remember that the body of an "if" statement is performed only when the expression in the parentheses is true. When you add the else, the rules change just a bit. You now have a kind of "either/or" condition. If the expression being tested is true, the statements following the *if* and preceding the *else* will be performed. If the expression tested is false, the statements associated with the *else* are performed.

The syntax rules for the else are the same as for the if. If the body of the else portion consists of more than one statement, you must enclose them in brackets, and—remember—each statement must end with a semicolon.

Line 30 calls the function percent()—which prints out the percentage of games won.

Line 31 calls the function play_again()—to find out if the player wishes to continue or quit.

Digging deeper.

Now that we've taken a look at the general scheme of things, we can get into the details of each function.

The function roll_dice() does exactly as its name implies. The first thing you should take note of is the way this function is declared. There's something extra here. See what it is? Up till now, our functions have been declared simply by the function name.

Now the key word *int* has been added in front of the name. This specifies that the value to be returned by the function will be an integer. In this case, we could have left it off, since the default is always an integer.

But, if we wanted to return some other data type from a function, we must declare the type in the function definition and in the calling function. For instance, if we wanted to return a character from a function named ret_char(), we would first declare the function type in the calling function like this:

Then the function declaration might look like this:

The variables *l* and *b* are the values being passed to the function, and are included here only to differentiate between the two examples.

Lines 36 through 39 declare some local variables, print a prompt, and wait for a key press.

Line 40 gets a random number and places it in d1. Random() is a function specific to the ST and is an extension of the BIOS (Basic Input/Output System). It returns a 24-bit random number.

In our case, we need an integer. Take a good look at Line 40. See the *int* in parentheses? This is a "cast operator." What we're doing is forcing the return of Random() into a 16-bit integer, rather than doing it implicitly through automatic conversion (just leaving the cast operator out). In this particular case, the statement would've worked either way, but sometimes the difference can be critical.

Look at these two code segments:

In the first example, the addition is performed, yielding a result of 11.2. Then, since the variable *i* is defined as an integer, the conversion from *float* to *int* is done automatically by trucation, making *i* equal to 11.

In the second example, 3.4 and 7.8 are converted to integers before the addition is performed. This yields a result of 10. Not quite the same answer.

Line 41 takes the value in d1 and converts it to a positive number between 1 and 6, using modulo arithmetic and the absolute value function.

The abs() function is defined in the stdio.h file. It

C-manship continued

looks and works exactly the way you've grown accustomed to in BASIC, returning the absolute value of a single argument.

The percent sign is the modulus operator. It is used only in integer arithmetic and yields the remainder when the number on the left is divided by the number on the right. For example, the expression 6 % 4 gives a result of 2.

So, in Line 41, we're taking the absolute value of d1 (in case we got a negative number from Random()), dividing it by six, then adding one to the re-

ler. Using six in the modulo math assures us always get a remainder less than six (zero rough five, to be exact). Adding one gives us our all of the die (one through six).

Lines 42 and 43 get a value for the second die in the same manner.

The function then prints out the value of each die, as well as the total. The total (t) is then passed back to main().

legent-

Regent Base

A Full Function Relational Database!

Regent Base's procedural language make it a natural for handling any of your small business needs. Modules are available for Invoicing, Accts. Receivable, Checkbook Balancing, General Ledger, etc.

Regent Base is a relational database written specifically for the Atari ST. Don't settle for simple clones of IBM products. Regent Base is easy to use and state-of-the-art!

7131 Owensmouth, Suite 45A Canoga Park, CA 91303 (818) 883-0951



CIRCLE #130 ON READER SERVICE CARD

Line 50 declares the function check_roll() as returning an integer. Three values are being passed to the function. Notice that the variables being passed (Line 15) and the variables that are accepting the values, have the same names. This is purely for reasons of clarity. They're still completely separate identities.

Now look at the body of the function. This is surely the most complex piece of code we've tackled yet. Basically, the whole thing is an "if" statement, but with layer upon layer. This function will give you great insight into the problems inherent in nested "if" statements.

Before we get too far into this function, I should introduce you to the *else if* construction. I mentioned previously that, with the "if…else" statement, we have an either/or situation. The *else if* takes this one step further, and allows us to add a test to the *else* portion of the statement. Look at this example:

if (exp1)
statement1;
else if (exp2)
statement2;
else
statement3;

If exp1 is true, statement1 will be executed and the elses ignored. If exp1 is false, then exp2 is tested. If we get a true result, statement2 is executed and the final else is ignored. Finally if both exp1 and exp2 are false, statement3 is executed.

In check_roll(), we're using the flag variable first to decide which set of "rules" apply to the player's roll. If it's his first roll, first will be equal to 1, and we'll go ahead and evaluate the second "if" statement, which checks to see if the roll was a seven or an eleven. If it was, the player wins. The flag wn is set to 1, and program execution continues at Line 66.

See those vertical bars in the middle of Line 57? That's the or operator. Line 57 reads: if first_roll equals seven or first_roll equals eleven. The or operator yields a true result if one or more of the expressions are true. Here are a couple of examples...If we assume that a equals 1, b equals 2, and c equals 3, then following expressions evaluate as shown:

a==1	11	b==6			TRUE
a==4	11	b==2			TRUE
a==1	11	b==2			TRUE
		b==5			FALSE
		b==3			TRUE
a==1	11	b==5	11	C == 3	TRUE
a==2	11	P==3	11	c==4	FALSE

Continuing with check_roll(), if the roll wasn't a seven or eleven, we evaluate the *else if* portion of the statement. Here we check for a 2, 3 or 12. If we find one of these values, the player loses.

The flag wn is set to -1, and, as in the first case, program execution continues at Line 66. If neither of the previous conditions are true, wn retains its initialized value of 0 (Line 54), and, once again, the program continues at Line 66—which returns the value of the flag to main().

Whew! All that's only if the player's on his first roll. If first is 0, program execution jumps to the "else if" statement on Line 62.

Before we continue, I'd like to see if I can help you avoid a good deal of teeth-knashing and hair-pulling in your future C programming. Look at those brackets on Lines 56 and 61. They're absolutely essential with nested "if" statements containing else constructions.

Without those brackets, the compiler has no way of knowing that the last two "else if" statements go with the outer "if" and not the inner. Keep in mind that the indenting is only cosmetic; it means absolutely nothing to the compiler. This is an easy trap to fall into, since the indenting makes everything so clear to the programmer.

Now let's take the second possible path in this function. If first is 0, all the stuff between the brackets is skipped, and we continue at Line 62. This line checks to see if the player's roll was equal to his first. If it was, wn is set to 1 (win), and its value is returned to main() at Line 66.

If the first condition isn't true, we drop down to test the second. Line 64 checks for a roll of seven or eleven. If it evaluates to true, wn is set to −1 (lose) and its value is returned at Line 66.

If none of the above conditions are met, the only thing that happens in this function is wn is set to 0 (Line 54) and its value is returned to main() (Line 66). The player has neither won nor lost, and must roll again. This process repeats until wn—and, subsequently, win—gets a nonzero value.

Moving on, Line 68 defines the function percent(). The word *VOID* in front of the function name indicates to the programmer that the function doesn't return a value. Like the *int*, it could've been left off.

VOID is defined in portab.h, which we included at the beginning of the program, and is really just an empty comment. In other words, even though we've declared percent() as VOID, it's still capable of returning an integer value. We're declaring it this way for the sake of clarity only.

This function does nothing more than calculate the percentage of games won and print the result out to the player. A few things should be said about Line 72, though.

First of all, in case it isn't obvious, the "/" (not to be confused with "\") is the division operator. The value on the left of the operator is divided by the value on the right.

You'll notice that the integer variables <code>num_win</code> and <code>num_games</code> are being cast to floating point. This is critical in this calculation. When you divide integers in C, you get an integer result; the decimal portion is truncated. If we allow this to happen with our percent calculation, we'll get two possible results, only one of which will be accurate. If we've won every game, then <code>num_win/num_games</code> will give us 1, which multiplied times <code>100</code> equals <code>100%</code>. Fine and dandy.

But what happens if we've only won one game out of two? In integer division, num_win/num_games will give a result less than 1. When the decimal portion is truncated, we'll end up with 0. And what's 0 times 100? It's certainly not 50%, the result we want.

Okay, we're almost done. Just one more function to take a look at. The function play_again() is responsible for finding out if the player wants to play another game. There's really nothing very new here. Something that we had a brief encounter with was the way we're using getchar() in Line 80. We could rewrite this line as follows:

One of the neat things about C is the way you can cram a lot of stuff on one line. Here, getchar() is called and its value is compared to the character Y. The variable ch now contains the value returned by getchar(), and it's compared to the character y.

If either of these compares finds a match, then the flag p is set to its true condition and returned into play, to be evaluated at Line 11. This way, the game repeats until the call to play_again() results in a 0.

Breathing time.

That's it—class dismissed. If any of the program is still fuzzy to you, study up on it, especially the function check_roll(). When you feel you've got it all down pat, try your hand at writing a simple game.

How about that classic guess-the-number game? It should be fairly easy. Have the computer pick a random number between 1 and 100. As the player tries to guess the number, have the computer tell him whether he's too high or too low.

As for me, C you later. (Sorry about that.)

(Listing begins on next page)

C-manship continued

```
#include (stdio.h)
#include (osbind.h)
#include (portab.h)
main()
      int first_roll, win, roll, play, first;
int num_win = 0;
int num_games = 0;
int ch;
      play = 1; win = 0;
while (play)
             {
first = 1;    roll = 0;
first_roll = roll_dice();
win = check_roll (first, first_roll, roll);
first = 0;
while (win == 0)
                   roll = roll_dice();
win = check_roll (first, first_roll, roll);
}
             ++num_games;
if (win == -1)
   puts("You lose. ");
else
{
                   ++num_win;
puts("You win! ");
             percent(num_games, num_win);
play = play_again();
int roll_dice()
      int d1,d2,t;
int ch;
      puts ("Press space bar to roll\n");
ch = getchar();
d1 = (int) Random();
d1 = abs(d1) X 6 + 1;
d2 = (int) Random();
d2 = abs(d2) X 6 + 1;
printf ("bie #1: Xd ", d1);
printf ("bie #2: Xd\n\n", d2);
t = d1 + d2;
printf ("Your roll: Xd\n\n", t);
return (t);
int check_roll(first, first_roll, roll)
int first, first_roll, roll;
      int wn;
      wn = 0;
if {first == 1)
             f (first_roll == 7 || first_roll == 11)
wn = 1;
else if (first_roll == 2 || first_roll == 3 || first_roll == 12)
wn = -1;
      else if (first_roll == roll)
wn = 1;
else if (roll == 7 || roll == 11)
wn = -1;
return (wn);
VOID percent (num_games, num_win) int num_games, num_win; {
       float pc;
       pc = ((float) num_win / (float) num_games) * 100.0;
printf ("You've won %d %% of the games\n", (int) pc);
 int play_again ()
       int p;
int ch;
      .

puts ("Play again? ");

if ((ch = getchar()) == 'Y' || ch == 'y')

p = 1;
else
       p = 0;
puts ("\n\n");
return(p);
```

Word Processing on the Atari 520ST

by Arthur Leyenberger

The 16-bit Atari ST has been available to the public for nine months now, and there's no denying its success. The reason for its popularity is largely due to the amount of software available for the machine.

There's no category of software more widely used than word processing programs, regardless of which computer we talk about. This applies to the Atari ST, as well. Fortunately, there are plenty of programs to choose from, as you'll soon discover.

The business of processing words is relatively straightforward on most computers. Sure, some programs offer a few more features here, or an easier-to-use command set there, but, for the most part, if you've seen one word processor, you've seen them all.

However, with the introduction of computers like the Apple Macintosh—and now the Atari ST with its GEM interface—the business of processing words has, at least potentially, been made easier.

There are five word processing programs for the ST, which can be categorized as either "text-based" or "GEM-based." Text-based programs function like about any other word processor on any computer; they display

only text on-screen. They typically require you to use commands or respond to menus, in order to edit, format and print your documents.

The GEM-based programs use the natural interface of the GEM desktop, with its icons, drop-down menus, windows and mouse control. The mouse may seem awkward at first. Some people claim that, since using a mouse requires that your hand leave the keyboard, it takes more time to use the mouse than it saves.

However, with a well-designed set of commands, a word processor that allows use of a mouse can be easier than a text-based program. After a couple hours of mousing around, most users find that they're accustomed to manipulating the mouse—it eventually becomes quite natural.

Text-based word processors.

ST-Writer — In the beginning, Atari said, "Let there be an ST." And there was, and it was good. Then the users said, "Let there be a word processor for the ST." And there wasn't, and it was bad. Then Atari scrambled; ST-Writer was the result—the first word processor for the ST computer.

ST-Writer is an all-text word processor, based primarily on the highly-rated AtariWriter for the 8-bit computers. AtariWriter has been around for a cou-

ple years now and has proven itself with many 8-bit owners. Anyone familiar with the program will find **ST-Writer** easy to slip into, comfortable as an old pair of slippers.

Instead of using the START, SELECT and OPTION keys of its predecessor, ST-Writer takes advantage of the ten function keys located across the top of the keyboard. The ESC, CTRL and ALTERNATE keys are also used, either individually or in conjunction with one of the function keys. Of course, the major difference is the eighty columns of text across your RGB or monochrome monitor screen.

On a color monitor, the control codes (used for special printer codes, end of paragraph carriage returns and option settings) are easily found, displayed in red. At the top of the **ST-Writer** screen is the command line, with red letters and white numbers. The screen is clear, too, with text in white on black—or the reverse, if you like.

On a monochrome monitor, text can also be displayed in either white on black or black on white. And, when using **ST-Writer** with a monochrome screen, you can choose to display either 20 or 40 lines on-screen at once.

There are a number of improvements Atari's made over the original. From the menu screen, you can now: format a



FOR THE ATARI ST



* LogiKhron Clock Card * Are you tired of resetting the date and time when the Atari ST is turned on? Then LogiKhron is for you! It automatically enters the date and time into the Atari ST each time the computer boots. Through the use of an internal battery, LogiKhron maintains the precise time and date even when the computer is off. Installation is easy, just insert LogiKhron into the left cartridge slot and enjoy the benefits. — Only \$49.95

* Electro Solitaire & 21 * Transform your computer into the perfect card playing friend. Why hassle with searching for a deck of cards, shuffling, and dealing if your computer can do it for you? Electro Solitaire & 21 adds a new dimension to the ever popular games of Solitaire and Blackjack. Just think, point, and play; it's as easy as that? — Only \$19.95.

* The Study Guide * The Study Guide is a carefully designed educational tool. You enter the information which you want to learn and the computer helps you learn it. Questions are then organized into formats such as multiple choice, true/false, essay, or fill in the blank. You can then compare your answers against the computer's to evaluate your success. For ages 11 to Adult. —\$39.95

* Electro Calendar * Electro Calendar is an enhanced version of your wall calendar. You can store and retrieve important messages quickly and easily. For instance, it can remind you of upcoming meetings, birthdays, anniversaries, or any important event. If your wall calendar becomes outdated, let Electro Calendar print one for you. It will display or print calendars between the year 0001 and 9999. — Only \$39.95

For more information or to place an order, call (314) 894-8608. Dealer inquiries invited.

Sorry, no Visa or MC accepted.



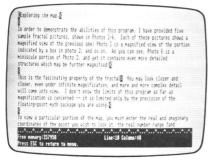
4129 OLD BAUMGARTNER • ST. LOUIS, MO 63129 • (314) 894-8608

Word Processing continued

disk; print to either the screen, a disk file or a printer; and receive files directly transmitted from an 8-bit Atari.

In the edit screen, the number of free memory is always displayed—over 150-thousand bytes free with RAM TOS. or over 350-thousand free bytes with TOS on ROM. Further, you can mark blocks of text and save them to disk.

There are other ST-specific features worthy of note. The program allows you to use files located in subdirectories, on any disk, and it automatically keeps track of which directory you're looking at when doing a file save or a disk index.



ST-Writer.

ST-Writer is a what-you-see-is-whatyou-get word processor. You can, therefore, see on-screen how single- or doublecolumn formatting will look before you print it out...a very useful feature.

Documentation consists of several files as freely available as is the program itself. There are tutorial, reference, quick reference and function key label files available.

In addition, a couple of other files are needed before the program can be effectively used. There's a configuration program that uses a specific configuration file to create the "XYZZX" printer driver file that ST-Writer looks for when told to print. If you're familiar with ASCII printer control codes, you can modify the source driver file so that ST-Writer works with your non-Epson-compatible

ST-Writer contains just about every feature most users would need. There are a few commands not offered—like ability to move the cursor from word to word or paragraph to paragraph, the ability to delete a word or paragraph at a time, or the capability to use multiple windows for text.

And there are a few problems with ST-Writer. For example, cursor movement is slower as your file gets bigger. There's a lengthy conversion time required to import a non-ST-Writer file. For a seemingly small file, it can take a couple minutes for the screen to return to normal.

There are also a few bugs that mysteriously lock up the computer at times -and, just as mysteriously, have no effect at other times.

One of the bugs rears its ugly head when you try to print double-column output. It seems, when a carriage return occurs at the end of a paragraph in the left column, the right column margins get out of sync. Another bug prevents you from blocking the headers flush against the right margin. In fact, I've had some problems trying to print headers in general.

ST-Writer appears a reasonable choice for a word processor, considering its price and availability. Unfortunately, Atari's limited resources will probably prevent them from correcting bugs or adding features regularly. So, although it's free, you must decide if you want to trust your important word processing work to a program which Atari has no stake in maintaining or improving.

Regent Word.

While various versions of ST-Writer were making the rounds, Regent Word appeared on the scene, an easy-to-use but powerful word processor. Regent Word is from the same folks who developed AtariWriter and AtariWriter Plus —Regent Software.

The program is billed as the first fullfunction word processor for the ST computer. It was surely one of the first and is clearly full of features.

Regent Word is menu driven and will work on either a monochrome or RGB monitor. One of its key features is the

built-in "help" function. By pressing HELP on the keyboard, the user can display one of five menu screens at any time. Pressing the SPACE BAR cycles through the menus, and the UNDO key exits the menus.

The multiple menus in Regent Word aren't menus per se. Rather, they're help screens that tell you what the commands are. Since most commands are invoked by a single keystroke, the complexity of help menus and commands is not burdensome.

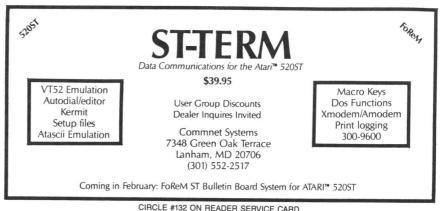
Commands are issued by a variety of two-key presses with the ALTERNATE, CTRL and ESC keys. Also, function keys across the top of the keyboard have been defined for block operations.

Like other ST word processors, Regent Word offers 80-column editing and the usual. The RETURN key is used only at the end of a paragraph; word wrap occurs at the end of each line; and DELETE and BACKSPACE work as expected.

The cursor can be positioned throughout text by a character or screen at a time. In addition, you can move directly to the top or bottom of the text with one command.

The print preview function shows how your underlined, elongated and bold print will look before you actually print it. Super- and subscripts, headers, footers, justification and page numbering are also supported.

Much like AtariWriter word processors, Regent Word allows you to access all the features of your printer control codes and options. Using CTRL and various letters, such attributes as line spacing, print style, centering, headers/ footers, margins and justification can be set. In addition, specific ASCII printer



Word Processing continued

codes can be sent directly to the printer from anywhere in the document.

A number of features in **Regent Word** are especially useful and well implemented. When the program's first run, you're asked to enter the date and time. Given the lack of battery backup and the unreliable clock in the ST, this feature ensures that any files created or edited with **Regent Word** will have the correct date and time stamp. During editing, the time is continually displayed at the top of the screen.

When loading a file, all files on the current disk are displayed on-screen, with a letter next to each. Pressing the letter corresponding to the file you want will load that file into memory. In addition, the directory also shows total storage available on the disk, plus creation dates and sizes of individual files.

```
RECENT MOBD Copyright 1985 Regent Software

F1 : Load file
F2 : Save file
F3 : Define search phrase
F4 : Search for phrase
F4 : Search for phrase
F5 : Define selemining of block
F7 : Define end of block
F7 : Define end of block
F8 : Save block
F8 :
```

Regent Word.

Another useful **Regent Word** feature is its ability to give you a word count of the file currently in memory at any time. The program also has a built-in communication feature, allowing documents to be sent or received via the communications port on the ST.

Currently, Regent Word is designed for Epson dot-matrix printers (or compatibles) and the Juki letter-quality printer. The program will use however much memory is available (an Atari 520ST with TOS in ROM yields almost 400K free for text files). Also, the size of the document does not affect cursor speed.

Copy protected **Regent Word** sells for \$50. Fortunately, a backup disk can be ordered in either single- or double-sided versions for only \$5.00. Still, there's no way to put this word processor on your hard disk. Overall, **Regent Word** is a powerful, easy-to-use, text-based word processor, just as advertised.

Regent Software also has a product called **Regent Spell**, a 30,000-word spelling checker that can be used with **Regent Word** or other word processors. As carefully designed and thought out as **Regent Word** is, though, **Regent Spell** seems the opposite. Perhaps it was rushed to market.

It's not that the program has bugs. On the contrary, it's fast and seems bug-free. The problem lies with the number of small irritations and feature omissions.

For example, there's no way to quit a spelling check before the program has reached the end of the file. And, since there's no word count or visual indication of progress, you have no idea how long the check will take.

Further, there's no display of the filename and no method to return to the last word checked. **Regent Spell** is a one-way program. There's no mass dictionary update, to let you take a file you know is good and have it added to the program's list of words.

Finally, although you can use some features of the program from the mouse, you must leave the mouse and press RETURN after clicking on INSERT or DELETE.

Regent Spell sells for \$40 (from Regent Software, 7131 Owensmouth, Suite 45A, Canoga Park, CA 91303 — (818) 883-0951) and is copy protected. As it stands now, the program works, but the number of irritations makes it difficult to use. In discussing these problems with Regent Software, I was assured that most (if not all) of my complaints would be incorporated into the next version of the program.

I have no reason to doubt their word. If these and a few other minor changes are made, **Regent Spell** could well be the *de facto* spelling checker for the ST.

Final Word.

It's somewhat difficult to describe Mark of the Unicorn's Final Word. Frankly, I don't know where to start. The program's a sophisticated word processor that'll probably require a substantial hunk of time to master. But, having digested the tome-length documentation, you'll find yourself amazed by the power at your word processing fingertips.

Final Word comes with almost 500 pages of documentation accompanying the two single-sided program disks. Part of this is a 150-page tutorial that must be followed chapter by chapter if you expect to get anywhere past turning on your ST.

In addition, a terse, 4-page installation guide tells you how to get this program up and running. The only specific reference to the Atari ST occurs in this little guide. As with the PC version (the original), the whole kit and caboodle comes in an attractive black slipcase.

One of the unique aspects of **Final Word** is that it's crashproof. Unlike other word processors, where you *could* lose your work, **Final Word** automatically saves your work into a buffer file whenever you stop typing for a period of ten seconds. If your computer loses power, all you've lost is ten seconds' work.

Another feature is split-screen editing. With a single command, you can split the screen into two parts. And, since Final Word can edit up to twelve documents at once, you could display parts of various files in one window, while editing your document in the other. Or you could keep a rough draft in one window as you polish off the final version in the other. Text can easily be copied or moved between windows.

Final Word is really two word processors in one. Either may be chosen, based upon the needs of the task at hand. The on-screen Editor is a what-you-see-is-what-you-get word processing editor. You type and edit the text on-screen, and it appears exactly as it will on the final, printed copy.

The other editor, called the Advanced Formatter, allows you to specify how your finished documents will look, by including formatting commands in the body of the document.

These commands are inserted into the document as you type and edit, but you'll only see how it looks when the document is printed. With the Advanced Formatter, you can produce serious writing, including table of contents, index and footnotes.

Final Word contains a series of menus, grouped into a main menu and ten function menus. The main menu lists all submenus. When displayed, it partially obscures your text. After you're familiar with the program, you can turn the menu feature off.

After a brief exposure to **Final Word**, you'll get used to seeing the message *swapping*, which occasionally flashes at the bottom of the screen. When this message is displayed, the program is copying the text from memory into a disk file called the "swap file."

Swapping is automatic whenever you stop typing for ten seconds. You can change the time interval to suit your needs. It's this swap file that contains your text—when the power fails, the

computer crashes, or you forget to save a file. Should you need to retrieve lost text, a recover program is run to reestablish where you left off.

Final Word is truly a powerful program. For the power writer, or someone who needs sophisticated word processing features, this one should be sufficient.

Some of the program's heavy duty features include: precise control of headers and footers; the ability to place footnotes at the bottom of each page, at the end of the document or embedded in the same line as their reference; automatic chapter, section and "new page" formatting controls; the ability to create lists, numbered or not, within the body of the text; and the ability to create a table of contents and index.

The Final Word tutorial is what makes this complex program manageable. Although a little chatty at times, it uses good training techniques—beginning each section with a list of objectives, providing plenty of examples during the tutorial, then summarizing what was learned at the end of the section. The reference manual is complete, too.

There are a few flaws that you should be aware of. The program is copy protected. You can run it from a copy, but one of the two original disks (used as a "key disk") must be in drive A whenever you start up. Fortunately, the ability to change just about every parameter and option of the program allows you to put the multitude of necessary programs on a double-sided disk or, better yet, a hard

Another problem: for all its power, Final Word does not allow double-column printing. Newsletter editors should look elsewhere if that's a major requirement. Further, the manual assumes you're working on a CP/M or MS-DOS system. For the uninitiated, this could be a little confusing.

Probably the most serious weakness in the program is the extremely tedious setup-and the sheer number of program files. To get to the point where you

can just type one word from within the program requires a seemingly endless checklist. And heaven forbid you should need to recover a file. The first few times you try to run "recover," you'll be quivering in your boots.

Final Word sells for \$125 and works with a variety of dot-matrix and letterquality printers. Although it can be used with a single disk drive, the less patient Atari ST user will opt for two drives or a hard disk.

If you need the word processing power to go along with your "Power without the Price," Final Word is the only current alternative. It's available from Mark of the Unicorn, 222 Third Street, Cambridge, Ma 02142 — (617) 576-2760.

GEM-based word processors.

HabaWriter is the first GEM-based word processing program for the Atari ST. All the features of the GEM interface—like drop-down menus and mouse control of the cursor—are available.

However, the first release of the program, version 1.0, was somewhat "bug

FASY-DRAV



There is a difference between paint and draw programs. Paint programs are recreational packages that allow freeform painting on a dot-bydot basis. With each new stroke you obliterate everything you cover. And

erasing permanently removes everything you've created.

An object-oriented drawing program like Easy-Draw is a versatile, powerful tool you use to create business graphics, presentation materials, line drawings complex illustrations on a figure-by-figure

solid or transparent

basis. It lets you: lay down figures to build CIRCLE #133 ON READER SERVICE CARD

composite drawings • size, move and manipulate objects individually and collectively • use a grid system for controlled, precise scale drawings

 produce print-outs with accuracy exceeding your screen images

· create custom drawings easily.

Ask your dealer for Easy-Draw, the drawing program for professionals.



MIGRAPH™
720 S. 333rd St., Suite 201 [®] Federal Way, WA 98003 (206) 838-4677



Easy-Draw is a registered trademark and Migraph is a trademark of Migraph, Inc.

ST-LOG

Word Processing continued

gy." Files were occasionally lost, the screen froze, and the cursor tended to disappear. Fatal bugs have been eliminated in version 1.1 and a number of enhancements made to the program. This review is based on version 1.1.

HabaWriter is copy protected, but you can copy the program files to another disk. As long as the original disk is in drive A when you start the program, it will start...then you can remove the original "key disk."

When the program begins, a familiar GEM window appears on-screen, with a menu bar across the top. Desktop accessories are available under the "desk menu," assuming the .ACC files were on your disk when you first booted up your ST.

The menu bar contains **HabaWriter** commands, and each menu has related commands. The menus labeled File, Edit, Search, Format, Style and Print are all descriptive of commands they contain, and everything is logically laid out. The function keys on the ST keyboard can also be used to select commands.

The **HabaWriter** document window is a regular Atari ST window. You can change its size, move it around the desktop and close it by clicking on the close box.

You can also use the vertical and horizontal slider bars to move throughout the document currently in the window. Up to six windows can be open at a time, and there's a clipboard for cutting and pasting parts of (or entire) documents.

To load a previously created file, the user selects the "open" command from the File menu. A GEM file selector box appears, and a file can be chosen, or the drive and directory can be changed.

As the file loads, a small, square box much like a meter appears on-screen, showing the progress of reading the file.

HabaWriter lets you work with many documents at once. The procedure for opening another existing document is as described above, or you can create a new document.

The multiple window technique is very handy for taking notes while you're writing. As you think of ideas you want to save, you can click on your other window, type your thoughts and return to the spot where you left off.

You can copy or cut and paste text between or within documents. Once the text is highlighted, by dragging the mouse from start to end, the block can be moved directly to another location or document, or to the clipboard. An entire file can also be pasted into a document.

The document format can be set, changed and even saved with the file. Each time the document's loaded in the future, settings will be loaded along with the text.

Margins, indentation, justification, type styles, tabs and preferences can all be specified. **HabaWriter** supports AS-CII or "word processing mode" files, and sub- and superscripts.

There are a few features **HabaWriter** version 1.1 lacks. Currently, there's no way to change the line spacing to anything other than single-space mode. Headers and footers aren't supported. There are no fonts at this time—just underline, bold and normal text.

The program has trouble reformatting paragraphs or documents in ASCII mode. In fact, the feature only works properly in "HabaWriter" mode on text entered with the program. The Search and Replace function can't handle ASCII characters like carriage returns (CTRL-M).

The DELETE key on the ST keyboard does not work (frustrating!), and, finally, there's no index in the 46-page manual.

On the positive side, Haba is making an effort to produce quality software. Version 1.1 of the program corrected earlier bugs and added features, such as the ability to create your own printer configuration file, the ability to send ASCII printer codes to the printer, and sub- and superscripts.

I'm told that version 1.2 of **HabaWriter** will have variable line spacing, headers and footers, and multiple printer configuration files on the distribution disk.

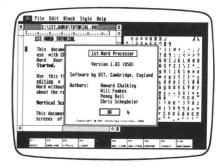
I'd also like to mention Haba's on-line support on CompuServe. Gerry Humphrey from the product development staff is very active on the 16-bit SIG (pcs 58).

Not only does he answer all questions courteously, but he's interested in feedback on this and other Haba products, so they can be enhanced to give you the best products possible. If you have any questions, suggestions or complaints on **HabaWriter**, leave Gerry a message. He'll get back to you quickly.

The on-line customer support provided by Haba is another indication that Haba wants to be your word processing company. I don't know of any other com-

pany currently marketing a word processor for the Atari ST which provides this level of support. Given the current version of the program and the planned changes, **HabaWriter** could easily become the ST word processor for a lot of people.

HabaWriter works in either high or medium resolution on the ST. The program lists for \$80, and Version 1.2 should be available by the time you read this. Existing owners can receive an upgrade by sending \$7.50 and their original disk to Haba Systems, 6711 Valjean Avenue, Van Nuys, CA 91406 — (818) 901-8828, attention Technical Support.



1st Word.

1st Word is a GEM-based word processor developed by GST Holdings, Ltd., an English company. The program was originally provided free by Atari for ST purchasers during the Christmas 1985 season. It's now sold separately for \$40 and is still being marketed by Atari Corp., 1196 Borregas Avenue, Sunnyvale, CA 94086 — (408) 745-2021.

Like **HabaWriter**, **1st Word** takes full advantage of user-oriented GEM features like drop-down menus, icons and windows. Editing tasks, such as cut and paste or changes in document layout and style, can be performed with the mouse. The documentation consists of a 42-page file on the program disk.

1st Word isn't copy protected, so it can easily be placed on the higher capacity, double-sided disks or a hard disk. The program works in low, medium and high resolution, but only medium- and high-resolution screens will provide you with 80-column text format.

A number of files come on the distribution disk. In addition to the 1st Word program and resource file, there's a program called 1st Print, to allow you to print while using 1st Word. You can't print a file while there's an open window on-screen, though. Trying to run

the printer program from the GEM desktop will not work.

There's a user guide file and short "tutorial file" that's nothing more than a short example. Three printer drivers—Epson, Qume and plain ASCII—are included on the disk.

In addition, an install program's available, to let you create the necessary printer driver file after you've edited the hex source file. This program creates either a .DOT or a .DSY file, for use with dot-matrix or daisy-wheel printers, respectively.

The operation of **1st Word** is quite similar to that of **HabaWriter**, with a couple notable exceptions. In addition to the menu bar at the top of the screen, which contains various commands in separate drop-down menus, there's a set of function key icons across the bottom, to indicate the word processing functions assigned to each function key.

Keys F1 through F5 indicate toggle settings of bold, underlined, italic, light and insert mode. The other five keys perform actions when editing: line deletion, new page, line centering, and paragraph indenting and formatting.

A particularly useful feature of **1st Word** is that these function keys can be operated either from the keyboard or by clicking the mouse on the appropriate key icon.

Another significant difference between **HabaWriter** and **1st Word** is the font table on-screen, partially obscured by the primary GEM window. This table holds the ST character font, which may vary from country to country. Since not all the ST's 256 characters are available from the keyboard, this table allows you to select any character you want, simply by clicking the mouse on the correct position.

1st Word will copy that character to your window at the current cursor position. This font table is only available in medium and high resolution.

There are a few things I don't like about 1st Word...Like HabaWriter, it only lets you single-space documents. The program also has problems reformatting text from an ASCII file. And there's a silly page eject each time you print a document, which can't be surpressed. There are no extra fonts (like Macintosh uses) available for the program.

On the favorable side, **1st Word** allows the use of headers and footers, although they can only be one liners. The program supports page numbering, conditional page breaks, the use of position markers, and cut and paste operations. As mentioned before, it's not copy protected, so it can easily be backed up and installed on a hard disk.

1st Word is an easy-to-use and capable word processing program for the Atari ST. I'm sure we'll see more sophisticated GEM-based word processors become available, but, until then, **1st Word** will let you do a lot of writing.

GEM Write is a word processor for the ST, which has been promised since the ST was first announced. Atari said that several GEM programs would be available when the computer hit the streets in the summer of 1985. Similar to the Apple Macintosh, which comes with a decent word processor and drawing program, the ST was to arrive with some software. But, somewhere between there and here, the GEM programs got waylaid.

For the last several months, I've been repeatedly asking both Atari and Digital Research when we could expect **GEM Write** and **GEM Draw**. Both have been available for the IBM PC market for quite a while.

The response I get from either party is the same—it's the other guy who's holding things up.

If you believe the scuttlebut, Atari wants to pay a lower price than they first agreed to (seems believable). And DRI wants Atari to pay them for some other stuff, before they turn over the programs (also believable).

The debate won't be settled here. Having used **GEM Write** on a PC, and assuming that it'll appear for the ST sometime, I thought it would be appropriate to give it a brief mention here.

GEM Write looks like HabaWriter and 1st Word, but isn't as functional. Sure, it uses a mouse and windowing environment like the others, but it allows only one open window at a time. You can't do something as rudimentary as mixing formats to produce, say, a single-spaced paragraph in a double-spaced document. Also, there's no way to pass control codes to your print or delete files from within the program.

GEM Write allows you to use either drop-down menus or CTRL-key sequences for issuing commands. The latter are very similar to those used by Wordstar, a popular word processor for the PC. GEM Write supports pagination, justification, single-line headers and

Atari ST Software

MICRO C-Shell \$49.95 Unix style C shell with aliases I/O Redirection, & batch files.

MICRO C Tools \$24.95 Unix style software tools for text editing and debugging.

MICRO Make \$34.95 Automatically builds programs. Creates batch files or executes compiler/linker etc. directly.

Beckemeyer Developent Tools 592 Jean St. #304 Oakland CA 94610

(415)658-5318

CIRCLE #134 ON READER SERVICE CARD



CIRCLE #135 ON READER SERVICE CARD

The Exciting Atari ST Computers Are Here...

New software and enhancements are arriving daily for this wonderful computer. We will evaluate and carry only the <u>best</u> products, so you can <u>depend</u> on us to <u>support</u> everything we sell!

Call or circle our Reader Service Number on the Response Card to put your name on our mailing list. That will entitle you to our FREE CATALOGS with product reviews, tips and rumors on the ST.

VISA and MasterCard gladly accepted
Toll Free 800-782-7007 (Oregon 479-9516)



CIRCLE #136 ON READER SERVICE CARD

footers, block editing, and search and replace functions.

Probably its strongest feature is the ability to merge a picture into the body of a document. **GEM Paint** files can be brought into the program and placed where you like. Then the entire document can be saved, or printed as one entity. This is how it works on the PC. The availability of **GEM Paint** for the ST is as questionable as is that of **GEM Write** itself.

If you need the ability to merge text with graphics, then you may be inclined to wait around for the ST **GEM Write**. Otherwise, existing GEM-based word processors, such as **HabaWriter** and **1st Word** easily outdistance **GEM Write**'s simple-minded features.

Which is for you?

This comparison review was based on many, many hours of intimate, personal, first-hand use (and, in some instances, abuse) with the currently available word processors for the Atari ST. Having had the chance to get familiar with the ST over the last nine months, and having used the various word processing programs over the last several, has allowed me try each program and form opinions based on empirical data.

I began this project with no favorite programs or axes to grind. I've used dozens of word processing programs on various computers over the last few years. In addition, I spend my daily working hours evaluating hardware and software from the user's viewpoint.

I feel strongly that, for an application program to be the best it can be, it must be designed with a particular computer in mind from the start. A word processing program is limited by the hardware it runs on. If it doesn't take advantage of all the hardware has to offer, it's not an optimum program.

WORD FOR WORD™



You can play WORD FOR WORD on a game board that looks like this, or you can create your own! Drop-down menus make it easy to design



the shape, size, and layout of the game board. Other features let you assign letter values, select a skill level, and challenge words.

When the game board is the way you want it, invite up to three friends to play. And you can

include *Alphie* (your computer) in the game. He has a 20,000 word vocabulary that is sure to challenge and improve your skills. The choice is yours and the options are almost endless!

To Order

Contact your Atari ST dealer, or send \$39.95 plus \$3.50 for shipping and handling. (\$43.45) California residents add \$2.40 sales tax. (\$45.85)

Bay View Software

177 Webster St., Suite A-295 Monterey, Calif. 93940 (408) 373-4011

MasterCard or Visa accepted

Works with color (medium resolution) or monochrome monitor. WORD FOR WORD is a trademark of Bay View Software.

CIRCLE #137 ON READER SERVICE CARD

With regard to word processing on the Atari ST, only a GEM-based program can offer the user the most.

My choice, of the programs compared in this article, is **1st Word**. With the exception of a few flaws (which, unless resolved, limit its usefulness), **1st Word** provides the ease of use, power and flexibility that an ST word processing program should.

If you were lucky enough to receive **1st Word** during the 1985 Christmas season for free, all the better. But, even at its list price of \$40, it represents what I think is the best ST word processor.

1st Word should satisfy the word processing needs of the majority of ST owners. For that matter, HabaWriter would probably be okay, too (especially version 1.2). However, it's slightly more expensive and is copy protected.

If you simply must have a text-based word processor, then you can't beat the price of **ST-Writer**. It's freely available on many bulletin boards and on several information services.

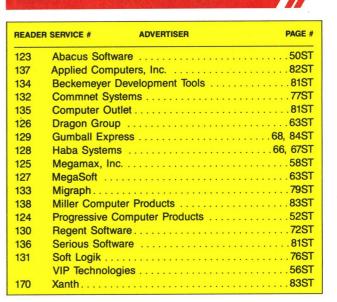
Regent Word works as advertised, seems bug-free and is straightforward to use. Multiple menus, which can be accessed in an instant, take you through the assorted commands. There's no need to be a cartographer to navigate your way around this program.

Final Word, from Mark of the Unicorn, is the most, of all of these programs. It is the most expensive, the most sophisticated, the most time-consuming to learn. It also weighs the most

Kidding aside, if you need this much power and are willing to spend some time learning the intricacies of it, **Final Word** may be just right for you.

That's my opinion, based upon hours of use. Of course, the final decision rests with you, since you'll be the one who either blesses or curses the day you brought a particular word processor home to your ST.

ST INDEX TO ADVERTISERS



PAGE 82ST / MAY 1986 ST-LOG



QUALITY SOFTWARE

- ► TDI Modula II
- ► Regent Spell, Word II
- ➤ Softworks Personal Basic
- ➤ Spinnaker Educational
- ➤ Softlogic Clock Card
- ➤ ST-Copy

 Dealer Inquiries Welcome

1-800-647-7740

orders only

Supra Hard Drive 10 Meg only 649.00

1 Meg Upgrade only 125.00

520 ST Call 1040 ST Call

SUPRA DEALS

- ➤ Supra 1 Meg ST Special
- ► Supra BBS ST Special

ST Station Packages

- ➤ ST Station 99.95
- ➤ ST Station w/computer and drives (as pictured below)

CALL

Quality Systems & Software at one convenient price

1-206-624-9292

PIONEER BUILDING

600 FIRST AVENUE

SEATTLE, WA 98104

CIRCLE #170 ON READER SERVICE CARD



It takes 2 of their's (Atari) to make 1 of ours.







Why pay more — FOR LESS!



THE SHANNER SD-2000 Available Now!

Why buy 2 Atari 1 Mb. Drives, separately packed, encased in large plastic housings for \$599.90, when you can purchase the SD-2000 Drive System for \$399.95. The SHANNER SD-2000 is comprised of two 3.5", 1 Mb. double sided, double density drives packaged in an attractive, coordinating grey METAL housing and is fully compatible with the Atari ST.*

You can pay Atari or you can SAVE \$200.00.

You be the judge. \$3995

*Atari and Atari ST are trademarks of Atari Corporation.

GUMBALL EXPRESS ORDER FORM • For FAST delivery use this order form or call TOLL FREE 800/423-9442

Product Description Price P&L TOTAL Shanner SD-2000 \$399.95 \$7.50 \$407.45

If you currently own either an Atari SF354 or SF314, you can use your existing power supply. If not, please order Model No. SD-2000PS for \$14.95.

☐ Check here and add \$14.95 to \$399.95

All products will be shipped prepaid UPS ground.

☐ Check enclosed. (NOTE— order will be shipped when check clears).

Make check payable to:
Gumball Express
707 S.W. Washington Street Suite 200
Portland, Oregon 97205

☐ VISA ☐ MASTERCARD	☐ INTERBANK (MasterCard only)
Name on card	
Account #	
Expiration Date	
Signature	

Signature _____SHIP TO:

SHIP TO:
Name _____

Address _____ State ____ Zip ____

C.O.D.'s and purchase orders will not be accepted by Gumball Express. Outside the USA add \$10. and make payment by bank draft, payable in U.S. dollars drawn on a U.S. bank.



ACE 80/ACE 80XL

by Amiable Computer Enhancements (ACE Ltd.) Available from:

MAGIC SOFTWARE 3398 Seminole Trail Monroe, MI 48161 (313) 289-1823 TNT COMPUTING P.O. Box 443 Holt, MI 48842 (517) 394-2412

80-column Cartridge \$49.95
ACE 80 - Disk for all 8-bit models
ACE 80XL - 48K Disk for XL/XE models

by Murray D. Kucherawy, Ph.D.

I love my Atari 800. I bought it in 1982. When I got tired of playing games, I installed a BIT-3 board, purchased the 80-column version of **Letter Perfect** and did serious word processing on a letter-quality printer.

My wife edits an international medical journal. After seeing my system, she purchased two for her office, located in a university hospital. She still chuckles over the raised eyebrows when she talks about her *Atari* word processor.

The 800XL, with its "closed" construction, seemed to shut out third-party entrepreneurs. Except for a brief flurry concerning Atari's XL expansion box, the 80-column capability was gone.

However, Amiable Computer Enhancements has introduced **ACE 80**, a 12K cartridge which will put 80 columns on your TV or monitor. Actually, there are two versions.

First, ACE 80XL works in all Atari computers with at least 48K. In the XL and XE models, you can program in BA-SIC in 80 columns. The ACE 80XL also fits the left cartridge slot of the 800, but, of course, you can't use BASIC simultaneously.

The ACE 80 is a right-cartridge slot version, specifically designed for the 800, so that the left slot is available for

your BASIC or other language cartridge.

Upon booting up, **ACE 80** invades the Atari OS and replaces the normal *E*: and S: devices (the 40-column editor and screen display) with an 80-column device occupying just under 12K of RAM. A title page immediately appears and awaits a keypress.

You now have the opportunity to utilize a unique feature of ACE 80—custom design of the screen display. The START and SELECT keys vary the brightness of the character set and the background (eight levels each), respectively.

SHIFT-START toggles the cursor from flashing to nonflashing to invisible. Finally, since ACE 80 can operate with an ordinary color TV, control of the background screen color is provided via SHIFT-SELECT (sixteen choices).

Further adjustment is possible later, as your work session progresses. With that done, all that remains is to hit any key to boot your disk (or cartridge on the Atari 800). The screen will present you with an 80×24 display.

The character set is well designed and exhibits complete descenders. All regular alphanumeric characters, graphic characters and control characters are available in both regular and inverse video. Forget about POKE 756,204, however; the international character set of the 800XL is not there.

The central question of this review

then becomes "How legible is the display?" The answer depends on what you're using for yours.

A monochrome monitor produces an excellent picture, comparable to that of the BIT-3. A color monitor takes away some of the resolution, but it's still a good image. A color TV gives a good or fair display, depending on how well the set's been aligned, but I couldn't recommend it for extended use. I was unable to test it on a black and white TV, but my guess is that the display would be very good on a properly tuned set.

I recommend that you examine the image on your type of terminal before purchase. Remember, the final screen appearance can be "fine tuned" to your liking by appropriate use of the START and SELECT keys.

 $ACE\ 80$ BASIC programming requires that you keep some limitations in mind.

The logical line length is 80 characters. Any wrap-around is ignored, so you can't edit program lines longer than one screen line. However, it's a simple matter to jump into 40-column mode, do the editing, then switch back to 80 columns. Editing is noticeably faster than in the 40-column mode.

Serious graphics programmers should note that "drawto" and "fill" commands don't work properly in 80-column mode.

Tabs are permanently set at eight positions apart.

Atari ST Software

MICRO C-Shell \$49.95 Unix style C shell with aliases I/O Redirection, & batch files.

MICRO C Tools \$24.95 Unix style software tools for text editing and debugging.

MICRO Make \$34.95 Automatically builds programs. Creates batch files or executes compiler/linker etc. directly.

Beckemeyer Developent Tools 592 Jean St. #304 Oakland CA 94610

(415)658-5318

CIRCLE #139 ON READER SERVICE CARD

810 ON A PLATE **DISK DRIVE \$100.**

Printed Circuit Boards (PCB) w/parts 800 Main \$10 16K RAM \$10 810 Analog \$10 800 Power \$5 10K OS \$10 810 Power \$15 CPU w/GTIA \$10 810 side w/DS \$40 1200 XL \$35 800 XL \$50
IC \$5. ea GTIA, 800 ANTIC, 800 CPU, XL CPU, POKEY, 6520
PIA, 6507, 444, 6532, 6810, 810 ROM C
IC \$10. ea XL ANTIC, MMU, XL/XE OS, BASIC C, 850 ROM B,
1050 ROM, 1771
Complete working 810 Less case \$120.00 (\$100.)
With B&C Black Anodized Case \$140.00 (\$120.)
With Case and Happy Upgrade \$220.00 (\$200.)
Field Service Manuals 800/400, 800XL or 810 \$25. ea
For 1050, 1025, 1027, 825, 850 or 1200XL
Diagnostic Cartridges Computer or Disk \$25. ea
(\$) Prices in parenthesis do not include I/O Cable or Power Pak

B+Computervisions 749-1003 3283 Kifer Rd., Santa Clara, CA 95051

CIRCLE #140 ON READER SERVICE CARD

Computer Garden

Wilkes-Barre	& Scrai	nton's	#1	Atari	Dealer	
40ST Systems	\$839	8-Bit 130X	H	ardwa omput	re er	

1040ST Systems 130XE computer \$135		
Spinnaker Math Helper\$30 Spy vs Spy, I or II\$18.99 Academy Typing Tutor\$21.99 Gemstone Warrior\$22.99 The Eidolon\$24.99 B-Bit Languages	Color. \$999 520ST Systems Black & White. \$699 Color. \$869 Color. \$869 All ST's include 1000K drive, TOS ROM, mouse & monitor. ST Productivity VIP Professional. \$109.99 Newell Gen. Ledger. \$64.99 Mirage H&D Base. \$64.99 ST Games King's Quest II. \$32.99 Fahrenheit 451. \$29.99	1050 disk drive
Mirage H&D Base		SynCalc or SynFile+ \$32.99
Newell Gen. Ledger. \$64.99		
Mirage H&D Base		Deschtree modules \$20.00
ST Games \$24.99 King's Quest II	Mirage U.D Page #64.00	Describe Houses \$39.99
King's Quest II	CT C	Paper Clip 130XE \$37.99
Kings Quest II		B-Graph\$24.99
Sundog or Mudpies\$24,99 8-Bit Games Fahrenheit 451\$29.99 ST Educational Spinnaker Math Helper\$30 Academy Typing Tutor\$23 ST Languages Haba Hippo-C \$44.99	King's Quest II\$32.99	AtariWriter Plus \$32.99
Fahrenheit 451\$29.99 ST Educational Spinnaker Math Helper\$30 Academy Typing Tutor\$23 ST Languages Haba Hippo-C \$44.99 Alternate Reality\$22.99 Karateka\$18.99 Kerateka\$18.99 Gemstone Warrior\$22.99 The Eidolon\$24.99	Sundog or Mudpies\$24.99	8-Bit Games
ST Educational Karateka \$18.99 Spinnaker Math Helper \$30 Spy vs Spy, I or II \$18.99 Academy Typing Tutor \$23 Gemstone Warrior \$22.99 T Languages Haba Hippo-C \$44.99 8-Bit Languages	Fahrenheit 451 \$29.99	
Spinnaker Math Helper\$30 Spy vs Spy, I or II\$18.99 Academy Typing Tutor\$21.99 Gemstone Warrior\$22.99 The Eidolon\$24.99 B-Bit Languages		Karateka \$19.00
Academy Typing Tutor \$23 Gemstone Warrior \$22.99 ST Languages Haba Hippo-C \$44.99 8-Bit Languages	Spinnaker Math Helper \$30	
ST Languages Haba Hippo-C\$44.99 B-Bit Languages	Academy Tanina Tatan 622	
Haba Hippo-C \$44.99 8-Bit Languages		Gemstone Warrior \$22.99
Haba Hippo-C \$44.99 8-Bit Languages	SI Languages	The Eidolon\$24.99
	Haba Hippo-C \$44.99	8-Bit Languages
	OSS Personal Pascal \$49.99	OSS Basic XE/XL \$47/\$37

New Free Catalog!

To get yours call, write, or use Reader Service.

To order send check or money order to Computer Garden, 106 W.Carey St., Plains, PA 18705. PA customers add 6% tax. Be sure to include enough postage (overpayments are refunded). Cash COD's call (717) 823-4025. No credit cards.

CIRCLE #141 ON READER SERVICE CARD

Review continued

Other than these exceptions, all Atari graphics modes function normally.

Some programs, such as AtariWriter and VisiCalc, will not work with the ACE 80 cartridge. They don't access the OS devices, but use a custom screen display. The programmers at Amiable Computer Enhancements have developed 'patches" which circumvent these problems for certain software products.

Included with the cartridge is a disk which will insert these patches into a backup copy of your software. All you need do is boot up the disk, select from the menu the program you wish to convert (for example, A+ from OSS), insert your backup copy and press RETURN. In a few seconds, you have a new version, compatible with ACE 80.

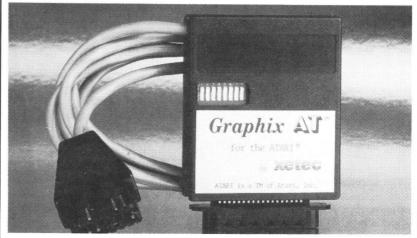
Other products currently "patchable" are Eastern Software's MacroAssembler and LJK's Letter Perfect. It should be

noted that the patches are for version 2.1 of OS/A+ and version 6 or higher of Letter Perfect for the BIT-3 board. Patches for LJK's Data Perfect Spell Perfect programs are in the works.

The list price of ACE 80 or ACE 80XL is \$49.95, less than 25% of the cost of an 80-column board. With the official demise of the Batteries Included 80column cartridge, ACE 80 becomes the most economical way of upgrading your Atari to professional levels.

Murray D. Kucherawy holds a Ph.D. in physics, and teaches mathematics and physics in London, Ontario, Canada. Dr. Kucherawy firmly believes in the future of computers in the classroom (particularly the Atari!) and spends much time promoting computer use among his colleagues.

GRAPHIX AT For the ATARITM



High Performance

NOW — Keyboard graphics is available for the ATARITM computers in one cost effective interface with the following features:

- Full Line Buffer
- Direct Key Board Graphics
- 8 Active Switches
- 7 Available Commands
- ATARI WRITERTM Compatible
- Supports Most Popular Printers including Daisy Wheel
- · Compact Design Plugs Directly into Printer

Atari and Atari Writer and Trademarks of Atari Corporation

Suggested list \$69.95

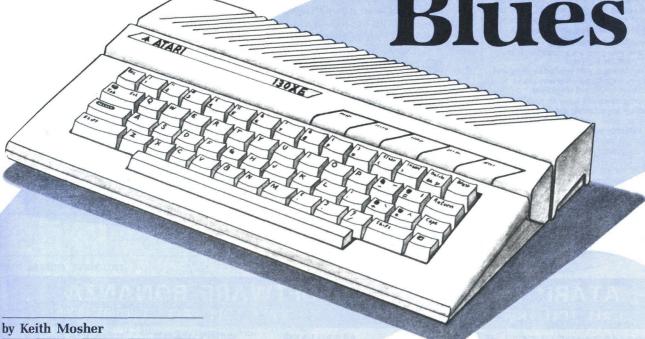
Includes Lifetime Warranty

XCICC, Inc. / 2804 Arnold Rd. / Salina, KS 67401 / 913-827-0685

CIRCLE #142 ON READER SERVICE CARD



The 8-Bit Blues



Two years ago I was painfully hacking away on my 400, typing in ANALOG Computing programs and saving them on my 410 program recorder. All the while, I hoped and prayed I could scrape up enough bucks for an 800, or maybe an 800XL.

About a year ago I finally scraped those bucks together. At the same time, the price of the 800XL dropped from about \$225 to \$175. Wow! What a savings—or so I thought. A few months later, when I bought my first disk drive, I watched the 800XL price drop like a skydiver who hadn't deployed his chute.

I thought I had it made. I thought I had the leading edge of the Atari computer line. But no! Prices for the 800XL continued to drop—and were followed by lower prices for the 130XE and (with trumpets rather muted) the 520ST.

I mean, there I was, sitting at my desk, just sitting there at my desk, and I realized I had just bought a brand new, obsolete machine. I mean, right there in ANALOG Computing were all kinds of powerful machines with (what?) 500+K of RAM. I was just getting used to having 64K!

Tech is tech.

As a high school student in the seventies (before home computers) I had aspirations of being an Audio Engineer, and now I am one. At the time, the hip thing was to have the leading edge in Audio Technology.

I was proud of my portable GE cassette recorder and my Philco record player, but I lusted after the real hi-fi units pictured in Stereo Review, Mix and the other audio magazines. Eventually, I purchased one of those leading edge hi-fi units. . . But there, in the magazine the very next day, was a bigger, better, super new hi-fi unit. I had bought a brand new, obsolete machine?

I realized then that the wallet is not as fast as the engineer. I also realized that I did (and still do) have an excellent hi-fi system. Oh yes, better things will come along, but I don't need them all. Some of them go beyond the limits of my needs. Someday I will have to replace the whole thing, but it serves me well for now.

Back to the future.

So here I sit, typing on my trusty antiquated 8-bit machine, and it's working just fine. I can't afford to trash a complete system because something new has come on-line, especially if what I have meets my needs. Oh yes, someday I'll get one of those new-fangled, whiz-bang machines, but for now...

There's the rub.

You see, those of us involved in any technology are alert enough to keep abreast of the latest developments, however, our wallets take a slower pace. And worse, unlike hi-fi enthusiasts, we hackers live or die by our magazines for lowcost programs, insight into our toys, tricks and reviews.

The magazines live on hackers and advertisers. The advertisers live on the computer manufacturers. The computer manufacturers must: (1) sell the user hardware; (2) sell the user more hardware; and (3) sell the user new hardware; or go out of business.



is that program going wrong? BASIC VIEW helps you locate troublesome bugs by showing you the step by step execution of any Atari Basic program. BASIC VIEW traces through a listing of your program in a way that is easy to follow, easy on the eyes. You control the speed of execution, when the program will start and stop, and what variables you'd like to see displayed as your program executes.

- •Works with all Graphic Modes
- ·Separates your program's output from the **BASIC VIEW Listing Trace**
- Does not Interfere with your Basic Programs. •Helps you understand programs you've copied from books and magazines.

Debugging does not have to be a painful, frustrating experience. BASIC VIEW will save your time and your patience, providing valuable help to beginners and pros. The cost is minimal. You won't want to write another program without BASIC VIEW.

Available for all Atarl 400s, 800s, 800XLs, and XE computers with at least 48K. BASIC VIEW is only \$20.00 (Illinois residents add \$1.25 for sales tax.)

Softview Concepts P.O. Box 1325, Lisle, IL 60532

For more info, call (312) 968-0605 Atari is a registered trademark of Atrai inc.

3. 8-Bit Blues continued

So what does this mean to those of us who've just spent all we have to buy brand new, obsolete machines? It means less space in magazines for the information we can use. It means looking at ads for equipment we can't have yet. It means articles that are of little use, other than to make us feel a little puny while working with our toys. It means watching our \$175 computers sell for \$69.95.

But wait. Your system is working just fine now, and perhaps the wait will be beneficial. Let someone else find the bugs. Give the technical designers a chance to correct their mistakes (and don't try to tell me they don't make any).

Desiderata.

If you compare your system with others you may become vain and bitter, by turns, for there will always be systems greater and lesser than your own. Stay interested in your system, however humble, if it serves you; it's a real possession in the changing fortunes of time.

Sure, someday you'll save up, relegate the ol' 8-bit to the kids or the garage, and buy one of the new "Top of the Line" (for that week). But do not forsake your system until it's really old. Only a few can afford to scrap a system just because something better exists.

Remember, as I learned with hi-fi: if it meets your needs, hang on to it. Enjoy it. Be at peace with your system and soul. With all its shame, drudgery and broken dreams, it's still a beautiful, useful system.

Keith Mosher has a Bachelor's of Media Arts degree from the University of South Carolina, where he's been working as an audio engineer/producer since 1980, producing soundtracks for instructional TV and film. He started computing in 1981 with an Atari 400, the Atari BASIC manual and ANALOG Com-

ATARI* HARDWARE & SOFTWARE BONANZA

MANUALS

De Re Atari \$12.50

850 Operators Manual \$15.00

BARE BOARDS

850 Interface Board \$10.00

810 Analog Board \$ 1.09

CONNECTORS

Includes Parts List, Instructions. 810 Rear Board \$ 1.00

\$ 5.00

Inside Atari Basic

Pilot Primer

CALL TOLL FREE 1-800-551-9995

CALL TOLL FREE 1-800-551-9995

\$5.00

\$5.00

\$7.50

\$3.50

800/400 MODULES **NEW PARTS COMPLETE WITH IC'S**

50 EA. All Modules

Complete

- 800 Main Board • 800/400 CPU with GTIA . 800 10K "B" 0.S. Module • 16K RAM CX853
- 400 Main Board . 800 Power Supply Board

800XL Modulator

INTEGRATED CIRCUITS

• CPU C014337 50 · CPII C010745 EA. · PIA C010750 • ROM C012399B C012296 Antic • ROM C012499E Pokey C012294 • ROM C014599B · PIA C014795 • FDC 1771 • CPU Delay C060472

DISK DRIVE

CUSTOM 810 DRIVE

Fully operational 810 mounted on acrylic base. No case, Includes I/O cable and power supply

\$95°

AMERICAN TV

Mail Order and Repair 15338 Inverness St., San Leandro, CA 94579 1988 Washington Ave., San Leand NO MINIMUM ORDER! We accept money orders, personal checks or C.O.D.s. VISA, Master/Card okay. Credit cards restricted to purchases over \$20.00. No personal checks on C.O.D. — **Shipping**: \$4.00 shipping and handling on orders under \$150.00. Add \$2.00 for u.u.u. orders. Series subject to change without notice.

Much more! Send SASE for free price list.

*Atari is a registered trademark of Atari Corp. \$150.00. Add \$2.00 for C.O.D. orders. California residents include 61/2% sales tax.

810 MODULES SAMS Service Manuals for 800/400 or 800XL . . \$19.50 ea.

810 Side Board \$29.50 810 Side with Data Sep . . . \$39.50 810 Power Board \$15.00 810 Analog Board \$10.00 \$12.50

ADDITIONAL IC'S

GTIA	. C0	14	80	5 .		 \$ 9.95
2793 F	DC .				 	 \$19.50

BOARD SETS

800 4 PIECE BOARD SET Includes 800 Main, CPU, 10K ROM,

and Power Board \$28.50 810 BOARD SET

Includes Sideboard with Separator,

Rear Power and Analog Boards . \$57.50

POWER PACKS

Replaceme	nt T	ransfor	for	
800/400,	810,	1050,	120	OXL,
1020			\$1	4.50
800XL/600	XL,			
130XL P				
1027 Trans	siomer .		. \$2	5.00

Includes manual

ridge while programming to eliminate the severe errors in the Built-

SOFTWARE

I/O 13PIN PC Mount \$ 4.50 I/O Cable Plug Kit 30 Pin Cart. Socket \$ 4.50

EDITOR/ASSEMBLER

Editor/Assembler Cartridge Write your own High Speed 6502 Machine Language Programs. Written by Atari, Works with all Atari Computers except St. Manual Included

BASIC CARTRIDGE

Basic Rev. "A" Cartridge works with all Atari Computers except ST. 800XL Owners Note! Use this Cart

Telelink I Cart	\$3.00
Donkey Kong Cart	\$5.00
Pac-Man Cartridge	\$5.00
Eastern Front Cart	\$5.00
Buck Rogers Cart	\$5.00
Crossfire Cart	\$5.00
Chicken Cartridge	\$5.00
Picnic Paranoia Cart	\$5.00
Mr. Cool Cart	\$5.00
Clown and Balloon Disk.	\$5.00
Stratos Disk	\$5.00
Serpentine Disk	\$5.00
Lymbrynth Disk	\$5.00
Magneto Bugs Disk	\$5.00
The Factory Disk	\$5.00
The Pond Disk	\$5.00

Missile Command \$5.00 Galaxian Cart. Defender Cart. Spanish Lessons Frogger Cassette

Crossfire Cass. \$2.50 Clown and Balloon Cass. . 2.50 Picnic Paranoia Cass. . . \$2.50

Protector II Cass. \$2.50 Nautalus Cass. \$2.50 \$10.00 Basic Cartridge . . Editor Assembler Cart. . \$15.00

Q*Bert Cartridge \$10.00 Popeye Cartridge \$10.00 Kindercomp Cart. . . . \$10.00 \$10.00

TOLL FREE 1-800-551-9995

SERVICE RATES

Flat Service Rates below include Parts & Labor, 60-Day Warranty

*****		٠,												
800														\$49.50
850														\$49.50
														\$49.50
1200	X	L												\$49.50
810														\$79.50
800X	L													\$49.50
1050														\$85.00
800	Ke	У	b	0	a	rc		R	e	p	ai	r		\$35.00
														xchanged
with	reb	u	ile	da	ab	le	•	е	X	cl	12	ın	ge	. Include
\$7.00	re	ti	ır	n	S	hi	n	ni	n	n	а	n	ďί	nsurance

10K Rev. "B" 0.S. Upgrade for older 800/400's

End printer/disk drive timeouts and OTHER ERRORS. Many new programs require Rev. B. Type the following neek in Basic to see if you have Rev. B. PRINT PEEK(58383). If the result equals 56 you have the old 0.S. Three Chip ROM set with instructions . . . \$7.50. Complete 10K Rev. B moduls \$9.50

GTIA Upgrade For 800/400

810 Drive Upgrade

Greatly improve the performance of your older 810. Stabilize the speed with the addition of an analog and redesigned rear board. Instructions included S 27.50

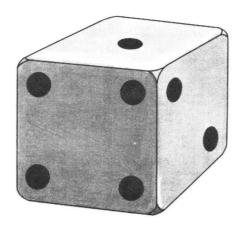
> IN CA CALL 415-352-3787

CIRCLE #109 ON READER SERVICE CARD



Atarzee

A computer dice game



by Clayton Walnum

Okay, folks, here it is! No more scrambling for score pads, no more frantic searches for a complete set of dice and, best of all, no more score tallying! This version of a popular dice game makes your Atari do all the work. Slap that joystick into port 1 and follow me.

Typing it in.

Type in Listing 1, then use
Unicheck (see page 12) to be
sure there are no errors. If
you're using a disk system,
save the program and skip
ahead to the next section.

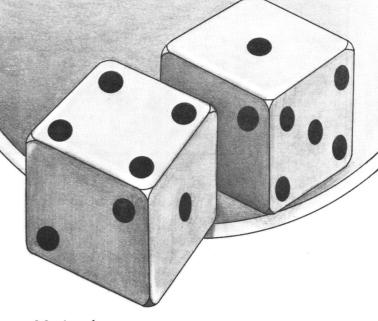
If you are a cassette user,
you should add the lines
in Listing 2 after you've
checked your typing with

Roll them bones.

Unicheck.

When the program is run, you will be asked for the number of players, then prompted to enter their names.
Up to six people can play, and each name may have up to ten characters.

The scoreboard is then drawn and the first player's name will appear at the top of the screen. Push the joystick forward to make your first roll. When the roll has been completed, you'll see a cursor appear beneath the dice.



Moving the

joystick left or right moves the cursor. Place the cursor under the die you wish to reroll, then press

the trigger to finalize your choice. You may choose as many dice to reroll as you wish. If you make a mistake, just press the trigger again—and your choice will be reversed. When you're through, push the joystick forward (be careful not to do this prematurely), and the dice you chose will reroll.

Your third roll is accomplished this same way. If at any time you don't want to reroll, just push the stick forward without marking any of the dice. After your final roll, a

cursor will appear on the scoreboard. Using the joystick, place the cursor over the appropriate score category and press the trigger. Your score will then be registered.

When one player's turn is completed, the next player should press the trigger, and his scoreboard will appear on the screen. This is not necessary in a one-player game. At the end of the game final scores are displayed. Press the trigger to play again.

If you know how to play poker, you should be able

Software Discounters **America**

S.D of A

Battalion Commander (D) . \$25 Battle of Antietam (D) .. \$33

For Orders Only—1-800-225-7638 PA Orders—1-800-223-7784 Customer Service 412-361-5291

Open Saturday

- Free shipping on orders over \$100 in continental USA
- No surcharge for VISA/MasterCard
- Your card is not charged until we ship

ACCESS		7
Beach Head (D)	\$21	
ACADEMY	. 42 1	3
Typing Tutor 520ST	600	
ACTIVISION	. \$23	
Borrowed Time 520ST	622	
Creek American Cook	. \$33	į
Great American Cross	646	
Country Road Race (D)	. \$16	
Hacker (D)	. \$16	3
Hacker 520S1	. \$29	1
Master of the Lamps(D)	. \$16	- 3
Mindshadow (D)	. \$16	1
Mindshadow (D)	. \$33	į
Music Studio	\$33	i
Space Shuttle(D)	\$16	3
AMERICAN EDUCATION	NAL	1
COMPUTER		ı
Biology (D)	. \$16	
French (D)	\$16	
Grammar (D)	\$16	Ì
Science: Grades 3/4 (D)	\$16	9
Science: Grades 5/6 (D)	\$16	
French (D) . Grammar (D) . Science: Grades 3/4 (D) . Science: Grades 5/6 (D) . Science: Grades 7/8 (D)	\$16	,
Spanish (D)	\$16	
Spanish (D) U.S. Geography (D)	\$16	I
U.S. History (D)	\$16	ı
World Geography (D)		ı
ADTIMORY		ı
Bridge 4.0 (D)	\$16	ı
Bridge 520ST	\$19	ı
Bridge 4.0 (D) Bridge 520ST Compubridge 520ST Hotel Alien (D) Strip Poker (D) Strip Poker 520ST	\$19	ı
Hotel Alien (D)	.\$9	ı
Strip Poker (D)	\$21	ı
Strip Poker 520ST	Call	ı
Female Data Disk 1	\$16	ı
Male Data Disk 2	\$16	ı
Female Data Disk 1 Male Data Disk 2 Female Data Disk 3	\$16	ı
AVALON HILL		ı
Computer Title Bout (D)	\$19	ı
Jupiter Mission 1999 (D)	\$33	ı
Panzer Jagd (D)	\$19	ı
T.A.C. (D)	\$26	I
BATTERIES INCLUDED		I
B-Graph (D) Degas 520ST Home Pak (D)	\$25	ı
Degas 520ST	\$26	۱
Home Pak (D)	\$33	ı
Paperclip (D)	\$39	ı
Paperclip (D)	Call	ı
BRODERBUND		ı
Bank St. Writer (D)	\$33	ı
Championship		I
Loderunner (D)	\$19	ì
Karateka (D)	\$19	ı
Karateka (D)	\$26	
Print Shop Graphics		
Library #1 (D)	\$16	1
Library #1 (D)		
Library #2 (D)	\$16	Ì
Print Shop Graphics		ĺ
Library #3 (D)	\$16	,
Library #3 (D)	\$14	ĺ
Stealth (D)		i

011100 412 00
The Goonies
All Titles Available Cal
ELECTRONIC ARTS Archon (D) Archon II (D) Financial Cookbook 520ST Hard Hat Mack (D) Movie Maker (D) Murder Zinderneuf (D) Music Const. Set (D) One-on-One (D) Pinball Const. Set (D) Racing Destruction Set (D) Realm of Impossibility (D) Seven Cities of Gold (D)

HBJ Computer SAT (D)\$49
HIPPOPOTAUMUS Backgammon 520ST \$25
Computer Alamanac 520ST \$23
ICD
P.R. Connection Call
US Doubler\$49
Ballyhoo (D)
Cutthroats (D) \$23.
Deadline (D) \$29
Enchanter (D) \$23
Hitchhiker's Guide
to the Galaxy (D) \$23
Infidel (D) \$25
Planetfall (D) \$23
Seastalker (D) \$23
Sorcerer (D) \$25
Spellbreaker (D) \$29
Starcross (D) \$29
Suspect (D) \$25
Suspended (D)\$29

MICROLEAGUE		
General Manager (D) . \$25 1985 Team Data Disk (D) \$16 MICROPROSE F15 Strike Eagle (D) . \$23 Kennedy Approach (D) . \$23 Silent Service (D) . \$23 MINDSCAPE Bank St. Music Writer (D) \$26 Brataccus 520ST . \$33 Crossword Magic(D) . \$33 Halley Project— A Mission in Our Solar System (D) . \$26 Tinka's Mazes (D) . \$9 Tink's Adventure (D) . \$9 Tink's Subt. Fair (D) . \$19 Tonk in the Land of Buddy-Bots (D) . \$9 MIRAGE CONCEPTS Atari ST Tool		MICROLEAGUE
5 1985 Team Dafa Disk (D) \$16 MICROPROSE F15 Strike Eagle (D) \$23 Kennedy Approach (D) \$23 MINDSCAPE Bank St. Music Writer (D) \$26 Brataccus 520ST \$33 Crossword Magic(D) \$33 Halley Project— A Mission in Our Solar System (D) \$26 Tinka's Mazes (D) \$9 Tink's Subt. Fair (D) \$19 Tonk in the Land of Buddy-Bots (D) \$9 MIRAGE CONCEPTS A MIRAGE CONCEPTS A MIRAGE CONCEPTS	9	Baseball (D) \$25
MICROPROSE F15 Strike Eagle (D) \$23 Kennedy Approach (D) \$23 Silent Service (D) \$23 Silent Service (D) \$23 Silent Service (D) \$26 Silent Service (D) \$26 Silent Service (D) \$26 Silent Service (D) \$26 Silent Service (D) \$30 Si		General Manager (D) \$25
F15 Strike Eagle (D)	5	1985 Team Data Disk (D) \$16
Kennedy Approach (D)	3	MICROPROSE
Kennedy Approach (D)		F15 Strike Eagle (D) \$23
MINDSCAPE Bank St. Music Writer (D) \$26 Brataccus \$20ST . \$33 Crossword Magic(D) . \$33 Halley Project— A Mission in Our Solar System (D) . \$26 Tinka's Mazes (D) . \$9 Tink's Adventure (D) . \$9 Tink's Subt. Fair (D) . \$19 Tonk in the Land Of Buddy-Bots (D) . \$9 MIRAGE CONCEPTS Atari ST Tool		Kennedy Approach (D) \$23
MINDSCAPE Bank St. Music Writer (D) \$26	9	Silent Service (D)\$23
Bank St. Music Writer (D) \$26 Brataccus 520ST \$33 Crossword Magic(D) \$33 Halley Project— A Mission in Our Solar System (D) \$26 Tinka's Mazes (D) \$9 Tink's Adventure (D) \$9 Tink's Subt. Fair (D) \$19 Tonk in the Land of Buddy-Bots (D) \$9 MIRAGE CONCEPTS Atari ST Tool		
Brataccus 520ST	5	
A Halley Project— A Mission in Our Solar System (D)	3.	Brataccus 520ST \$33
A Halley Project— A Mission in Our Solar System (D)	9	Crossword Magic(D) \$33
Solar System (D)	3	Halley Project—
Tinka's Mazes (D) \$9 Tink's Adventure (D) \$9 Tink's Subt. Fair (D) \$19 Tonk in the Land of Buddy-Bots (D) \$9 MIRAGE CONCEPTS Atari ST Tool		A Mission in Our
Tinka's Mazes (D) \$9 Tink's Adventure (D) \$9 Tink's Subt. Fair (D) \$19 Tonk in the Land of Buddy-Bots (D) \$9 MIRAGE CONCEPTS Atari ST Tool		Solar System (D) \$26
Tink's Adventure (D) \$9 Tink's Subt. Fair (D) \$19 Tonk in the Land of Buddy-Bots (D) \$9 MIRAGE CONCEPTS Alari ST Tool		
Tink's Subt. Fair (D)\$19 Tonk in the Land of Buddy-Bots (D)\$9 MIRAGE CONCEPTS Atari ST Tool		Tink's Adventure (D)\$9
MIRAGE CONCEPTS Atari ST Tool	3	Tink's Subt. Fair (D) \$19
MIRAGE CONCEPTS Atari ST Tool	5	Tonk in the Land of
MIRAGE CONCEPTS Atari ST Tool Box Vol. 1\$23	9	
Atari ST Tool Box Vol. 1\$23	9	MIRAGE CONCEPTS
Box Vol. 1 \$23	5	
	9	Box Vol. 1 \$23

Ultima 4 (D) \$39
Acct. Payables (D)\$44
Acct. Receivables (D) \$44
General Ledger (D) \$44
PENGUIN/POLARWARE
Crimson Crown 520ST \$25
Graphics Magician
Painter (D) \$23
Oo-Topos 520ST \$25
Sword of Kadash 520ST . \$25
The Coveted Mirror 520ST \$25
Transylvania 520ST \$25
PRECISION
Superscript XL/XE \$49
PROFESSIONAL
SOFTWARE
Fleet System 2 WP w/70,000
Word Spell Checker (D) \$39
PRYORITY
Forbidden Quest 520ST . \$25
QUICKVIEW
Zoom Racks 520ST \$49



REGENT

...we promise performance

SC-100

* monitor cables available for \$7.

The SC-100 is designed to work with Apple, Atari, Commodore, IBM-PCjr and other personal computers. Includes audio speaker and standard earphone jack; provides the most vibrant brilliant colors; tested, proven, and rated as the best color monitor available

List \$29995 Madness Price \$14900 Sold to the first 85 customers

Print Shop (D) \$26		
Print Shop Graphics	Super Boulder Dash (D)	Wishbringer (D) \$23
Library #1 (D) \$16	Prices too low to	Witness (D)
Print Shop Graphics		Zork 1 (D)
Library #2 (D) \$16	EPYX	Zork 2 or 3 (D)\$25
Print Shop Graphics	Ballblazer (D) \$25	 All titles in stock for
Library #3 (D) \$16	Jumpman Jr. (R)\$9	520 ST—Call for prices
PS Paper Refill \$14		KOALA
Stealth (D)		Light Pen w/Painter (D) . \$35
CBS	Rescue on Fractalus (D) \$25	LJK
Addition/Subt. (D) \$16		Data Perfect (D)\$33
Big Bird's Spc.		Letter Perfect (D) \$33
	The Eidolon (D) \$25	Spell Perfect (D) \$29
Dr. Seuss Puzzler (D) \$7		LEARNING COMPANY
	The Pawn 520ST \$29	Bumble Games (D) \$25
Decimals: Mult/Div (D) \$16		Colorasaurus (D)\$19
Ernie's Magic Shapes (R) \$7	Spy vs. Spy (D)	Magic Spells (D) \$23
Fractions: Add/Subt (D) . \$16	Spy vs. Spy 2 (D) \$19	
Fractions: Mult/Div (D) . \$16	FTL/SOFTWARE HEAVEN	Reader Rabbit (D) \$23
Math Mileage (R)\$7	Sundog 520ST\$25	Word Spinner (D) \$23
Mult/Div (D)	GAMESTAR \$25	MARK OF THE UNICORN
Timebound (R)\$7	Baseball (D)	Hex 520ST \$25
		PC Intercomm 520ST \$79
Webster Word Game (D) . \$7 CONTINENTAL/ARRAYS		The Final Word 520ST \$95
	On Track Racing (D) \$16	MICHTRON
Home Accountant (D) \$44		Flip Side 520ST \$25
Book of Adventure	Check Minder 520ST Call	Gold Runner ST \$25
Games II		M-Disk 520ST \$25
DATASOFT	Phone Book 520ST \$39	Mudpies 520ST \$25
Alternate Reality (D) \$25		Soft Spool 520ST \$25
Never Ending Story (D) . \$19	Sargon III (D)	Time Bandit 520ST \$33

Forth 520ST	. \$33
H & D Base	
MISC.	
Abacus Books 520ST	Call
Dragonriders of Pern (D).	. \$9
Gorf (R)	\$7
Hard Hat Mack (D)	\$9
Miner 2049'er (R)	\$7
Omnitrend Universe	\$59
Omnitrend Universe 2 ST	\$49
Popeye (R)	. \$9
ST Talk	\$12
Wizard of Wor (D)	. \$7
OSS	
Action (R)	\$49
Action Tool Kit (D)	\$19
Basic XE (R)	
Basic XL (R)	
Basic XL Tool Kit (D)	\$19
DOS XL (D)	\$19
MAC 65 (R)	\$49
MAC 65 Tool Kit (D)	\$19
Personal Disk	
Kit 520ST	\$25
Personal Pascal 520ST	\$49
Writer's Tool w/	
Spell Checker (R)	\$44
ORIGIN	
Ultima 3 (D)	\$34

Regent Spell 520ST \$33
SCARBOROUGH
Mastertype (D)\$23
Net Worth (D) \$44
SIERRA ON LINE
Black Cauldron 520ST \$25
Kings Quest 2 520ST \$33
Ultima 1 (D) \$23
Ultima 2 (D) \$37
Ultima 2 520ST \$39
Winnie the Pooh 520ST . \$19
SIMON & SCHUSTER
N.Y. Times Crossword
Puzzles Vol. 1 or 2 (D) . \$16
Spy Hunter (R) \$29
SPINNAKER
Adventure Creator (R) \$9
Alphabet Zoo (R) \$9
Cosmic Combat (R) \$9
Delta Drawing (R) \$9
Facemaker (R)\$9
Fraction Fever (R) \$9
Homework Helper 520ST . \$33
Kung Fu-Exploding
Fist 520ST \$33
Letter Scrambler (R) \$9
Story Machine (R) \$9

Wico Boss

Wico Bat Handle

Regent Word 520ST \$33

Breakthrough in the Ardennes (D)	\$27
Broadsides (D)	\$37 \$25
Carrier Force (I))	\$37
Colonial Conquest(D)	\$25
Combat Loador (D)	¢25
Computer Ambush (D) Computer Baseball(D)	. \$37
Computer Baseball(D)	. \$25
Computer QB (D)	. \$25
Field of Fire (D)	
Gemstone Warrior (D)	. \$23
Kampfgruppe (D)	. \$37
Questron (D)	\$33
NAM (D)	\$25
Panzer Grenadier (D)	\$25
Rails West (D)	\$37
Six-Gun Shootout (D)	\$25
Six-Gun Shootout (D) U.S.A.A.F. (D)	\$37
War In Russia (D)	\$49
SUBLOGIC	
	\$32
SYNAPSE	
Essex (D)	\$25
Lode Runner's	
Rescue (D)	. \$19
Mindwheel (D)	. \$25
Syn-Caic (D)	. \$33
Syn-File (D)	. \$33
TELLARIUM	
Amazon 520ST	. \$33
Fahrenheit 451 520ST	. \$33
Nine Princes in	
Amber 520ST	. \$33
Perry Mason: Case of the Mandarin	
	\$33
TRONIX	. 333
S.A.M. (D)	\$39
UNISON WORLD	
	. 933
Print Master 520ST	\$26
Print Master 520ST VIP TECHNOLOGIES	\$26
	\$26
Print Master 520ST VIP TECHNOLOGIES VIP Professional 520ST WEEKLY READER	\$26
Print Master 520ST VIP TECHNOLOGIES VIP Professional 520ST WEEKLY READER	\$26 Call
Print Master 520ST VIP TECHNOLOGIES VIP Professional 520ST WEEKLY READER	\$26 Call
Print Master 520ST VIP TECHNOLOGIES VIP Professional 520ST WEEKLY READER	\$26 Call \$19 \$19
Print Master 520ST VIP TECHNOLOGIES VIP Professional 520ST WEEKLY READER Stickybear ABC's (D) Stickybear Numbers (D) Stickybear Opposites (D	\$26 Call \$19 \$19
Print Master 520ST VIP TECHNOLOGIES VIP Professional 520ST WEEKLY READER Stickybear ABC's (D) Stickybear Numbers (D) Stickybear Opposites (D	\$26 Call \$19 \$19
Print Master 520ST VIP TECHNOLOGIES VIP Professional 520ST WEEKLY READER Stickybear ABC's (D) Stickybear Numbers (D)	\$26 Call \$19 \$19 \$19
Print Master 520ST VIP TECHNOLOGIES VIP Professional 520ST WEEKLY READER Stickybear ABC's (D) Stickybear Numbers (D) Stickybear Opposites (E WINDHAM CLASSICS Treasure Island 520ST Wizard of Oz 520ST	\$26 Call \$19 \$19 \$19 \$19
Print Master 520ST. VIP TECHNOLOGIES VIP Professional 520ST WEEKLY READER Slickybear ABC's (D) Stickybear Numbers (D) Stickybear Opposites (C WINDHAM CLASSICS Treasure Island 520ST Wizard of Oz 520ST XLENT	\$26 Call \$19 \$19 \$19 \$19 \$25 \$25
Print Master 520ST VIP TECHNOLOGIES VIP Professional 520ST WEEKLY READER Stickybear ABC's (D) Stickybear Numbers (D) Stickybear Opposites (E WINDHAM CLASSICS Treasure Island 520ST Wizard of Oz 520ST XLENT Megafont (D)	\$26 Call \$19 \$19 \$19 \$25 \$25 \$16
Print Master 520ST VIP TECHNOLOGIES VIP Professional 520ST WEEKLY READER Stickybear ABC's (D) Stickybear Opposites (E WINDHAM CLASSICS Treasure Island 520ST Wizard of Oz 520ST XLENT Megafont (D) Page Designer (D)	\$26 Call \$19 \$19 \$19 \$25 \$25 \$16 \$19
Print Master 520ST. VIP TECHNOLOGIES VIP Professional 520ST WEEKLY READER Slickybear ABC's (D) Stickybear Opposites (I WINDHAM CLASSICS Treasure Island 520ST XLENT Megafont (D) Page Designer (D) Rubber Stamp (D)	\$26 Call \$19 \$19 \$19 \$25 \$25 \$16 \$19 \$19
Print Master 520ST VIP TECHNOLOGIES VIP Professional 520ST WEEKLY READER Stickybear ABC's (D) Stickybear Numbers (D) Stickybear Opposites (E WINDHAM CLASSICS Treasure Island 520ST Wizard of Oz 520ST XLENT Megafont (D) Page Designer (D) Rubber Stamp (D) Typesetter (D)	\$26 Call \$19 \$19 \$19 \$25 \$25 \$16 \$19 \$19 \$23
Print Master 520ST VIP TECHNOLOGIES VIP Professional 520ST WEEKLY READER Stickybear ABC's (D) Stickybear Opposites (E WINDHAM CLASSICS Treasure Island 520ST Wizard of Oz 520ST XLENT Megafont (D) Rubber Stamp (D) Typesetter (D) Typesetter (D) Typesetter 520ST	\$26 Call \$19 \$19 \$19 \$25 \$25 \$16 \$19 \$19
Print Master 520ST VIP TECHNOLOGIES VIP Professional 520ST WEEKLY READER Stickybear ABC's (D) Stickybear Numbers (D) Stickybear Opposites (E WINDHAM CLASSICS Treasure Island 520ST Wizard of Oz 520ST XLENT Megafont (D) Page Designer (D) Rubber Stamp (D) Typesetter (D) Typesetter (D) Typesetter 520ST ACCESSORIES Ape Face Printer	\$26 Call \$19 \$19 \$19 \$25 \$25 \$16 \$19 \$19 \$23
Print Master 520ST. VIP TECHNOLOGIES VIP Professional 520ST WEEKLY READER Slickybear ABC's (D) Stickybear Opposites (I WINDHAM CLASSICS Treasure Island 520ST XLENT Megafont (D) Rubber Stamp (D) Typesetter (D) Typesetter (D) Typesetter (D) Typesetter 520ST ACCESSORIES Ape Face Printer Interface	\$26 Call \$19 \$19 \$19 \$25 \$25 \$16 \$19 \$19 \$23
Print Master 520ST VIP TECHNOLOGIES VIP Professional 520ST WEEKLY READER Stickybear ABC's (D) Stickybear Numbers (D) Stickybear Opposites (E WINDHAM CLASSICS Treasure Island 520ST Wizard of Oz 520ST XLENT Megafont (D) Page Designer (D) Rubber Stamp (D) Typesetter (D) Typesetter (D) Typesetter 520ST ACCESSORIES APE Face Printer Interface Astra Disk Drives	\$26 Call \$19 \$19 \$19 \$25 \$25 \$16 \$19 \$23 \$26
Print Master 520ST VIP TECHNOLOGIES VIP Professional 520ST WEEKLY READER Stickybear ABC's (D) Stickybear Opposites (E WINDHAM CLASSICS Treasure Island 520ST Wizard of Oz 520ST XLENT Megafont (D) Rubber Stamp (D) Typesetter (D) Typesetter (D) Typesetter 520ST ACCESSORIES Ape Face Printer Interface Astra Disk Drives Boous SS DD	\$26 Call \$19 \$19 \$19 \$25 \$25 \$16 \$19 \$19 \$23 \$26 \$44 Call
Print Master 520ST VIP TECHNOLOGIES VIP Professional 520ST WEEKLY READER Stickybear ABC's (D) Stickybear Opposites (E WINDHAM CLASSICS Treasure Island 520ST Wizard of Oz 520ST XLENT Megafont (D) Rubber Stamp (D) Typesetter (D) Typesetter (D) Typesetter 520ST ACCESSORIES Ape Face Printer Interface Astra Disk Drives Boous SS DD	\$26 Call \$19 \$19 \$19 \$25 \$25 \$16 \$19 \$19 \$23 \$26 \$44 Call
Print Master 520ST VIP TECHNOLOGIES VIP Professional 520ST WEEKLY READER Stickybear ABC's (D) Stickybear ABC's (D) Stickybear Opposites (E WINDHAM CLASSICS Treasure Island 520ST Wizard of Oz 520ST XLENT Megafont (D) Page Designer (D) Rubber Stamp (D) Typesetter 520ST ACCESSORIES Ape Face Printer Interlace Astra Disk Drives Bonus SS, DD \$6. Bonus SS, DD \$7. Bulk Disks SS DD \$5.	\$26 Call \$19 \$19 \$19 \$25 \$25 \$25 \$19 \$23 \$26 \$44 Call \$99Bx 7100
Print Master 520ST VIP TECHNOLOGIES VIP Professional 520ST WEEKLY READER Stickybear ABC's (D) Stickybear ABC's (D) Stickybear Opposites (E WINDHAM CLASSICS Treasure Island 520ST Wizard of Oz 520ST XLENT Megafont (D) Page Designer (D) Rubber Stamp (D) Typesetter (D) Typesetter (D) Typesetter 520ST ACCESSORIES Ape Face Printer Interface Astra Disk Drives Bonus SS, DD \$6: Bonus SS, DD \$7: Bulk Disks SS,DD \$59 Compuserve Starter Kit	\$26 Call \$19 \$19 \$19 \$25 \$25 \$25 \$16 \$19 \$23 \$26 \$24 Call \$98 \$24 \$17 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10
Print Master 520ST VIP TECHNOLOGIES VIP Professional 520ST WEEKLY READER Stickybear ABC's (D) Stickybear Opposites (E WINDHAM CLASSICS Treasure Island 520ST Wizard of Oz 520ST XLENT Megafont (D) Rubber Stamp (D) Typesetter (D) Typesetter (D) Typesetter (D) Typesetter 520ST ACCESSORIES Ape Face Printer Interlace Astra Disk Drives Bonus SS, DD \$6. Bonus DS, DD \$7. Bulk Disks SS, DD \$50 Compuserve Starter Kit D, D, U-Print A	\$26 Call \$19 \$19 \$19 \$25 \$25 \$25 \$16 \$19 \$23 \$26 \$24 Call \$199Bx \$190Bx \$190Bx \$190Bx \$190Bx \$190Bx \$190Bx \$190Bx \$190Bx \$190Bx \$190Bx
Print Master 520ST VIP TECHNOLOGIES VIP Professional 520ST WEEKLY READER Stickybear ABC's (D) Stickybear ABC's (D) Stickybear Oxposites (E WINDHAM CLASSICS Treasure Island 520ST Wizard of Oz 520ST XLENT Megafont (D) Page Designer (D) Rubber Stamp (D) Typesetter (D) Typesetter 520ST ACCESSORIES Ape Face Printer Interface Astra Disk Drives Bonus SS, DD \$6. Bonus DS, DD \$7. Bulk Disks SS, DD \$59 Compuserve Starter Kit D, D, U-Print A Disk Case (Holds 50)	\$26 Call \$19 \$19 \$19 \$25 \$25 \$25 \$16 \$19 \$23 \$26 \$24 Call \$98 \$24 \$17 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10
Print Master 520ST VIP TECHNOLOGIES VIP Professional 520ST WEEKLY READER Slickybear ABC's (D) Slickybear Numbers (D) Slickybear Opposites (E WINDHAM CLASSICS Treasure Island 520ST Wizard of Oz 520ST XLENT Megafont (D) Page Designer (D) Rubber Stamp (D) Typesetter (D) Typesetter (D) Typesetter (D) Typesetter (D) Typesetter (D) Some Some Stamp (D) Some Some Stamp (D) Some Some Some Some Some Some Some Some	\$26 Call \$19 \$19 \$19 \$25 \$25 \$19 \$19 \$23 \$23 \$26 \$19 \$19 \$23 \$24 Call \$19 \$19 \$25 \$25 \$25 \$25 \$25 \$25 \$25 \$25 \$25 \$25
Print Master 520ST VIP TECHNOLOGIES VIP Professional 520ST WEEKLY READER Stickybear ABC's (D) Stickybear Opposites (E WINDHAM CLASSICS Treasure Island 520ST Wizard of Oz 520ST XLENT Megafont (D) Rubber Stamp (D) Typesetter (D) Typesetter (D) Typesetter (D) Typesetter 520ST ACCESSORIES APE Face Printer Interface Astra Disk Drives Bonus SS, DD \$6.8 Bonus DS, DD \$7.1 Bulk Disks SS,DD \$59 Compuserve Starter Kit D, D, U-Print A Disk Case (Holds 50) Dows Jones News Retrieval Membershir	\$26 Call \$19 \$19 \$19 \$25 \$25 \$19 \$23 \$26 \$44 Call \$99Bx \$99Bx \$170 \$19 \$19 \$19 \$19 \$19 \$19 \$19 \$19 \$19 \$19
Print Master 520ST VIP TECHNOLOGIES VIP Professional 520ST WEEKLY READER Stickybear ABC's (D) Stickybear ABC's (D) Stickybear Oxposites (E WINDHAM CLASSICS Treasure Island 520ST Wizard of Oz 520ST XLENT Megafont (D) Page Designer (D) Rubber Stamp (D) Typesetter (D) Typesetter (D) Typesetter 520ST ACCESSORIES APE Face Printer Interface Astra Disk Drives Bonus SS, DD S59 Compuserve Starfer Kit D, D, U-Print A Disk Case (Holds 50) Dows Jones News Retrieval Membershii Kit (6 hrs.)	\$26 Call \$19 \$19 \$19 \$25 \$25 \$26 \$16 \$19 \$23 \$26 \$26 \$27 \$27 \$27 \$27 \$27 \$27 \$27 \$27 \$27 \$27
Print Master 520ST VIP TECHNOLOGIES VIP Professional 520ST WEEKLY READER Stickybear ABC's (D) Stickybear ABC's (D) Stickybear Oxposites (E WINDHAM CLASSICS Treasure Island 520ST Wizard of Oz 520ST XLENT Megafont (D) Page Designer (D) Rubber Stamp (D) Typesetter (D) Typesetter (D) Typesetter 520ST ACCESSORIES Ape Face Printer Interlace Astra Disk Drives Bonus SS, DD \$6. Bonus DS, DD \$7. Bulk Disks SS,DD \$9. Compuserve Starter Kit D. D. U-Print A Disk Case (Holds 50) Dows Jones News Retrieval Membershij Kit (5 hrs.)	\$26 Call \$19 \$19 \$19 \$19 \$25 \$25 \$25 \$16 \$19 \$23 \$26 \$19 \$23 \$26 \$19 \$23 \$26 \$14 \$299Bx \$214 \$214 \$299Bx \$214 \$214 \$214 \$214 \$214 \$214 \$214 \$214
Print Master 520ST VIP TECHNOLOGIES VIP Professional 520ST WEEKLY READER Stickybear ABC's (D) Stickybear ABC's (D) Stickybear Oxposites (E WINDHAM CLASSICS Treasure Island 520ST Wizard of Oz 520ST XLENT Megafont (D) Page Designer (D) Rubber Stamp (D) Typesetter (D) Typesetter (D) Typesetter 520ST ACCESSORIES Ape Face Printer Interlace Astra Disk Drives Bonus SS, DD \$6. Bonus DS, DD \$7. Bulk Disks SS,DD \$9. Compuserve Starter Kit D. D. U-Print A Disk Case (Holds 50) Dows Jones News Retrieval Membershij Kit (5 hrs.)	\$26 Call \$19 \$19 \$19 \$19 \$25 \$25 \$25 \$16 \$19 \$23 \$26 \$19 \$23 \$26 \$19 \$23 \$26 \$14 \$299Bx \$214 \$214 \$299Bx \$214 \$214 \$214 \$214 \$214 \$214 \$214 \$214
Print Master 520ST VIP TECHNOLOGIES VIP Professional 520ST WEEKLY READER Stickybear ABC's (D) Stickybear Opposites (E WINDHAM CLASSICS Treasure Island 520ST Wizard of Oz 520ST XLENT Megafont (D) Page Designer (D) Rubber Stamp (D) Typesetter 520ST ACCESSORIES ADE Face Printer Interface Astra Disk Drives Bonus SS, DD \$6. Bonus DS, DD \$7. Bulk Disks SS, DD \$5. Compuserve Starter Kit D. D. U-Print A Disk Case (Holds 50) Dows Jones News Retrieval Membershit Kit (5 hrs.) Kraft Joysticks MPP300ST Modern MDP1000E Modern C	\$26 Call \$19 \$19 \$19 \$19 \$25 \$25 \$26 \$19 \$19 \$23 \$26 \$26 \$19 \$54 \$27 \$100 \$19 \$54 \$99 \$54 \$99 \$54 \$99 \$54 \$99 \$554 \$99 \$99 \$554 \$99 \$99 \$99 \$99 \$99 \$99 \$99 \$99 \$99 \$9
Print Master 520ST VIP TECHNOLOGIES VIP Professional 520ST WEEKLY READER Stickybear ABC's (D) Stickybear Opposites (E WINDHAM CLASSICS Treasure Island 520ST Wizard of Oz 520ST XLENT Megafont (D) Rubber Stamp (D) Typesetter (D) Typesetter (D) Typesetter (D) Typesetter 520ST ACCESSORIES Ape Face Printer Interlace Astra Disk Drives Bonus SS, DD \$6. Bonus DS, DD \$7. Bulk Disks SS, DD \$59 Compuserve Starter Kit D, D, U-Print A Disk Case (Holds 50) Dows Jones News Retrieval Membershig Kit (5 hrs.) Kraft Joysticks MPP300ST Modem MPP1000E Modem CIMPP1100 Printer Inc.	\$26 Call \$19 \$19 \$19 \$19 \$19 \$25 \$25 \$25 \$16 \$19 \$23 \$26 \$44 Call \$199Bx \$27 \$14 \$54 \$54 \$54 \$54 \$54 \$54 \$54 \$55 \$14 \$15 \$14 \$14 \$14 \$14 \$14 \$14 \$14 \$14 \$14 \$14
Print Master 520ST VIP TECHNOLOGIES VIP Professional 520ST WEEKLY READER Slickybear ABC's (D) Stickybear Opposites (E WINDHAM CLASSICS Treasure Island 520ST Wizard of 0z 520ST XLENT Megafont (D) Page Designer (D) Rubber Stamp (D) Typesetter (D) Typesetter (D) Typesetter 520ST ACCESSORIES APE Face Printer Interface Astra Disk Drives Bonus SS, DD \$6. Bonus SS, DD \$7. Bulk Disks SS, DD \$50 Compuserve Starter Kit D, D, U-Print A Disk Case (Holds 50) Dows Jones News Retrieval Membershi Kit (5 hrs.) Kraft Joysticks MPP300ST Modem MPP1000E Modem CI MPP1150 Printer Int.	\$26 Call \$19 \$19 \$19 \$19 \$25 \$25 \$26 \$19 \$19 \$23 \$26 \$26 \$19 \$54 \$27 \$100 \$19 \$54 \$99 \$54 \$99 \$54 \$99 \$54 \$99 \$554 \$99 \$99 \$554 \$99 \$99 \$99 \$99 \$99 \$99 \$99 \$99 \$99 \$9

P.O. BOX 111327—DEPT. AN— BLAWNOX, PA 15238

*Ordering and Terms: Orders with cashier check or money order shipped immediately. Personal/company checks, allow 3 weeks clearance. No C.O.D.'s. Shipping: Continental U.S.A.—Orders under \$100 add \$3; free shipping on orders over \$100. PA residents add 6% sales tax. AK, HI, FPO-APO—add \$5 on all orders. Sorry—no International orders. Defective merchandise will be replaced with same merchandise. Other returns subject to a 15% restocking charge—NO CREDITS! Return must have authorization number (412) 361-5291. checks, allow 3 weeks clearance. No C.O.D.'s. Shipping: Continental Prices subject to change without notice. MODEM OWNERS: Type Go SDA on Compuserve's Electronic Mall to see our On-Line Catalog of over 700 software titles for Atari, Commodore & Apple. Plus our new Bargain Basement Shoppe with great Software values under \$10. Go SDA Now!

to jump right into **Atarzee**. The mechanics of the game are simple: you "roll" the dice in an effort to get the best hand. You're allowed three rolls, after which you must pick a score category. You must always pick a category—even if it means scoring a zero.

The scores on the left side of the board are calculated by totalling the number of that category rolled. So, if you had three sixes in your hand and chose the six category, your score would be 18 for that turn. If the subtotal of points earned in categories one through six is 63 or more, you get 35 bonus points.

The right side of the scoreboard should look familiar to poker players. If you roll a three-of-a-kind and pick that category, your score will be the total of the dice. Ditto for four-of-a-kind. A full house (three of one number and two of another) gets you 25 points. A small straight is four consecutive numbers (appearing on-screen in any order) and scores 30 points. A large straight is five consecutive numbers, score is 40. Chance is simply the total of the dice. An **Atarzee** is five-of-a-kind. The first of these rolled is 50 points. Each one after that adds 100 bonus points, plus you can still use the dice in another category!

When the scoreboards are filled, the game is over; final scores are displayed. The highest I've seen is 635. You'll be up into the wee hours to beat that.

One final word: the disk version of **Atarzee** saves the ten highest scores to disk. When playing, be sure you leave the disk in the drive, so the program has access to the data. If you ever wish to start a new high scoreboard, go to DOS and delete the file ATARZEE.DAT. The next time you run the program, a new file will be created. The cassette version retains high scores until the computer's turned off. Roll 'em!

Listing 1. BASIC listing.

130 NEXT X 140 5 (N16,P) = 5 (N7,P) + 5 (N15,P) + 5BT: 5=N0 RETURN 150 REM ********PRINT SCORES ******* 160 IF NP=N1 AND S=N1 THEN RETURN
170 N1\$=N\$(P*N10-N9,P*N10):POSITION N9,N0:? N1\$:R=N0:C=N16:S=N1
180 IF NP=N1 AND NOT START THEN BETTS 190 FOR X=N1 TO N13:SOUND N0,X*N15,N10,N8:SOUND N1,255-X*N15,N10,N8:FOR Y=N1
TO N5:NEXT Y 200 SOUND NO, NO, NO, NO: SOUND N1, NO, NO, N 210 R=R+N2:IF R>N15 THEN R=N2:C=36 220 IF S(X,P) <N0 THEN POSITION C,R:? " ● ":NEXT X:GOTO 250 230 SC\$=STR\$(S(X,P)):IF LEN(SC\$)=N1 TH EN SC\$(2)=" " 240 POSITION C,R:? SC\$:NEXT X 250 IF S(N14,P) < N0 THEN POSITION 35,N1 4:? "0 ":GOTO 290 250 SC\$=STR\$(\$\frac{1}{2}\frac{1}{ 260 5C\$=5TR\$(5(N14,P)):IF LEN(SC\$)=N2 THEN 5C\$ (N3) =" 270 IF LEN(SC\$)=N1 THEN SC\$(N2,N3)=" 280 POSITION 35,N14:? SC\$
290 POSITION N6,N16:? S(N15,P);" ":POS
ITION N15,N16:? S(N16,P);" ":START=N0 : RETURN 320 SOUND NO.100,N12,N15:SOUND NO,NO,N 0,NO:NEXT Y:RETURN 330 REM ***TOTAL DICE VALUES******
340 FOR X=N1 TO N6:C(X)=N0:NEXT X:FOR
D=N1 TO N5:C(D(D))=C(D(D))+N1:NEXT D:R
ETURN ETURN
350 REM *******CHECK FOR ATARZEE******
360 IF YZ THEN RETURN
370 GOSUB 340:FOR X=N1 TO N6:IF C(X)=N
5 THEN YZ=N1:POP :GOTO 390
380 MEXT X:RETURN
390 C2=PEEK(712):FOR X=N0 TO 255 STEP
N2:POKE 712,X:SOUND N0,X,N10,N8:SOUND
N1,255-X,N10,N8:MEXT X
400 POKE 712,C2:SOUND N0,N0,N0,N0:SOUND
N1,N0,N0,N0
410 IF 5(N14,P)<=N0 THEN RETURN
420 5(N14,P)=5(N14,P)+100:POSITION 35,N14:? 5(N14,P) 420 5(N14,P) - 5(N14,P) N14:? 5(N14,P) 430 GOSUB 120:POSITION N15,N16:? 5(N16,P); ":RETURN 440 REM *****ERASE PROMPT LINE***** 450 POSITION 20,N16:? #N6;" :: RETURN 460 REM *****MAIN GAME LOOP***** 470 P=P+N1:POKE 77,N0:IF P>NP THEN P=N 480 YZ=N0:TRN=TRN+N1:IF TRN>N13*NP THE N 1200 N 1200 490 GOSUB 160:POSITION 21,N16:? "PUSH STICK TO ROLL"; 500 IF STICK(N0) <> N14 THEN 500 510 GOSUB 450:FOR D=N1 TO N5:GOSUB 310 :NEXT D:GOSUB 360 520 POSITION 20,N16:? "PICK DICE TO RE ROLL" 530 C=N11:POSITION C,21:? "A" 540 ST=STICK(N0):IF ST=N14 THEN 650 550 IF STRIG(N0)=N0 THEN 610 560 IF STK>N7 AND STK>N11 THEN 540 570 C0=C IF ST=N7 THEN C=C+N4:IF C>27 THEN 590 IF ST=N11 THEN C=C-N4:IF C(N11 THE

N C=M11 600 POSITION C0.21:? " ":POSITION C.21 :? "^";:FOR X=N1 TO 50:NEXT X:GOTO 540 610 D=(C-N7)/N4:IF D(D) (N0 THEN POSITI ON C,N17:? " ";:GOTO 630 620 POSITION C,N17:? "*"; 630 D(D)=-D(D) 639 V(V)=-D(D) 640 SOUND NO.100,N10,N8:FOR X=N1 TO N1 0:NEXT X:SOUND NO.N0,N0,N0:FOR X=N1 TO 100:NEXT X:GOTO 540 650 GOSUB 450:FOR X=N11 TO 27 STEP N4: POSITION X,N17:? "";:NEXT X:POSITION C.21:? ""; 660 FOR X=N1 TO 100:NEXT X:RL=RL+N1 670 FOR D=N1 TO N5:IF D(D)>N0 THEN NEX D:60T0 690 680 GOSUB 310:NEXT D 690 GOSUB 360 700 IF RL=N2 THEN RL=N0:GOTO 720 710 GOTO 520 22, N16:? "SELECT CATEGORY 720 POSITION ": A=79:C=N2:R=N2:POSITION C,R:? 730 IF STRIG(NO)=NO THEN 820 740 ST=STICK(NO):IF ST(>N13 AND ST(>N1 4 THEN 730 750 RO=R:CO=C 760 IF ST=N14 THEN R=R-N2:IF R<N2 AND C=N2 THEN R=N14:C=21
770 IF R<N2 AND C=21 THEN R=N12:C=N2
780 IF ST=N13 THEN R=R+N2:IF R>N12 AND C=N2 THEN R=N2:C=21 790 IF R>N14 THEN R=N2:C=N2 800 LOCATE CO.RO, A: POSITION CO, RO:? CH R\$ (A-128) 810 LOCATE C.R.A:POSITION C.R:? CHR\$(A +128):FOR X=N1 TO 50:NEXT X:GOTO 730 820 POSITION C.R:? CHR\$(A)::A=N7*(C=21)+R/N2:GOSUB 450:GOSUB 340 830 IF S(A,P)>=N0 THEN SOUND N0.100,N1 908 5(A,P)=N0:NM=R/N2+N2:FOR D=N1 TO N 5:5(A,P)=5(A,P)+D(D):NEXT D 905 FOR X=N1 TO N6:IF C(X)>=NM THEN GO 5UB 90:GOTO 1120 910 NEXT X:5(A,P)=N0:GOSUB 90:GOTO 112 920 REM *******FULL HOUSE******* 930 F2=N0:F3=N0 940 FOR X=N1 TO N6:IF C(X)=N0 THEN NEX T X:GOTO 980 950 IF C(X)=N2 THEN F2=N1 960 IF C(X)=N3 THEN F3=N1 970 NEXT X 980 IF F2 AND F3 THEN 5(N10,P)=25:GOSU B 90:GOTO 1120 990 5(N10.P)=N0:G05UB 90:G0T0 1120 1000 REM *********************** 1010 CM=N0:NM=R/N2:SC=(NM-N1)*N10:FOR X=N1 TO N6:IF C(X)(N1 THEN CM=N0:NEXT X:GOTO 1040 1020 CN=CN+N1:IF CN=NM THEN S(NM+N7,P) 1020 CH-CHTHIIF CH-NG INEN SCHMTN/,P. =SC:GOSUB 90:GOTO 1120 1030 NEXT X 1040 S(NM+N7,P)=N0:GOSUB 90:GOTO 1120 1120

1070 REM ********ATARZEE******** 1080 FOR X=N1 TO N6:IF C(X)=N5 THEN 11 AA 1090 NEXT X:5(N14,P)=N0:GOTO 1110 1100 5(N14,P)=50 1110 GOSUB 90 1180 GOTO 470 1190 REM *******GAME OVER****** 1200 CN=N0:P=N1:FOR X=N1 TO N10:PR(X)= NO:NEXT X 1210 IF S(N16,P) <= RS(N10) THEN 1290 1220 CN=CN+N1:IF S(N16,P)>RS(CN) THEN 1249 1230 GOTO 1220 1240 FOR X=N9 TO CN STEP -N1:R5(X+N1)= R5(X):PR(X+N1)=PR(X):R5\$((X+N1)*N10-N9 . (X+N1)*N10)=R5\$(X*N10-N9,X*N10) 1245 NEXT X 1250 A=N0:N1\$=N\$(P*N10-N9,P*N10):FOR X =N1_TO N10:IF N1\$(X,X) <>" " THEN NEXT X:GOTO 1280 1260 A=A+N1:IF A=N2 THEN FOR Y=X-N1 TO N10:N1\$(Y,Y)="\B":NEXT Y:GOTO 1280 1270 NEXT X 1270 NEXT X 1280 R5(CN)=5(16,P):PR(CN)=N1:R5\$(CN*N 10-N9,CN*N10)=N1\$:FL=N1 1290 CN=N0:P=P+N1:IF P(=NP THEN 1210 1300 IF FL THEN CLOSE #1:OPEN #N1.N8,N 0,"D:ATARZEE.DAT" 1310 IF FL THEN FOR X=N1 TO N10:? #N1; R5(X):? #N1;R5\$(X*N10-N9,X*N10):NEXT X CLOSE #M1:FL=N0 1320 GRAPHICS N17:POSITION N7,N4:? #N6;"SD0335":POSITION N7,N5:? #N6;" 1330 FOR X=N1 TO NP:N1\$=N\$(X*N10-N9,X* N10) 1340 FOR Y=N1 TO N10:IF N1\$(Y,Y)=" " T HEN N1\$(Y,Y)="-":NEXT Y:GOTO 1360 **1350 NEXT** 1350 NEXT Y
1360 POSITION N3,N6+X:? #N6;N1\$:POSITI
ON N13,N6+X:? #N6;"-";5(N16,X)
1370 SOUND N0,X*30,N10,N8:SOUND N1,255
-X*30,N10,N8:FOR Y=N1 TO 20:NEXT Y:SOU
ND N0,N0,N0,N0:SOUND N1,N0,N0,N0
1380 NEXT X:GOSUB 1460
1390 GRAPHICS N17:POSITION N3,N0:? #N6 "record scores" 1400 POSITION N3, N1:? #N6;"-----1410 FOR X=N1 TO N10:POSITION N3,X+N4: ? #N6;RS\$(X*N10-N9,X*N10);"@";R5(X):NE XT X 1420 FOR Z=N1 TO N10:IF PR(Z)=N0 THEN NEXT Z:GOTO 1450 1430 FOR X=1 TO 50:NEXT X 1440 POSITION N2,Z+N4:? #N6;"}":GOSUB 60:NEXT 1450 GOSUB 1460:GOTO 1690 1460 POKE 711,N15:POSITION 2,22:? #6;" 1400 FORE 711, N15: POSTTION 2,22: 740, W 1470 FOR X=N1 TO 50: NEXT X: POKE 711, N0 :IF STRIG(N0)=N0 THEN RETURN 1480 FOR X=N1 TO 50: NEXT X: POKE 711, N1 4:GOTO 1470 1490 DIM D\$(102),N\$(60),N1\$(N10),BD\$(4 0),YZ(N6),D(N6),C(N6),S(N16,N6),SC\$(N3),RS\$(100),RS(N10),PR(N10)

1510 BD\$=" | teee | tee 1520 N\$(N1)=" ":N\$(60)=" ":N\$(N2)=N\$ 1530 GRAPHICS NO:POKE 752,N1:POKE 710, NO:DL=PEEK(560)+PEEK(561)*256+N4:POKE DL+N6,N6:POKE DL+N7,N6:POKE DL+N17,N7
1540 POSITION N2,N5:? "CLAYTON WALNUM'
5":POSITION N6,N15:? "ELEPTED"
1550 FOR X=N1 TO N5:POSITION X*N5+N3,N
8:? D\$(86,102):FOR Y=255 TO N0 STEP -2
0:SOUND N0,Y,N10,N8:NEXT Y:NEXT X 1560 SOUND NO,NO,NO,NO:FOR X=NO TO 255 STEP N4:POKE 709,N10*(INT(X/N16)=X/N1 1570 SOUND NO, X, N10, N8: SOUND N1, 255-X, 1570 SOUND NO,X,N10,N8:SOUND N1,Z55-X, N10,N8:NEXT X 1580 SOUND N0,N0,N0,N0:SOUND N1,N0,N0, N0:POKE 709,N10 1590 POKE 82,N0:POSITION 21,N19:? "COP YRIGHT (C) 1986 BY ANALOG COMPUTING":F OR X=N1 TO 500:NEXT X 1600 GRAPHICS N0:POKE 559,N0:POKE 752, N1:POKE 710,50:FOR X=N3 TO 22:POKE DL+ X,N6:NEXT X:? CHR\$(125):POKE 559,34 1610 TRAP 1610:POSITION N0,N3:? #N6;"# OF PLAYERS ";:POSITION N12,N3 1620 INPUT NP:IF NP(N1 OR NP)N6 THEN 1 1630 FOR X=N1 TO NP 1640 TRAP 1640:POSITION NO,N3+X:? "#"; X;"'S NAME";:INPUT N1\$ 1650 N\$(X*N10-N9,X*N10-(N10-LEN(N1\$))) =N15:NEXT X 1660 POSITION N1,22:? #N6;"ONE SECOND. 1670 TRAP 1890: OPEN #N1, N4, NO, "D: ATARZ EE.DAT"

1680 FOR X=N1 TO N10:INPUT #N1;A:R5(X)
-A:INPUT #N1;N1\$:R5\$(X*M10-N9,X*N10)=N

1\$:NEXT X:TRAP 4000

1690 FOR X=N1 TO N16:FOR Y=N1 TO N6:5(X,Y)=-N1:NEXT Y:NEXT X

1700 FOR X=N1 TO N4:FOR Y=N1 TO N6:5(N 7,Y)=N0:5(N15,Y)=N0:5(N16,Y)=N0:NEXT Y

:NEXT X:P=N0:TRN=N0:S=N0:START=N1

1710 GRAPHICS N0:DL=PEEK(560)+256*PEEK
(561)+N4:POKE DL-N1,64+N6:POKE DL+N2,N

6:POKE DL+N18,N6:POKE DL+N19,134

1720 POKE 752,N1:POKE 712,N8:POKE 709,
N0:POKE 710,22:POKE 708,118

1730 RESTORE :FOR X=N0 TO N19:READ A:P

OKE 1536+X,A:NEXT X

1740 DATA 72,138,72,169,12,162,0,141,1 EE.DAT" 1740 DATA 72,138,72,169,12,162,0,141,1 0,212,141,23,208,142,24,208,104,170,10 4.64 1750 POKE 512,NO:POKE 513,N6:POKE 5428 6,192 1760 POSITION N1,N1:? "r 1770 FOR X=N2 TO N12:POSITION N1,X:? B D\$:NEXT X 1780 POSITION N1, N13:? " 1790 POSITION N1, N14:? BD\$: POSITION N1 ,N15:? "1

0":POSITION 21,N4:? "4 of a kind----0"
1850 POSITION 21,N6:? "Full house---0":POSITION 21,N8:? "Small straight-0"
1860 POSITION 21,N10:? "Large straight
-0":POSITION 21,N12:? "Chance------0"
1870 POSITION 21,N14:? "ATARZEE------0"
1870 POSITION N1,N0:? "DIEPER:":POSITI
ON N0,N16:? "SORUS:":POSITION N9,N16:?
"SCORE:"
1880 FOR X=N1 TO N5:POSITION N6+X*N4,N
18:? D\$(X*N17-N16,X*N17):NEXT X:GOTO 4
60
1890 R5\$(N1)=" ":R5\$(100)=" ":R5\$(N2)=
R5\$
1900 CLOSE #N1:OPEN #N1,N8,N0,"D:ATARZ
EE.DAT"
1910 FOR X=N1 TO N10:R5(X)=0:? #N1;R5(X):? #N1;R5\$(X*N10-N9,X*N10):NEXT X
1920 CLOSE #N1:GOTO 1690

CHECKSUM DATA.

(see page 12)

10 DATA 620,145,907,207,85,111,404,255,618,758,261,24,767,184,560,5906
160 DATA 771,824,655,131,295,500,211,1
63,0,95,523,809,528,595,799,6899
310 DATA 130,647,473,444,396,356,474,7
92,358,769,106,553,581,313,888,7280
460 DATA 99,206,838,322,911,132,598,66
5,473,763,541,110,469,612,781,7520
610 DATA 505,434,685,141,912,644,298,6
90,2,221,712,466,768,192,163,6833
760 DATA 506,670,428,683,941,325,300,3
76,116,518,581,84,802,626,50,7006
905 DATA 10,140,154,134,413,376,384,79
5,634,689,399,939,615,532,987,7201
1050 DATA 689,569,853,141,174,126,895,489,307,946,841,62,49,889,58,7088
1200 DATA 689,569,853,141,174,126,895,489,307,946,841,62,49,889,58,7088
1200 DATA 689,569,853,141,174,126,895,489,307,946,841,62,49,889,58,7088
1200 DATA 689,566,55,711,743,549,593,84,5
42,451,673,62,11,705,41,5285
1340 DATA 609,546,196,531,180,924,818,826,931,597,63,376,42,959,370,7968
1490 DATA 160,31,546,879,739,949,985,3
39,308,181,886,520,226,951,681,8381
1640 DATA 511,975,6,764,9,822,536,265,595,292,153,276,227,129,548,6108
1790 DATA 491,348,730,813,395,122,962,479,380,797,551,841,945,83,7937

Listing 2. BASIC listing.

1300 REM 1310 REM 1670 GOTO 1890 1680 REM 1900 REM 1910 FOR X=N1 TO N10:R5(X)=0:NEXT X:GO TO 1690 1920 REM

CHECKSUM DATA.

(see page 12)

1300 DATA 284,285,747,301,302,799,304, 3022



COMPUTER EYES, capture software and MAGNIPRINT II + Only \$114.95

COMPUTER EYES/MAGNIPRINT Camera System
A complete ready to run system for those without access to video equipment. This system includes Computer Eyes, Magniprint II+. A high quality B/W video camera, and a IO ft coaxial cable with appropriate connectors. Only \$299.95

COMPUTER EYES alone (with capture and display software only) \$99.95

Computer Eyes Gr.9 Acquisition Software ... 12

Digitize your picture with the perfect hardware/software combination: COMPUTER EYES and MAGNIPRINT II. Digitize your voice with Parrot.

Charles !

Computer Eyes lets you take any form of video input and saves it as a high-resolution graphics screen. You can use a video camera, VCR, TV output, video disk, other computers, etc. Now you can capture your picture, your friends or any video image and show it on an Atari computer. Computer Eyes is an innovative slow scan device that connects between any standard video source and your Atari computer (see the review in A.N.A.L.O.G. magazine).

- Do a complete Hi-Res scan in under 6 seconds
- · Unique multi-scan mode provides realistic grey scale images in 24 seconds, and up for more detail scans.
- Full one-year warranty on parts and labor
- Plugs into your Atari joystick ports and uses a standard video phono plug

Now anyone can create the kind of graphics seen in this ad. When Computer Eyes is combined with Magniprint II+, you get unique capabilities that no other system can offer

- Print your pictures in up to 19 different sizes, including poster sizes several feet across
- Print pictures with full shading for a level of realism even better than your TV screen
- Take your Computer Eyes images and modify them with your Koala Pad, Atari Touch Tablet, Micro Illustrator program, or Magniprint's special touch-up feature
- Works with Foson Gemini Panasonic NEC Citoh and other compatible dot-matrix printers (850 interface or equivalent required)
- Supports all Magniprint II + features

Magniprint II is a versatile and powerful program which will meet

if not all your print out needs." ANALOG MAGAZINE

Print vour Atari® graphics like you've never seen before!

The plus is in the shading — now Magniprint lets you print the highest quality reproductions of your screens available anywhere. It lets you choose the shading you want for the different colors and shades on the screen. It allows you to adjust the shades while your picture is displayed on the screen, so what you get to what you see is what you get to make your picture is displayed on the screen, so what you get what you see is what you get your screen.

on your screen.
This new feature is perfect for printing pictures from Koala Pad, Touch Tablet, Micro Illustrator, and others. It will amaze you when you print pictures from Computer Eyes or Strip Poker.

Now get your pictures shaded the way you want them

Now get your pictures shaded the way you want them Magniprint II is the nost powerful print utility available for your computer! It is the norty software that can accurately print GTIA modes with it is hades. Prints a great print a great of the print o

NOW prints text modes 0,1,2 with full Magniprint capabilities.

y Magniprint II order get "PRINTALL" FREE, PRINTALL prints your programmen. It clearly prints "INVERSE" and all the Atari graphics characters. This alone is worth the price. FREE: With every Magniprint II o

DIGITIZE YOUR VOICE

PARROT...So good, It is being used by professional musicians



All new sound digitalizer and synthesizer for your Atari. Tired of low-quality mechanical sounding voice output? Now you can make any Atari speak in your own voice. Tired of four tone sound? Now any Atari can play a whole orchestra complete with a singing choir. "The Parrot" digital sound synthesizer system lets you do all this and much more.

How it works — The Parrot* system plugs into your joystick port and lets you record pure digital sound from your stereo, TV, microphone, or any other sound source. The special Parrot software lets you play back this high quality sound on any Atari system with no special hardware this high quality sound on any Atari system with no special hardware needed. It even lets you put this unbelievable sound right into your own programs, that will run on anyone's Atari. It also includes digital sequencer software that lets you turn your Atari into a synthesizer comparable to those costing thousands of dollars. Turn any natural sound into a musical instrument, or design your own custom sounds imagine playing a song with the sounds of a dog's bark, a chinese gong, a car's honk, your own voice, or anything your imagination can come up with. It turns your keyboard into an organ and lets you instantly swift hetween up to night offferent digital sounds. switch between up to nine different digital sounds, each with three full octaves of notes. Recording time varies depending on available memory and quality level desired. You've got to hear it to believe it!!!!

THE PARROT digital input hardware and playback/synthesizer soft-

ware with sample sounds and demos

All For Only \$39.95



UPPERSONATOR

CARTRIDGE TO DISK COPY SYSTEM

CARTRIDGE TO DISK COPY SYSTEM Yes, for only \$29.95, you can make working copies of all your Atari computer cartridges (16K or less). Our special package will let you save your cartridges to ordinary disk files. They will run exactly like the originals when used with the Impersonator. Each disk holds up to 12 cartridge programs. Now you can put all your real cartridges away for safe keeping and use the Impersonator for everything. YES, IT REALLY WORKS. The Impersonator does everything the high-priced cartridge back-up systems do...and more. ONLY \$29.95



Cassette Operating System (c.o.s.)

The only cassette program you'll ever need.

COPIES: C.O.S. Copies all Atari® cassettes - Copies disk files

to cassettes - Copies single boot cassettes to disk - Stores any cassette program to disk for safe keeping.

DISPLAYS: Displays any cassette program in hex, ascii, or converts it to a readable assembler language file. (Compatible with Atari® assembler cartridge)

ALTERS: Modifies the size, contents or combine and dissect whole programs. Modified files can be saved to disk or multi-stage cassette

Includes complete cassette tutorial. Including adding music to your cassette.

All this on one disk for only \$24.95

All for your Atari Computers. Disk drive and 48K required. Atari is a registered trademark of Atari Corporation. "Denotes products not related to Alpha Systems



used by advanced software pirates, and the copy protection methods used to stop them. It offers clear and understandable explanations sophisticated enough for software writers of any scale yet easy enough for a beginner just wanting to learn more about Atari® computers. A <u>MUST READ</u> FOR ALL ATARI® OWNERS.

BOOK INCLUDES: • Duplicate sectoring • Custom disk formatting • Creating "BAD" sectors • Hardware data keys • Legal protection like copyrights, trade secrets, patents • Protecting BASIC programs • Self-modifying Code • ROM + EPSOM cartridges • Hidden serial numbers • Self-destructing programs • Freeware • Misassigned sectoring • Misassigned sectoring • Much, much more

DISK INCLUDES: • Directory mover • VTOC scanner • Duplicate sector finder • Sector mover • Bad sector writer • Sector data displayer Autorun builder • Other useful programs.

This comprehensive book and disk package should not be confused with low quality imitations offered elsewhere.

BOOK II + DISK II: Advanced Software Protection. This all new sequel starts where the highly acclaimed <u>Book I</u> leaves off.<u>Book II</u> is the most up-to-date resource available for the Atari® owner. Includes reviews and explanations of products such as: The Happy Enhancement,* The Impossible,* The Scanalyzer,* The Chip,* The Pill,* and Super Pill,* & many others

Book II: Tells you specifically what they copy, what they won't, how they are used, and the details of how they work. Book II also includes such topics as: • Transmitting protected programs • Copying disks with more than 19 sectors/track. Includes the newest protection methods by companies like Synapse* AND Electronic Arts* • Data encryption • Phreaking methods • Program worms • Logic bombs • Bank-select cartridges • Random access codes • New trends in software law • cartridges • Random access codes • New trends in software law • Sample BASIC + Assembler programs • On-line security • And much

DISK II INCLUDES: • Automatic program protector • Custom format detector • Newest protection demos • Forced password appender • Data encrypter • And much more.

Book + Disk Packages only \$24.95 each or Special Offer both for only \$39.95



MAIL TO: Alpha Systems/4435 Maplepark Rd./Stow, OH 44224 Send check or money order. Include \$2.00 shp. & hdlg. Ohio residents add 5½% sales tax. CALL: 216-374-7469 to charge to MasterCard or VISA

BONUS: Order any 3 programs and get FREE your choice

Deluxe Space Games
Disk Pak 1000 or (3 games on a disk)

(Utility Package) ALL PRODUCTS WORK WITH ALL ATARI 8 BIT COMPUTER SYSTEMS

CIRCLE #146 ON READER SERVICE CARD



PANAK STRIKES!

by Steve Panak

Of all the games I play, I especially enjoy simulations, whether of sports, strategy, or swords and sorcery. It's their realism—a little more at stake than bright pixels dueling to the death in black, cathode-tube space. It's troublesome, but expected, that these games also take the most time to analyze.

As the arcade games die a lingering death, the void is being filled by simulations, from SSI and from Microprose. In the past few months, I've toyed with some Microprose titles, to find that they've gracefully combined realism with historical accuracy. More than a game, each offering is an experience.

In fairness, I should give SSI its share of the spotlight. Thus, I've forsaken other temptations this month, to bring you a review of a couple of simulations so substantial you'll *smell* the gunpowder.

BATTALION COMMANDER by David Hille COLONIAL CONQUEST by Dan Cermak SSI 883 Stierlin Rd., Bldg. A-200 Mountain View, CA 94043-1983 48K Disk \$39.95

Simulations are the hardest kind of software to create and sell. The well-crafted simulation must be both realistic and simple to play—two diametri-

cally opposed qualities. To increase realism, you must also increase the variables accounted for. As the variables increase, so must the choices at any given point in the game. The more choices you have, the more difficult it is to make all those choices, and the more difficult and time-consuming the game becomes.

It's a vicious circle. Even if you should create a piece of simulation software which breaks this cycle, you still have a larger barrier to your success—selling it. The simulation market isn't as large as the arcade action market (although the latter is rapidly shrinking). Most people simply don't wish to invest the time it takes to learn to play a realistic simulation. However, if you wish to invest a little time, these two games are well worth it.

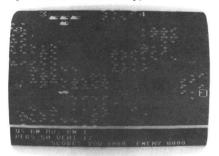
Battalion Commander places you in command of an army battalion. This unit has companies and platoons, as well as various support (supply regiments and engineers), all fiercely loyal to you, their fearless leader. However, as mentioned before, you might be powerless to adequately guide your troops if the controls bog you down.

This proves not to be a problem in **Battalion Commander**, as most commands are issued to the level of authority just below you. These junior commanders actually order the troops to their destinies, just as in reality.

Using the joystick or keyboard, you move the cursor about on-screen, either to scroll the display (revealing hidden areas), or to gain information about some of your units or enemy units. Of course, not all the information about the enemy is correct—it may be stale or faulty.

Actual commands must be issued with the keyboard, by pressing two keys. The first identifies the unit to whom the command is issued; the second is the command itself. You can tell units to go somewhere, shoot something, cease fire or, in the case of the special units, build (or destroy) a bridge or deliver supplies.

The easy-to-use summary of controls on the back of the manual makes the game easy to get into. Once commands are learned, they can be issued rapidly. This is important, as in this real-time simulation, the enemy isn't likely to wait for you to make up your mind (unless you hit the PAUSE key).



Battalion Commander.

To keep the game interesting, there are four scenarios available. In "attack," the object is to break through the enemy line, while in "defense," the tables are turned, and you must repel an attacker. In "pursuit and exploitation" (my personal favorite), once you've broken through the defenses, you must destroy as much as possible. In the "meeting engagement," two forces of roughly equal strength meet and slug it out.

These four games are multiplied by three options, to obtain quite a multitude of game variations. You can change the nationalities and relative strengths of the units, as well as the terrains (and with forty available, it's unlikely you'll ever use them all).

The manual is set up quite nicely and is organized to allow you to rapidly start playing the game (a trait past SSI manuals haven't always had). It's divided into sections containing basic instructions, detailed explanations and appendices summarizing most of the game's variables. Battalion Commander offers you a realistic glimpse of what it's like to lead an army battalion into a number a various combat situations.

Colonial Conquest, on the other hand, offers megalomaniacs out there the lure of world domination. Basically a computerized version of the old board game Risk, this program adds subtleties which make play much more enjoyable, exciting and realistic.

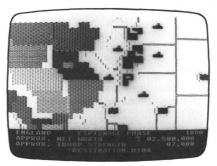
Six major countries (England, Germany, France, America, Japan and Russia), each controlled by either the computer or a player, attempt to attain the age-old goal of world domination. Whether any one achieves this goal depends on cum-

ning and diplomacy, along with a pinch of treachery.

There are 120 minor countries to gain control of - plus any of the major countries not taken by a human gamer. Control is obtained through the use of six game phases. In the "build" phase, you build up your armies; in "fortify," you give money to friendly countries so they can build up their armies. "Economic aid," has you supply money to major and neutral minor countries, while, in "subversion," you bribe another country's forces to weaken them. In "movement," predictably, you move your forces. Finally, the "combat" phase is performed by the computer, which determines the outcome of all hostilities in a cold and calculating manner.

Points are awarded for countries captured, deducted for countries lost. They're also awarded for gaining territory. You can play to a set score, or indefinitely. For those long games, a multiple save-game feature is included. Three scenarios (1880 and 1914—which set up world allegiances as they were in those years—and a random set-up) round out the features of the game.

Basically, the easiest way to know whether you'll like this game or not is to determine whether you like Risk. (I have to assume that most people have had some exposure to that classic game.)



Colonial Conquest.

Colonial Conquest plays pretty much like Risk, except that it's much more realistic, taking into account many more variables and allowing for many more options.

It also allows for diplomacy—that is, agreements between countries. What form of treachery and backstabbing these agreements take is entirely up to you. The only restriction is that you can't spy while another player enters moves into the computer. Unlike Risk, your time here isn't taken up rolling dice to determine the outcome of battles.

However, like Risk, this game is only entertaining if played by many people—in fact, the computer really only acts as scorekeeper, even though it can control major countries.

The manual is superb, quickly and concisely explaining the game, then going into some historical detail. Rounding out the manual is an appendix detailing the various attributes of the 130 countries of the game.

But not all is good news. The graphics I found below average and rather difficult to keep track of. However, since this isn't a graphics-oriented game, it's not a major problem.

Balancing this drawback is the excellent program design, which allows you to access critical DOS functions without leaving the program—say, to format that save game disk you just decided you needed, as well as ask for a directory. Anyone who's found themselves in the middle of a great game without a disk ready to save knows how painful that can be.

Colonial Conquest is an excellent game for a group bent on fighting each other for global domination. Of course, getting such a group together may be the biggest setback of the game. But, assuming you assemble a houseful of Napoleons, Colonial Conquest will certainly appease them.

Overall, I have to say, in the simulation field, SSI is still on top. Whether or not they'll remain there is anybody's guess. But with **Colonial Conquest** and **Battalion Commander**, they've certainly proven that they won't give up without a fight.

TRACK AND FIELD by Konami ATARI CORP. P.O. Box 61657 Sunnyvale, CA 94088 16K Cartridge \$29.95

This is the first new game cartridge from Atari for quite a while. A few years ago, the combination of this game and a new controller in one package would have been a great value. Today, though, the game is old and the value negligible.

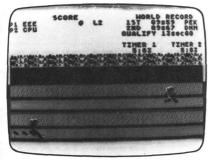
Track and Field is the home version of the arcade game which made the rounds about four years ago. Since the local arcade had dwindled yet again in size, I was unable to retest the arcade version. My recollections are surely as stale as last year's star athletes, but I've noticed that there are, as usual, both

similarities and differences in the two versions.

From the manual, it seems apparent that the game is meant (even at this late date) to cash in on the L.A. Olympics. After all, it is the official Home Computer Game of the 1984 Olympic games—but I'd rather not get into what I think of "official Olympic" items right now.

Unlike the epic world Olympics, this cartridge features only six events: the 100-meter dash, the long jump, the javelin throw, the 110 meter hurdles, the hammer throw and the high jump.

As in the arcade version, you must complete each event within a certain qualifying time, in order to progress onward. Control is very simple, and most events depend on proper timing when pressing that button or tilting that joystick.



Track and Field.

Using either a joystick or the special Track and Field controller, you run and jump your way into the record books (although a complaint I have, which I have with all cartridges, is that the high score is held only as long as the power lasts—little chance of becoming a sports legend). The supplied controller has three buttons, two of which you hammer on rhythmically to run, while the action button is used to jump or to launch the hammer or javelin. As is typical with sporting games of this type, it's impossible to duplicate the many variables present in the real thing.

The game has many downfalls, but when the two-player version is played with the proper opponent, you'll both have a good, sporting time. The manual is the typical Atari offering, colorful but without much substance. Each event is described, along with hints to help you win.

Further, the availability of a new controller provokes me to hope that new games will be offered, which will also use the thing. The firm, heavy base

makes its three buttons easy to activate. This seems a weak selling point at best, considering the availability of **Summer Games** (I or II), which is still, in my opinion, the best available sporting omnibus. In my stadium, **Track and Field** strikes out.

ZORRO by James Garon DATASOFT 19808 Nordhoff Place Chatsworth, CA 91311 48K Disk \$29.95

If there's one word to convey my opinion of this game, as a whole that word would be pathetic. **Zorro** is the video version of the lengendary movie hero, who is, no doubt, turning over in his celluloid grave. While filmdom's Zorro could fight his way to the girl with his trusty sword, this **Zorro** would have trouble cutting his way out of a tin can with a can opener.

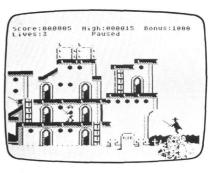
The graphics are acceptable on the new machines, and on-screen action moves at a rather rapid rate. However, on an 800 with the old graphics chip, the figures are more sticklike than human.

Control was, at times, hard to master; at other times, it was impossible. Not knowing just what joystick movement to use for the desired on-screen action was frustrating. This is partly due to the sparse instruction manual, but mostly it's due to the concept of the game itself.

The back panel of the manual provides some boring background babble about how Evil Sergeant Garcia has captured a beautiful senorita and imprisoned her in his fort. Predictably, your mission is to rescue her, as well as obtain whatever treasure you can along the way. You do this by solving puzzles and surviving perils on each of the many screens.

The manual gives little guidance as to exactly how you're to carry out this dismal mission. Oh, it provides hints, like: **Zorro** may carry only one object at a time. As always, killing guards (the disposable servants of video games) is good for at least a couple points. Similarly, you can pick up money for credit. Mapping is suggested to ensure that you'll find everything you need to rescue the fair maiden. I hardly think it will be necessary.

This is because, before you really get into the game, you're very likely to have grown tired of it. I doubt there are many



Zorro.

people out there who've finished **Zorro**, and I don't see how anyone but a masochist could possibly have done it more than once.

I guess that, brandishing your pixel sword, you're supposed to run about slicing and dicing up guards, plundering and looting the fort. In the movies, such adventure is fun. But it's not the case here, with yet another unoriginal arcade-action game. Although he might make it as a legendary movie and literary hero, as a video game **Zorro**'s a big zero.



CIRCLE #147 ON READER SERVICE CARD
MAY 1986 / PAGE 97

SPECTACUL!

ATARI 800XL



Order No. AAB800XL *See disclaimer below

ATARI 400



ATARI 1050

DISK DRIVE

DOS 3.0 Included

CHANCE SPECIAL Order No. AAB400

See disclaimer below

ATARI 130XE



2 Free Programs Our Choice

Order No AA130XF

2 Free Programs **Our Choice**

ATARI 65XE

Order No AA65XE

\$**8Q**99

COMREX 220AT PRINTER



Order No. EP220A

8999

Order No. AA1050

900

INDUS GT **DISK DRIVE**

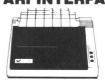


Order No. IADD

1900

3900

ATARI INTERFACE



100

ATARI 850 INTERFACE Order No. AA850

ICD P:R CONNECTION Replaces Atari 850 Interface

Order No.

ATARI 1020 COLOR PRINTER Order No.

AA1020

ATARI 1027

Order No. AA1027

Digital Devices PRINTER INTERFACE

Order No. DDA01

\$4999

ATARI ARCADE CHAMP Includes:

• Pac Man • Qix

· ROM holder

Order No. AA7102

ATARI 835 DIRECT CONNECT MODEM

Order No. **AAB835**

SUPRA MODEM Model 1200AT

Order No. SJ1200AT

MINDSCAPE **Fun Learning Software**

- . TONK IN THE LAND OF BUDDY BOTS
- TUCK GOES TO TOWN
- TINK'S ADVENTURE
- TINKA'S MAZES

YOUR CHOICE

ROCKLAN Game Carts

- GORF WIZARD OF WOR
- SPACE JOURNEY
 JOURNEY TO PLANET
 RACK-EM-UP
- DIAMOND MIND

YOUR

ea.

DISKETTES

ELEPHANT 51/4" SS/SD(10), No. EL1.............\$1199 MAXELL 51/4" SS/SD(10), No. MXD1......\$1199 GENERIC w/Flip'n File(10), No. NT03......\$1199 AMARY 51/4" Disk Tub, 50 capacity......\$999

AVALON HILL GAME DISKETTES

CONFLICT 2500 STOCKS AND BONDS GUNS OF FORT DEFIANCE FOOTBALL STRATEGY VIET CONG GFS SORCRESS MARKET FORCES FACTS IN FIVE LEGIONAIRE SPACE STATION ZULA

PARIS IN DANGER

VORRAK GYPSY FLYING ACE DIVEX

YOUR CHOICE

399 ea.



477 East Third Street, Dept. B705, Williamsport, PA 17701



1-800-268-3974

Ontario/Quebec

1-800-268-4559 Other Provinces

CANADIAN ORDERS -

All prices shown are for U.S.A. orders Call the Canadian Office for Can. prices

1-416-828-0866

Telex:06-218960 2505 Dunwin Drive, Mississauga, Ontario Canada L5L1T1



by Karl E. Wiegers

Last month, we explored how to use the built-in power of Atari's Central Input/Output system (CIO) in an assembly language program to display text in graphics modes 0, 1 and 2. First we used CIO to open the graphics screen (device S:, IOCB #6). Then we saw how to output a record to either the graphics screen or the default screen editor (device E:, IOCB #0).

Finally, we used CIO to close IOCB #6, the graphics screen. We also saw how to set the auxiliary bytes ICAX1 and ICAX2 to open the screen in different graphics modes, with or without a text window, with or without clearing the screen.

In this issue, we'll learn how to plot points and draw lines in the lower resolution graphics modes. Methods for setting the contents, then selecting color registers for plotting will be shown, too. As with the first part of this project, the screen displays are not breathtakingly beautiful, but you can take care of that on your own.

Plotting points and drawing lines.

Example 3 in last issue's **Boot Camp** explained how to print a string of text in graphics 1 or 2. If you experimented with the suggestion of changing the graphics mode number to 3, 4 or 5 in that example, you

found that your text string was miraculously converted into a line of colored pixels.

In Atari BASIC, the PLOT and DRAWTO statements regulate line drawing operations in a graphics screen. Fortunately, one of the CIO commands available for IOCB #6 is DRAW. So let's explore the fundamentals of plotting to a graphics screen using assembly language. Our examples are restricted to graphics modes 3 through 5, since special tricks are needed for the higher resolution modes.

Example 6. — A straight line.

We'll start simply, by just drawing a straight line in a default color (green), in a graphics 5 screen. The program in Listing 4 does the trick. Enter this listing using the Atari Assembler Editor or another assembler.

Be sure to type this listing in using the line numbers shown, since we'll be adding more statements for the next example. The .OPT OBJ,NOLIST statement in Line 40 just makes sure you generate object code starting at location \$3000 in RAM. This saves time by not listing the entire program each time you assemble it.

Building on the previous text examples, we have now added the DRAW command (which has a value of 17 decimal, \$11 hex) to the equates list (Line 130). The operation to open IOCB #6 for the graphics

Boot Camp continued

screen, (device S:) is the same as in Example 2 last time (Lines 450-570), except that this example uses a full screen (ICAX1 is 12) of graphics 5 (ICAX2 is 5).

A line segment is defined by the coordinates of its two endpoints. Just as in BASIC, we need to first plot a pixel at the coordinates of one endpoint, then draw to the coordinates of the other endpoint.

A graphics 5 screen can have X-coordinates ranging from 0 through 79 and Y-coordinates from 0 through 47. Be sure you don't try to draw outside the allowable coordinate range, or you'll generate an error. This example draws a line from location 12,10 to 75.40.

The plotting of a single point can be achieved using the PUTREC operation of CIO. This illuminates a single pixel at the coordinates specified in bytes \$54 (ROWCRS) for Y and \$55 (COLORS) for X. Lines 620-660 in Listing 4 set these coordinates.

This is equivalent to printing a single character on the graphics screen in a text mode. Consequently, the length of the string to be plotted (i.e., the length of the PUTREC buffer in bytes ICBLL and ICBLH) should be set to 1 (Lines 740-780).

In Atari BASIC, the color of points and lines is controlled by selecting a specific color register using the "color" command. You should be able to find a table in your BASIC manual which informs you that, in graphics 5, COLOR 1 selects color register 0, COLOR 2 selects register 1, and COLOR 3 selects register 2.

Don't ask me why. It's an interesting quirk that "printing" certain letters in a graphics mode greater than 2 also selects a particular color register. Printing a capital *A* uses color register 0, *B* calls for register 1, and *C* picks register 2.

This feature makes our lives simpler. Lines 1390-1410 declare some data values, to establish this letter-to-color register relationship. Lines 700-730 then choose one of those text strings to be printed, there-by selecting the register of our choice. Change the REG1 in Lines 700 and 720 to REG0 or REG2, to see the effect. Finally, the JSR CIOV in Line 780 plots our point where we want it.

Now, to simulate the BASIC "drawto" command. First, set the coordinates of the line's endpoint, just as we did for the starting point (Lines 830-870). Then, set up IOCB #6 for a draw operation in Lines 910-940. Lines 950-960 again show the selection of color register 1 (COLOR 2 statement in BASIC).

The number that would appear in the color statement must be stored in location 763 (\$2FB, AT-ACHR). This will ensure that our line is drawn us-

ing the default color in color register 1, a light green. You can change the value stored in ATACHR to draw a line in a color different from the one you used to plot the first point. In this case, we did both operations using the same color register, 1.

Finally, let CIOV take over in Line 970, and your line magically appears. Of course, IOCB #6 needs to be closed before you can run the program again. The routine in Lines 1210-1250 should be familiar from the previous examples as a close screen operation. This display will remain on the screen until you press BREAK or SYSTEM RESET, thanks to the infinite loop in Line 1270.

Example 7. — Drawing multiple lines.

No one's going to get excited about drawing a single straight line in a medium-resolution display. However, a straightforward extension of the program in Listing 4 will plot a series of points and connect them with lines.

You can modify this routine to draw as many line segments as you like, all at top machine speed. Now merge the statements in Listing 5 with your program from Listing 4. Many of the lines in Listing 4 are replaced in Listing 5, so you may wish to save the former intact before proceeding.

The approach here is to plot the initial point of our figure as in the previous example, then look up additional pairs of coordinates from data tables. These points will be plotted successively and will serve as the endpoints for a series of line segments to complete the figure. If all goes well, we'll end up with a five-pointed star in the middle of the screen.

The first point is plotted as before in the PLOT-POINT routine (Lines 620-780). This time, we select color register 0 as our plotting color, by doing a PUTREC operation with a letter A (Lines 700-730 again).

The contents of the color registers themselves are changed in Lines 830-860, to give a yellow drawing on a purple background. This is equivalent to using the "setcolor" command in BASIC. Color register 0 is selected for the drawing operation in Lines 870-880.

Two tables of X- and Y-coordinates are defined at the end of the program (Lines 1330-1340). The routine in Lines 930-1070 extracts points from these tables and calls a DRAWLINE subroutine, which executes the DRAW operation of CIO (Lines 1120-1170). Except for the fact that this segment of code is a subroutine and thus terminates with an RTS (return from subroutine) instruction, it's equivalent to the drawing step from Listing 4. Notice that we can have

as many DRAWs as we like in a row; only the very first point must be plotted with the PUTREC operation.

The Y-register of the 6502 microprocessor is used as an offset pointer to the next entry in the data tables. It begins with a value of 0 (Line 930). We use this offset to get the next X-coordinate and store it in the appropriate location (Lines 950-960), then do the same for the Y-coordinate (Lines 970-980).

Since CIO operations tend to change the X- and Y-registers, we will save the contents of the Y-register on the stack before executing the DRAW (Lines 990-1000), then retrieve it afterward (Lines 1020-1030).

The pointer is incremented after the drawing procedure (Line 1040). When the value of this pointer reaches 5 (Lines 1050-1070), we've plotted all five pairs of points in this example. The program branches to the CLOSESCREEN routine at Lines 1210-1250.

It should be easy to see how to use this approach in your own programs, any time you want to draw a series of connected lines.

The BASIC equivalent.

Let's see how we would write the program from Example 7 in Atari BASIC:

10 GRAPHICS 5+16
20 SETCOLOR 0,1,12
30 SETCOLOR 4,6,8
40 COLOR 1
50 PLOT 20,15
60 DRAWTO 60,15
70 DRAWTO 28,35
80 DRAWTO 40,5
90 DRAWTO 52,35
100 DRAWTO 20,15
110 GOTO 110

As with the text examples, BASIC is obviously much less work than doing the same thing in assembly language. However, you'll find times when assembly is really the tool of choice, for many graphics applications.

Conclusion.

These program examples provide an introduction to the use of the 8-bit Atari's built-in input/output capabilities for controlling screen displays. While some additional refinements are needed to use the

### ATARI COMP. HARDWARE 65XE	NE * CALL (614) 864-99	COLUMBUS, OH 43213
CENTURIAN (810) 169.99 ATARI 1050 DISK DRIVE 124.99 PRINTERS STAR SG10 219.99 PANASONIC 1080 199.99 EPSON LX80 219.99 ATARI 1027 79.99 ATARI 1025 139.99 ATARI 1020 19.99 ATARI XM801 189.99 MPP MICROPRINT 34.99 APE FACE 49.99 MPP 1150 49.99 ATARI HARDWARE	ENTERTAINMENT	520ST COLOR W/SOFTWARE 788.00 W/SOFTWARE 799.99 HIPPO C 49.99 FORTA 59.99 CHAT 15.99 EXPRESS 29.99 HABA WRITER 49.99 SUNDOG 25.99 BUSINESS LETTERS 29.99 PERRY MASON 32.99 TYPESETTER 25.99 HABA HARD DRIVE 689.99
ACCESSORIES US DOUBLER .49.99 1030 MODEM .44.99 XM301 MODEM .49.99 MPP 1000E MODEM .49.99 HABA 1200 BAND .149.99 ATARI LAB .19.99 850 INTERFACE .99.99 SPECIAL ATARI ATARI .1050 410 RECORDER DISK DRIVE 112.99 .124.99	BASIC XE 46.99 PAPER CLIP 34.99 ATARI WRITER 19.99 ATARI WRITER LUS 34.99 PROOFREADER 14.99 VISICALC 14.99 VISICALC 14.99 LOGO 32.99 BASIC CART 7.99 SYN FILE 29.99 SYN CALC 29.99 SYN TREND 23.99 B-GRAPH 26.99	HABA 1200 MODEM
CARDS) NO PERSONAL CHEC CHANGE WITHOUT NOTICE. SHIPPING: ADD \$3.00 ON ALL ORI ACTUAL FREIGHT CHARGED ON INTERNATIONAL: ACTUAL FREI UNITED STATES INCLUDING A.P. POLICIES: NO RETURNS WITHOUTIVE. ALL DEFECTIVES WILL BE I	GHT CHARGED ON ALL ORDERS	S ALL PRICES SUBJECT TO ON ALL ORDERS OVER \$100.00. OUTSIDE THE CONTINENTAL NO RETURNS UNLESS DEFEC-

CALL ELECTRONIC ONE (614) 864-9994

CIRCLE #149 ON READER SERVICE CARD

You've got your spouse working.

The kids have paper routes.

Even the dog provides stud service for a fee.

Times are hard.

So Why is Your Computer Still Unemployed?

Let Your Atari Contribute To The Family Income

The OPPORTUNITY DISK Will Tell You How

\$2.95 Plus \$1.00 Postage and Handling NYS Residents Add Sales Tax

SINIECOM

Dept. 60, 13 White St., Seneca Falls, N.Y. 13148 \$2.50 Shipping for Orders Outside USA and Canada Atari® is a trademark of Atari, Inc.

Boot Camp continued

higher resolution graphics modes, these examples should get you started on more serious graphics programming in assembly language.

By combining these concepts with other powerful Atari graphics features, such as the ability to use custom character sets, modified display lists for mixing graphics modes in a single screen, and display list interrupts, you can write sophisticated assembly language programs to achieve effects and speed that BASIC simply cannot provide. Have fun!

Listing 4. Assembly listing.

```
:Listing 4-Assemble Some Graphics
:by Karl E. Wiegers
10
20
30
            .OPT OBJ.NO LIST
*= $3000
40
50
60
   command byte values for various
80 :CIOV operations
90
0100 OPEN = $03
0110 PUTREC = $09
                            ; open IOCB
                            output a record; close IOCB
      CLOSE = $0C
DRAW = $11
0120
0130
                            :draw a line seq
0140
       equates for row and column cursor
0150
0160
       position on graphics screen
0170
      ROWCRS = $54
COLCRS = $55
0180
0190
กวกก
       ;location to use to select color
;register-plot & draw operations
0260
0270
0280
0290
      ATACHR = $02FB
0300
      equates for IOCB locations; (given for IOCB #0)
0310
0315
0320
                 $0342
$0344
0330
                            ;command byte
                            ;buf addr-lo byte
;buf addr-hi byte
;buf len-lo byte
0340
      ICBAL
                 $0345
$0348
0350
      ICBAH =
0360
      ICBLL
                 $0349
$034A
      ICBLH =
                            ;buf len-hi byte
0370
0380
      ICAX1
                            ;auxiliary byte 1
      CIOV =
0390
0400
                 $034B
                            ;auxiliary byte 2
                 $E456
                            entry point
0405
      ;central I/O subsystem
0410
      routine to open IOCB #6 as device "5:" (graphics screen)
0420
0430
0440
      ÓPENSCREEN
LDX #$60
0450
0460
                            ; offset to IOCB #6
0470
           LDA HOPEN
                            ;command is OPEN
            STA
                ICCOM, X
           LDA #5CREEN&255 ;device to open
0490
           STA ICBAL,X
LDA #SCREEN/256
0500
0510
                ICBAH, X
0520
            STA
0530
           LDA #12
                            ;no text window
0540
                ICAX1,X
            STA
0550
           LDA #5
                            graphics mode 5
                ICAX2,X
0560
           STA
0570
            JSR CIOV
                            ;go do it
0580 :
```

```
0590 ;begin by plotting one endpoint of 0600 ;the line segment, at 12,10
0610
0620 PLOTPOINT
0630
                          :X-coordinate is 12
           LDA #12
           STA COLCRS
0540
0650
           LDA #10
                          ;Y-coordinate is 10
0660
           STA ROWCRS
0670
           LDX #$60
                          offset to IOCB #6
           LDA MPUTREC
0680
                          command is
9685
                          PUT a RECord
           STA ICCOM,X
LDA #REG1&255
0690
0700
                           ;select color
0705
                             register 1
           STA ICBAL,X ;by "printing" letter "B"
0710
0715
           LDA #REG1/256 ; this is like
8728
0725
                             a COLOR
0730
           STA ICBAH, X ; statement in BASIC
0740
           LDA #1
                         ; only print 1 char
0750
           STA ICBLL.X
9769
           LDA #0
           STA ICBLH, X
0770
0780
           JSR CIOV
                         ;90 do it
0790
กลกก
      now set the other endpoint of the line segment, at 75,40
0810
0820
0830 ENDPOINT
0840
           LDA #75
                         :X-coordinate is 75
0850
           STA COLCRS
0860
          LDA #48
                         ;Y-coordinate is 40
0870
           STA ROWCRS
0880
0890
      ;now use CIOV to connect the dots
0900
      DRAWLINE
0910
0920
          LDX #$60
                         ;offset from IOCB#6
                         command is DRAW
0930
          LDA HDRAW
               ICCOM, X
           STA
0950
          LDA #2
                         :select color
0955
          ister 1
STA ATACHR
      register
0960
0970
           JSR CIOV
                         ;90 do it
1180
1190
        close the graphics screen
1200
1210
      CLOSESCREEN
1220
          LDX #560
                         offset to IOCB #6
1230
          LDA #CLOSE
                         command is CLOSE
1240
          STA
               ICCOM, X
1250
          JSR CIOV
                         ; go do it
1260
      STOP JMP STOP
1270
1280
1290
      data values for text strings
1340
1350
1360
      data values for text strings;
1370
      ŚCREEN
              BYTE "5"
1380
1390 REGO .BYTE "A"
1400 REG1 .BYTE "B"
1410 REG2 .BYTE "C"
                   Listing 5.
               Assembly listing.
10 ;Listing 5-Assemble Some Graphics
20 ;by Karl E. Wiegers
```

;equates for color registers used

0210

0220

```
0230 COLOR0 = $02C4
0240 COLOR4 = $02C8
0250
0590 ;begin by plotting the first point
0600 ;of the figure, at 20,15
0610
          LDA #20
LDA #15
                         ;X-coordinate is 20
;Y-coordinate is 15
0630
0650
0700
          LDA #REG0&255 :select color
                             register 0
a letter "A"
0705
0715
0720
          LDA #REG0/256 ; this is like
a COLOR 1
0725
     ; change colors to purple background
0800
     and yellow lines
0810
0830
                         ;purple into
                         color register 4
0840
           STA COLOR4
0850
          LDA #28
                          :yellow into
          STA COLORO
                          color register 0
0860
                         ;selects color
8878
                           register 0
0875
0880
          STA ATACHR
9899
0900
      routine to connect X,Y points
8918
      from tables of coordinate data
0920
0930
          LDY #8
                         ;use Y as table
                          offset pointer
0935
0940 POINT
          LDA XDATA,Y ;no, get next
0950
                            x-coordinate
0952
0955
          STA COLCRS ; goes in column reg
0960
```

```
0970
            LDA YDATA,Y ;get next
0975 ;
                              y-coordinate
                             ;in row register
;save Y-register
8980
            STA ROWCRS
0990
            TYA
            PHA
1000
            JSR DRAWLINE ;draw from last point to this one PLA ;restore Y-register
1010
1015 ;
1020
            PLA
            TAY
1030
                             ;increment table offset pointer
1949
            INY
1045
            CPY #5
BNE POINT
                             ;equal to 5 yet?
1959
1969
                             ;no, go for next
1065
                              point
            BEQ CLOSESCREEN ; yes, close screen and quit
1070
1075
1080
1090
       ;subroutine to draw from last
1100
      ;plotted point to the current one
1110
      DRAWLINE LDX #$60
1120
1130
            LDA HDRAW
1140
            STA ICCOM, X
JSR CIOV
1150
1160
1170
            RT5
1280
      data for plotting points, in two tables, one for X-coordinates and one for Y-coordinates
1290
1300
1310
1320
1330
      XDATA .BYTE 60,28,40,52,20
1340 YDATA .BYTE 15,35,5,35,15
```

13"COLOR S149

STAR DELTA 10 PRINTER

160 CPS, 8K Buffer, Dual Interface (serial & parallel), Friction/Tractor, Bi-directional Logic Seeking, Hi Res. Graphics & Epson Compatible. \$299.00

GAME CARTRIDGES - your choice \$5.00 GORF, Wizard of Wor, Donkey Kong, Pole Position, Journey to the Planets, Rack 'Em Up & Diamond Mine

\$19.00

California residents add sales tax Minimum shipping charge \$5.00

Everything for the ATARI Systems to Parts

MORE SOFTWARE—\$5.00 each

Touch Typing (cassette), Spanish Course (cassette), Wombats (disk), Stock Analyst & Bond Analyst

COMPLETE SYSTEM:

ATARI 130XE Computer, 1050 Disk Drive, 1027 Printer, AtariWriter, & 2 Games

\$399.00

SAN JOSE COMPUTER 1844 Almaden Rd. Unit E San Jose, CA 95125 (408) 723-2025

BEST BUY ON SMALL QUANTITIES

COLORED DISKS AS LOW AS 69¢ EA. - FLOPPY DISKS AS LOW AS 59¢ EA.

Fully guaranteed. Includes sleeves and hub rings. DISKETTES (2 box minimum) 10 per box

5¼"	Black Generic Bulk		Colored G	eneric Bulk
Bulk	SS/DD	DS/DD	SS/DD	DS/DD
20-69	.69 ea.	.89 ea.	.79 ea.	.99 ea.
70+	.59 ea.	.79 ea.	.69 ea.	.89 ea.

		(Plastic Case Included)
51/4"	Blk. Generic	Colored Generic
Bxs. (10)	SS/DD	SS/DD
2-6	8.90	10.90
7+	7.40	9.90

3½"	Verbatim	Sony	Sony
Bulk/Bx. (5)	SS/DD	SS/DD	DS/DD
20-69/2-6	1.79 ea.	12.90 bx.	18.90 bx.
70+/7+	1.69 ea.	11.90 bx.	17.90 bx.

MICRO-LEAGUE SPORTS

ATARI 520 ST HARDWARE CALL FOR PRICES

Let us design a system for you!

Let us design a system for y	/0U!
ATARI 520 ST SOFTWARE	
DRAGON GROUP	
4X Forth	84
4X Forth Accelerator	Call
MIRAGE	
Express (Word Processor)	34
VIP TECHNOLOGIES	
VIP Light	Call
VIP (Lotus 1-2-3 type)	119
SST SYSTEMS	
Chat	17
MARK OF THE UNICORN	3 3 5
Mince	Call
PC Intercom	
Final Word	
Hex	
INFOCOM	
Call for titles and prices	
HIPPOPOTAMUS SOFTWARE	
Hippo Computer Almanac	. 25
Hippo Jokes & Quotes	
Hippo ST Disk Utilities	
Hippo ST Ramdisk	
Hippospell	
Hipposimple	
Hippoart	
Hippobackgammon	
Hippo Eprom Burner	
Hippoword	
Hippoconcept	
Hippopixel	
MICHTRON	
M-Disk	. 28
Mudpies	
Soft Spool	
Flip Side	
Calendar	
Mi-Term	Cal
Gold Runner	Cal
Time Bandit	Cal
BBS	
Holmes & Duckworth	
Tool Box	Cal
Forth	
H&D Base	
OSS	
Personal Pascal	50
Personal Prolog	
XLENT	

Rubber Stamp Call

EPSON PRINTERS	
FX-85 34	9
FX-286Ca	III
STAR MICRONICS	
SG-10	
SG-15	ıll
PANASONIC PRINTERS	
KX-1080 19	
KX-1091 24	
KX-313126	9
PRINTER INTERFACE CABLES	
	39
	19
	19
	9
	9
Microbits Microstuffer	_
	35
PRINTER RIBBONS	
Gemini Printers (Black)	4
Gemini Printers (Blue/Red/	_
Purple/Brn./Grn.)	5
Epson (80 Series) black	6
Epson (Color)	8
	1
	3
MONITORS	
Teknica M.J-10	9
	9
Monitor Cable	7
MODEMS	•
	19
	19
Avatex (300/1200 BAUD) 11	
	4
Compuserve Starter Kit	-
UPGRADES/ACCESSORIES	
Flip n' File 10	4
Flip n' File 15	7
Original Flip n' File 50 1	4
Disk Bank/5 (Holds 50) 1	2
Power Strip (6 outlet) 1	4
	3
Disk Drive Cleaning Kit	9
MicroMate Paper	
	0
	6
Dust Covers Call for availability	
Disk Coupler (notch)	6
	9
Omniview XL/XE Ca	111
	5
(o outlet)	J

ATARI SOFTWARE	
ATARI Atariwriter Plus Learning Phone	
NEW ATARI PROGRAMS ACTIVISION Hacker	. 18
Master of Lamps Great Amer. Road Race Star Bowl Football	17 17
BATTERIES INCLUDED Paperclip Homepak	35
B/Graph BRODERBUND	
Printshop Printshop Graphics Library 1, 2 or 3 (ea.)	
Printshop Paper Refill Karateka Championship Lode Runner	14 21
ELECTRONIC ARTS	
BUY ONE, GET ONE FREE - CALL FOR PRICES!	
CALL FOR PRICES! EPYX Eldolon	
CALL FOR PRICES! EPYX Eldolon	. 28
CALL FOR PRICES! EPYX Eldolon Koronis Rift Summer Games	. 28 27
CALL FOR PRICES! EPYX Eldolon Koronis Rift Summer Games Ballblazer (D)	. 28 27 27
CALL FOR PRICES! EPYX Eldolon Koronis Rift Summer Games Ballblazer (D) Rescue on Fractalus (D)	. 28 27 27
CALL FOR PRICES! EPYX Eldolon Koronis Rift Summer Games Ballblazer (D) Rescue on Fractalus (D) INFOCOM	28 27 27 27
CALL FOR PRICES! EPYX Eldolon Koronis Rift Summer Games Ballblazer (D) Rescue on Fractalus (D)	28 27 27 27 27
CALL FOR PRICES! EPYX Eldolon Koronis Rift Summer Games Ballblazer (D) Rescue on Fractalus (D) INFOCOM Cut Throats (D)	28 27 27 27 27 23 29
CALL FOR PRICES! EPYX Eldolon Koronis Rift Summer Games Ballblazer (D) Rescue on Fractalus (D) INFOCOM Cut Throats (D) Deadline (D) Enchanter (D) Hitchhiker's Guide to	28 27 27 27 23 29 23
CALL FOR PRICES! EPYX Eldolon Koronis Rift Summer Games Ballblazer (D) Rescue on Fractalus (D) INFOCOM Cut Throats (D) Deadline (D) Enchanter (D) Hitchhiker's Guide to the Galaxy (D)	28 27 27 27 23 29 23
CALL FOR PRICES! EPYX EIdolon Koronis Rift Summer Games Ballblazer (D) Rescue on Fractalus (D) INFOCOM Cut Throats (D) Deadline (D) Enchanter (D) Hitchhiker's Guide to the Galaxy (D) Sea Stalker (D)	28 27 27 27 23 29 23 23
CALL FOR PRICES! EPYX Eldolon Koronis Rift Summer Games Ballblazer (D) Rescue on Fractalus (D) INFOCOM Cut Throats (D) Deadline (D) Enchanter (D) Hitchhiker's Guide to the Galaxy (D) Sea Stalker (D) Starcross (D)	28 27 27 27 23 29 23 23 23 29
CALL FOR PRICES! EPYX Eldolon Koronis Rift Summer Games Ballblazer (D) Rescue on Fractalus (D) INFOCOM Cut Throats (D) Deadline (D) Enchanter (D) Hitchhiker's Guide to the Galaxy (D) Sea Stalker (D) Starcross (D) Suspect (D)	28 27 27 27 23 29 23 23 23 29 27
CALL FOR PRICES! EPYX EIdolon Koronis Rift Summer Games Ballblazer (D) Rescue on Fractalus (D) INFOCOM Cut Throats (D) Deadline (D) Enchanter (D) Hitchhiker's Guide to the Galaxy (D) Sea Stalker (D) Starcross (D) Suspect (D) Suspended (D)	28 27 27 27 23 29 23 23 29 27 29
CALL FOR PRICES! EPYX Eldolon Koronis Rift Summer Games Ballblazer (D) Rescue on Fractalus (D) INFOCOM Cut Throats (D) Deadline (D) Enchanter (D) Hitchhiker's Guide to the Galaxy (D) Sea Stalker (D) Starcross (D) Suspect (D)	28 27 27 27 23 29 23 23 29 27 29 27
CALL FOR PRICES! EPYX Eldolon Koronis Rift Summer Games Ballblazer (D) Rescue on Fractalus (D) INFOCOM Cut Throats (D) Deadline (D) Enchanter (D) Hitchhiker's Guide to the Galaxy (D) Sea Stalker (D) Starcross (D) Suspect (D) Suspect (D) Suspended (D) Wishbringer Witness (D) Zork I (D)	28 27 27 27 23 29 23 23 29 27 29 23 23 23 23 23 23 23 23 23 23 23 23 23
CALL FOR PRICES! EPYX Eldolon Koronis Rift Summer Games Ballblazer (D) Rescue on Fractalus (D) INFOCOM Cut Throats (D) Deadline (D) Enchanter (D) Hitchhiker's Guide to the Galaxy (D) Sea Stalker (D) Starcross (D) Suspect (D) Suspended (D) Wishbringer Witness (D)	28 27 27 27 23 29 23 23 29 27 29 23 23 23 23 23 23 23 23 23 23 23 23 23

300/1200 BAUD MODEM SPECIAL

AVATEX 300/1200 BAUD MODEM - P:R CONNECTION - MODEM CABLE

ALL FOR \$179.00

Baseball 2	7
Team/Player Disk 1	4
Manager's Disk 2	8
MICROPROSE	
Acrojet	4
F-15 Strike Eagle (D) 2	3
Solo Flight (D) 2	3
Kennedy Approach 2:	3
Crusade in Europe 2	7
Silent Service: Sub sim 2	3
OSS	
Action (R)	9
Action Tool Kit (D)	9
Basic XL (R)	_
DOS XL (D)	_
Basic XE	
Mac 65 (R)	
Mac/65 Tool Kit (D)	
Basic XL Tool Kit	
SCARBOROUGH	9
Net Worth Cal Mastertype Filer Cal	
SIERRA ON LINE Ultima I	
Ultima II	-
	В
SSI	
SSI Battalion Commander27	7
Battalion Commander	7
Battalion Commander	7
SSI Battalion Commander 27 Computer Quarterback 27 Kampfgruppe 36 Objective Jursk 27	7
SSI Battalion Commander 27 Computer Quarterback 27 Kampfgruppe 38 Objective Jursk 27 Italian Commander 27	7 7 9 7
SSI Battalion Commander 27 Computer Quarterback 27 Kampfgruppe 36 Objective Jursk 27 Italian Commander 21 Computer Ambush 36	7 7 9 7 9
Battalion Commander	7 7 7 7 9 7
SSI	7 7 7 7 7 7 7 7 7
SSI Battalion Commander 27 Computer Quarterback 27 Kampfgruppe 38 Objective Jursk 27 Italian Commander 27 Computer Ambush 38 Rails West 27 Colonial Conquest 22 Panzer Grenadier 23	7 7 7 7 7 7 7
Battalion Commander 27 Computer Quarterback 27 Kampfgruppe 38 Objective Jursk 21 Italian Commander 27 Computer Ambush 38 Rails West 27 Colonial Conquest 22 Panzer Grenadier 22 Gemstone Warrior 23	7 7 7 7 7 7 7
Battalion Commander	7 7 7 7 7 7 7 3
Battalion Commander	7 7 9 7 7 7 7 3
Battalion Commander	7 7 9 7 7 7 7 3
Battalion Commander	7 7 9 7 7 7 3 11 8
Battalion Commander	7 7 9 7 7 7 7 3 11 8
SSI	779779773
SSI	77977773
SSI	77977773
SSI	7797773
Battalion Commander	7797773
### Battalion Commander	7797797773
Battalion Commander	7797797773
Battalion Commander	7797797773

To order call **TOLL FREE** -800-824-7506

ORDER LINE ONLY

COMPUTER CREATIONS, Inc.

P.O. BOX 493 - DAYTON, OHIO 45459

For information, order inquiries, or for Ohio orders (513) 435-6868



Order Lines Open 9:00 a.m. to 8:00 p.m. Mon.-Fri.; 10 a.m. to 4:00 p.m. Sat. (Eastern Standard Time). Minimum \$15 per order. C.O.D. (add \$3.00). Please specify computer system. Call toll free number to verify prices and availability of product. Prices and availability are subject to change without notice. We ship C.O.D. to Continental U.S. addresses only! Please include 4% shipping on all Hardware orders (min. \$4.00). Software and accessories add \$3.00 shipping and handling in Continental U.S. Actual freight will be charged outside U.S. to include Canada, Alaska, Hawaii, Puerto Rico and APO. Ohio residents add 65% sales tax. Canadian orders add 5% shipping, (min. \$5.00). All other foreign orders, please add 15% shipping, (min. \$10). For immediate delivery send cashier's check, money order or direct bank transfers. Personal and company checks allow 3 weeks to clear. School purchase orders welcome. Due to our low prices, all sales are final. NO CREDITS. All defective returns must have a return authorization number. Please call (513) 435-6868 to obtain an RA# or your return will not be accepted for replacement or repair. FOR YOUR PROTECTION WE CHECK FOR CREDIT CARD FRAUD.



Gemsets

A character set customizer for Gemini 10X/15X or Epson FX/JX/LQ

by Matthew J.W. Ratcliff

One of the most advanced features of Gemini 10X/15X and Epson FX/JX/LQ printers is the capability to redefine their character sets. This is a seldom used feature, since most computer systems do not support custom character sets easily. We Atarians, however, are old pros at it.

By creating a custom character set in a predefined format and sending it to the printer, along with the proper escape codes, virtually any character set may be used on these printers. Once enabled, program listings and word processor files can be printed with the custom set.

With a word processor like the **AtariWriter**, you can use the proper control codes to print text in superscript, subscript, condensed, emphasized, double strike and even double width—all with the custom character set. You may even toggle back and forth between the custom and normal printer sets, and you can also use the printer's built-in italics set to have up to three different print styles in one document. These capabilities can now be easily implemented with the program **Gemsets**.

Sets of another type.

After considering this capability for a while, I saw two possible approaches to the custom set handling. The Atari's own character sets are "horizontal" 8×8 grid bit maps. The Gemini requires a 7×9 "vertical" map, and the Epson FX series, an 8×11 map. See the

figures below for a comparison between the Atari and Gemini maps.

The most obvious approach is to create a vertical map custom character set editor for these printers. Although workable, this would require you to recreate all your favorite character sets and take up valuable disk space for these unique vertical maps. The better—but more difficult—approach would be to write a program capable of putting standard Atari character sets into your printer.

After a little head scratching, I came up with **Gemsets**, a translator program to take any Atari character set file, convert it and install it in your printer.

Listing 1 is the BASIC data for **Gemsets**. Please refer to **M/L Editor** on page 35 for typing instructions. When you've typed the listing, the resultant file should be named AUTORUN.SYS. When booted up, **Gemsets** will request [1] GEMINI 10X/15X or [2] EPSON FX/JX/LQ. (Epson MX/RX series printers do not support the custom character set feature.)

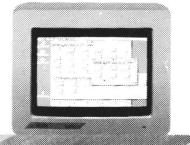
First, power down your printer and set top of form. Turn it back on and be sure it's on-line. Type the appropriate number key for your printer and press RETURN.

Gemsets will then list the disk directory to the screen and ask you for a character set filename. Type filename extension and press RETURN (drive defaulted to number one and cannot be changed). There are many error traps in the program, so it's unlikely that you'll ever crash it.

ATARI SPECTACULA

| 520ST S

Comes complete with 520ST computer with modulator, disk drive, mouse, logo, Basic, 1st Word, NEOchrome sampler and monochrome or color monitor.



MONOCHROME SYSTEM

COLOR SYSTEM

\$**799**00

HABA DISK 10 Meg HARD DRIVE \$**669**00

SUPRA MODEM 1200ST\$

KENSINGTON

CURTIS Surge Suppressors No. CUSP2, EMERALD.....\$3999 No. CUSPF2, RUBY......\$5999 No. CUSP1, DIAMOND.....\$2999

No. CUSP3, SAFETY STRIP.......\$1999 PANASONIC

KX1091

CITIZEN	
MSP-10 (80 col.)	\$279.00
MSP-15 (132 col.)	\$389.00
MSP-20 (80 col.)	\$349.00
MSP-25 (132 col.)	\$509.00
C.ITOH	
Prowriter 7500	\$179.00
Prowriter 1550P	\$349.00
Starwriter 10-30	
ÉPSON	
Homewriter 10, LX80	
FX85, FX286, RX100	CALL
SQ2000, HI80, HS80, AP80	CALL
LO800 LO1000	CALL

6000 Letter Quality	CALL
6100 Letter Quality	
6200 Letter Quality	
6300 Letter Quality	
5510 Dot Matrix	
LEGEND	
808 Dot Matrix 100 cps	\$179.00
1080 Dot Matrix 100 cps	\$259.00
1380 Dot Matrix 130 cps	\$289.00
1385 Dot matrix 165 cps	\$339.00
	Attended to the

3000 Series	\$799.00
8000 Series	\$1099.00
ELF 360	\$449.00
Pinwriter 560	\$999.00

OKIDATA	
182, 183, 192, 193, 2410, 84	CALL
Okimate 10 (Specify C64/Atari)	\$18900
Okimate 20 (IBM)	CALL

* · · · · · · · · · · · · · · · · · · ·
STAR
SB/SD/SG/SR SeriesCALL
Powertype Letter QualityCALL
TOSHIBA
1340 (80 column)\$399.00
P341 (132 column)\$799.00
P351 (132 column)\$1069.00

\$259.00 \$389.00

BATTERIES INCLUDED D.E.G.A.S.....\$27.99 Cutthroats.....\$29.99 Deadline.....\$34.99 Enchanter. \$29.99 Hitchhiker's Guide.....\$29.99 Infidel.....\$34.99 Planetfall \$29.99 Sea Stalker..... .\$29.99 Sorcerer \$34.99 Starcross.....\$34.99 Suspect \$29.99 Suspended \$34.99 Wishbringer \$29.99 \$29.99 .\$29.99 Zork II.....\$29.99

Zork III.....\$29.99

MINDSCAPE

Personal Pascal.....\$49.99

0.S.S.

SOFTWARE.



A jazzed-up 1-2-3 for your Atari 520ST!

- Spreadsheet
- Database
- Graphs

HABA/ARRAYS Hippo-C\$44.99 Business Letters. \$29.99 Write Your Own Will......\$29.99 Haba Writer..... \$44.99 Habadex Phonebook..... \$29 99 \$12.99 Habamerge.....\$12.99 Checkminder....\$39.99 Mail Room Manager\$39.99 **MUSE SOFTWARE** Final Word.....\$99.99

MIRAGE

Hex.....

Express \$34.99 SIERRA-ON-LINE Ultima II.....\$39.99 King's Quest.....\$37
PENQUIN SOFTWARE \$37.99

Crimson Crown.....

– MEDIA —

BLANK DISKETTES ELEPHANT

(10) 31/2" SS.....\$24.99

MAXELL

(10) 31	/2" SS	\$1	8.99
(10) 3	½" DS	\$2	29.99
$(5) 3\frac{1}{2}$	" SS w/Flin	o'n File \$1	0.99



AMARAY

Disk Tub 31/2"

\$9.99



Deja Vu.....

477 East Third Street, Dept. B705, Williamsport, PA 17701



SHIPPING: Add 3%, minimum \$7.00 shipping and handling on all orders. Larger shipments may require additional charges. All items subject to availability and price change. Returned shipments may be subject to restocking fee.

1-800-268-3974

1-800-268-4559

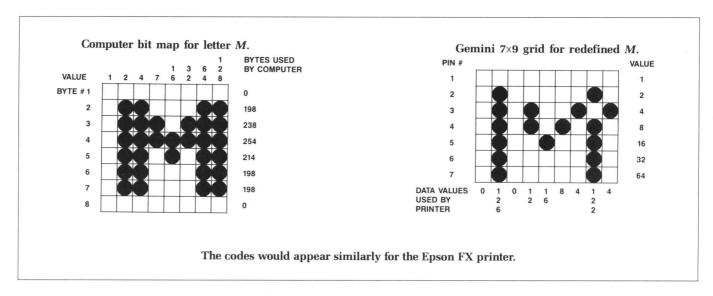
CANADIAN ORDERS -

All prices shown are for U.S.A. orders Call the Canadian Office for Can. prices

1-416-828-0866 In Toronto

Telex:06-218960 2505 Dunwin Drive, Mississauga, Ontario Canada L5L1T1





Once a valid character set file is given, it will be loaded into RAM, translated from Atari to your printer's format, then downloaded to your printer—in 5 seconds! Any file not exactly 1024 bytes long will be flagged as invalid, and will restart **Gemsets**. This is the proper file size for an Atari character set file.

You will then be prompted to press START to exit or reboot the system with the word processor of your choice. The custom character set has been enabled on the printer, and any subsequent listings or word processor printouts will use it. Some word processors send the printer reset code (ESC @) before printing your file, in which case your custom set will be disabled.

With the Gemini, you need only send the ASCII codes (such as "very special characters" with LJK) to re-enable it. The Epson printers, however, will clear out the custom character set from its download RAM. As far as I know, LJK's **Letter Perfect** is the only word processor that does this.

Now any character set you have on your Atari can be used on the printer, as well. If you don't have a custom character set handy, one can be made to test **Gemsets**. RUN the following program from BASIC to make a file out of Atari's standard set.

10 GRAPHICS 0:OPEN #1.8.0."D:ATARI.SET
20 FOR I=57344 TO 58367:PUT #1.PEEK(I)
:NEXT I
30 CLOSE #1:END

If you don't have a good character set editor, I highly recommend **Create-A-Font** by Vince Erceg, which appeared in **ANALOG Computing**'s issue 16.

Tips on the Gemsets utility.

You may wish to use **Gemsets** only occasionally, in which case you'll want to rename it. It can then be executed from a DOS binary load (*L*) function. Pressing START returns control to DOS after completing the download. This might be preferable, so that you can have character sets, **Create-A-Font** and **Gemsets** all on the same disk.

Gemsets was tested with Atari DOS 2.0S and OSS DOS-XL, both single and double density. I followed all the operating system rules, so it will run on all Ataris with 32K of RAM or more.

To change printer character sets within an **Atari-Writer** text file, you need to put in the proper CTRL-O (\land O) ASCII codes (samples given for Gemini X series printers). To return to the normal printer set, place the following on a separate line (preceded and followed by a RETURN): \land O27 \land O36 \land O0. To re-enable it, use: \land O27 \land O1. To use the italics set, you must disable the custom set with the first command above, then use: \land O27 \land O52. To return to normal: \land O27 \land O53.

You can switch from normal to italics and vice versa on the same print line, but not to the custom set. The control codes must be on a separate line; otherwise, the printer will ignore the command and continue printing with the last set used. Apparently, the printer cannot print custom and normal sets on the same line.

Printer-set design.

You'll quickly find that most Atari sets look quite chubby on the printer. Your design philosophy for printer characters will change as you get more use out of **Gemsets**. Because of artifacting, Atari's charac-

ANALOG COMPUTING MAY 1986 / PAGE 107



ters commonly have vertical segments two dots wide; one is preferable on the printer.

You may notice "bumps" on the right side of some characters. This is due to a limitation imposed by the printer. Two consecutive dots on the same horizontal line cannot be "on," since the printhead cannot fire that fast. **Gemsets** looks for dual horizontal bits "set" and strips out the second one, searching left to right. If there is an odd multiple of bits set, the last one defining part of the rightmost column of the character, this bumping will occur. The sample figures below illustrate this limitation with the letter M from Atari's standard character set. This is not a serious constraint, once you get used to it.

Diagonal lines come out sharpest in the custom print characters.

When defining custom printer characters, use all of the 8×8 grid space. Use the top seven rows for upper case characters and lower case letters which don't have "descenders." Use the lower seven rows for characters which require descenders (i.e., j, y, g, p and q). The **Gemsets** software checks the bottom row bit map value and sets the lower case flag if it's nonzero. When this flag is set, the printer will use the lower seven pins (of nine) to print the character, rather than the usual upper seven.

The printer takes care of the horizontal and vertical character spacing for you, so use the full width of the grid for character editing. With **Create-A-Font**, you will find it a fairly simple task to modify existing character set files to look good on your printer.

A few pointers.

Gemsets only defines 96 ASCII characters (32-127), the maximum allowed by the Gemini. If you plan to list programs with a custom set which has inverse video characters, put a REM in the first line of your program. This forces the Gemini to a 7-bit interface (otherwise, inverse characters will not print). This REM line should have the escape character (press ESC twice), followed by the equal (=) sign. This will force inverse characters to print normally.

As some of you may know, **AtariWriter** allows an AUTORUN.SYS file on your text files disk. This is how printer drivers (formerly available through the now-defunct APX) work with Epson, Gemini and other printers (minimizing the need to use the \land O functions). **Gemsets** cannot be used this way, however.

AtariWriter allows an autorun file to boot up and change memory locations, setting up the program for certain printers. It *will not* allow the autorun file to

take control of the keyboard or display, so **Gemsets** would lock up the computer.

This was done to protect the cartridge from being pirated. Therefore, **Gemsets** instructs you to reboot the system with your word processor, while keeping power on the printer to maintain the custom set just installed. There's no problem using it with an assembler or BASIC cartridge.

Epson owners may have deduced that I did not implement the full power of that printer, due to some Gemini limitations. The Epson allows you to define 255 characters, which means you could install inverse video characters, too. This would require an extra smart conversion routine, however, which handles ASCII characters greater than 127.

Footnotes.

All the above features—listed for the Gemini—are also available on the Epson. Study your printer manual and learn how to use these ESC codes to their full potential.

The custom printer character sets will greatly enhance the capabilities of your favorite word processor. I think that you'll find **Gemsets** a jewel of a utility to add to your library.

Matthew J.W. Ratcliff is an Electrical Engineer in St. Louis, Missouri. He's been programming in BASIC and assembly language on the Atari since 1982. He is also active in telecommunications and is a remote SYSOP on the Gateway BBS, (314) 647-3290.

Listing 1. BASIC listing.

 1510 DATA 55,30,16,52,106,172,40,52,23 2,224,8,208,205,153,25,52,7065 1520 DATA 200,192,8,208,195,173,66,52, 208,51,162,45,160,52,169,3,5946



CIRCLE #153 ON READER SERVICE CARD

ATARI

A DIVISION OF MICRO PERIPHERALS, INC. P.O. BOX 368

ATARI

KETTERING, OHIO 45409

Q	ATARI	SOFTWARE and BOOKS
Ò	520 ST's C'mon Now, Do It! CALL	ST SOFTWARE TOO MUCH TO LIST CALL
Ò	SF 314 Double Sided Drive	ALL titles from: Haba, VIP, Broderbund,
Ò	SF 354 Single Sided Drive	Mark of the Unicorn, Hippopotamus, Dragon
ă	SH 327 20 Megabyte Hard Disk CALL	Group, Infocom, Accolade, Michtron, SST
5	SC 1224 RGB Color Monitor CALL	Systems, Mirage Concepts, Martin, etc.
ና	130 XE (8-bit Wonder of the World!) 139	We will have everything WORTH having! "THE C PROGRAMMING LANGUAGE" by B.W.
ጘ	800 XL	Kernighan and D.M. Ritchie
ና	1050 Disk Drive	8 BIT SOFTWARE FOR THE LATEST, CALL
٢	NEW "X" and "S" series Printers CALL	PAPERCLIP
۲	Power Supply 400/800/810 1050/850 15	PRINTSHOP. 29
ζ	Power Supply 600/800 XL	GRAPHICS LIBRARY #1, #2, or #3 (each) 16
ζ	INDUS GT	0.S.S. BASIC XE
ζ	NEW Power Supply for Indus GT 19	0.S.S. BASIC XL
ζ	2.1.2	MONITORS
ζ	PANASONIC PRINTERS	TEKNIKA MJ-10 Composite Color
ď	KX-P1080 5 NLQ MODES! NEW 219 KX-P1091 Rated the No. 1 Printer! 249	THOMPSON Green W/Audio
ď	KX-P1091 Rated the No. 1 Printer: 249	THOMPSON Amber W/Audio 90
ď	KX-P1592 136 col, True 180 cps	THOMPSON Composite Color
ď	KX-P3131 L.Q. Daisy, 80 col	THOMPSON RGB/Composite
ų	KX-P3151 L.Q. Daisy, 136 col 429	
Y	KX-P110 Ribbon, Blk (for 1080/1091/1092) 9	ACCESSORIES
ď	COLOR RIBBONS for 1080/1091/1092 11	ST- COVERS, Heavy Grade Vinyl
ł	EPSON	ST- MOUSE MAT, Matching ST Color 10
Q		ST- 6' Printer Cable
Ç	LX-80 (80 col)	ST- Monitor Stand, Swivel & Tilt
Ç	FX-286 200 cps (135 col) 539	Disk File for 3.5" disks (holds 40)
Ç	JX-80 COLOR (80 col)	Flip N File DATA CASE (holds 50)
Ì		Disk File, with Lock (holds 100!)
Ì	STAR MICRONICS	Rotary Disk File (holds 72)
Ċ	SG-10 (80 col)	Power Strip, 6 outlet, (15 amp Surge)
Ì	SG-15 (135 col)	Printer Stand, Heavy Duty, Sloping
כ	POWERTYPE	ATARI Deluxe Joystick, CX-43 9
3		ATARI "Standard" Joystick 6
Ċ	MODEMS	6' Atari Serial I / O Cable
b	ATARI 1030	Compuserve Starter Kit (5 Hours)
5	XM-301 Direct Connect	0.5. DOUBLER (DDI. Delisity for 1050)
b	HAYES 300 Smartmodem 139 HAYES 1200 Smartmodem 399	PRINTER SUPPLIES
b	HAYES 2400 Smartmodem 629	MAILING LABELS, White, 500 pack
5	US ROBOTICS COURIER 2400-100% Haves! 429	per 1000 4
'n	PRENTIS P212ST-1200 bps, 100% Hayes! . 239	Blu, Pnk, Gn, Yel, 800 pack (200 ea)8
5	SIGNALMAN Express (1200 bps, Smart) 279	per 500, any 1 color 4
5	VOLKSMODEM 1200	per 1000, any 1 color 6
٢	AVATEX Smart 1200 bps	Big Labels, 1-7/16x4", White, per 500 4
S	INTERFACES/BUFFERS	PRINTER PAPER, Micro-Fine perfs, 20 lb. 500 sheets, Pure White Bond
5	ATARI 850	1000 sheets, same as above 12
S	P:R: CONNECTION (100% 850 compatible)	Carton (2600 sheets), as above 26
٢	CABLES - We've Got 'Em	PRINTSHOP "Rainbow" Color Paper Packs
٢	U CALL (For Hayes, etc.)	Pastels (5 colors), 50 sheets of ea
٢	U PRINT A	Matching Envelopes, 20 of each
٢	U PRINT A-64 with 64K Buffer	Brights (8 colors), 50 sheets of ea 29
٢	APE FACE XLP	Matching Envelopes, 2c of each
ζ	Supra/MPP MICROPRINT	ALL 13 colors, 50 sheets of each
ζ	Supra/MPP MICROSTUFFER (64K Buffer) 109	Matching Envelopes, 20 of each
ξ.	Supra/MPP MICROSTUFFER (64K Buffer) 109 Supra/MPP 1150	Matching Envelopes, 20 of each 14 (Deduct 10% for 100/color paper packs)

DISKETTES Minimum Order of 2 Boxes Prices Are Per Box of 10

1		l		1 1	3.5"	MICRO-FLO	PPPIES
GEN	ERIC	BO	NUS	WABASH	SONY	MAXELL	VERBATIM
SS/DD	DS/DD	SS/DD	DS/DD	SS/DD	SS/DD	SS/QD	SS/DD
8.50	10.50	10.50	13.50	10.50	23.50	21.50	18.50
7.50	9.50	9.50	12.50	9.50	21.50	19.50	17.50
	SS/DD 8.50	SS/DD DS/DD 8.50 10.50	SS/DD DS/DD SS/DD 8.50 10.50 10.50	SS/DD DS/DD SS/DD DS/DD 8.50 10.50 10.50 13.50	SS/DD DS/DD SS/DD DS/DD SS/DD 8.50 10.50 10.50 13.50 10.50	GENERIC BOVE WABASH SONY SS/DD DS/DD SS/DD SS/DD SS/DD 8.50 10.50 10.50 13.50 10.50 23.50	SS/DD DS/DD SS/DD DS/DD SS/DD SS/DD SS/DD 8.50 10.50 10.50 13.50 10.50 23.50 21.50

Rainbow Colored Centech Disks (2 ea of 10 colors per pkg) "Silver" Centech Disks (20 Pack) . .

TO ORDER, CALL TOLL FREE 1-800-255-5835



M-F 9 am-9 pm • SAT 10 am-4 pm EST Ohio Residents Call (513) 294-6236

CIRCLE #154 ON READER SERVICE CARD



Gemsets continued

1530 DATA 32,147,56,152,16,3,76,253,55,162,41,160,52,169,1,32,3341
1540 DATA 147,56,162,43,160,52,169,1,32,147,56,162,25,160,52,169,5127
1550 DATA 9,32,147,56,152,16,3,76,253,55,76,170,55,162,48,160,5739
1560 DATA 52,169,3,32,147,56,152,16,3,76,253,55,163,44,52,141,4439
1570 DATA 42,52,162,41,160,52,169,2,32,147,56,173,43,52,240,5,4094
1580 DATA 169,11,76,149,55,169,139,141,43,52,162,43,160,52,169,1,4549
1590 DATA 32,147,56,162,25,160,52,169,11,32,147,56,238,41,52,76,3905
1600 DATA 34,54,76,180,55,155,162,16,169,9,157,66,3,169,179,157,69,3,169,1,157,72,3,169,0,157,73,3110
1620 DATA 68,3,169,55,157,69,3,169,1,157,72,3,169,0,157,73,3110
1620 DATA 32,146,56,162,4674
1630 DATA 182,160,57,32,55,56,169,1,141,240,2,32,13,56,169,0,141,9199
1640 DATA 240,2,240,55,235,56,169,148,141,198,2,162,125,160,58,32,7164
1650 DATA 55,56,96,162,169,160,58,32,55,56,32,13,56,32,226,56,2245
1660 DATA 76,70,52,162,16,169,12,157,66,3,32,86,228,96,162,0,3860
1670 DATA 169,11,157,66,3,169,0,157,68,3,169,52,157,69,3,169,57,73,3,32 6,3,32,86,228,96,162,0,3860
1670 DATA 169,11,157,66,3,169,0,157,68
,3,169,52,157,69,3,169,0,157,73,3,32
,86,228,96,142,68,3,3084
1690 DATA 134,214,140,69,3,132,215,160
,0,140,72,3,140,73,3,177,4487
1700 DATA 214,201,4,240,11,238,72,3,20
8,3,238,73,3,200,208,23,478
1710 DATA 169,11,162,0,141,66,3,32,86,228,96,76,105,56,155,162,5853
1720 DATA 0,169,9,157,66,3,169,104,157,68,3,169,56,157,69,3,3239
1730 DATA 169,1,157,72,3,169,0,157,73,32,86,228,96,162,212,7146
1740 DATA 169,1,157,72,3,169,0,157,73,32,86,228,96,162,212,7146
1740 DATA 160,58,32,55,56,32,101,56,96,72,138,162,16,157,68,3,104,157,72,3,16
9,0,157,73,3,169,11,157,3631
1760 DATA 66,3,32,86,228,96,32,136,56,162,30,160,59,32,55,56,221
26,56,201,49,240,14,201,50,6716
1780 DATA 240,16,162,250,160,59,32,55,56,76,186,56,169,0,141,66,4706
1790 DATA 52,96,169,1,141,66,52,96,162
10,169,5,157,66,3,169,3,141,56,52,96,162
10,157,69,3,169,4,157,4156
1810 DATA 72,3,169,0,157,73,3,32,86,228
1,173,0,6,96,67,45,1999
1820 DATA 83,69,84,32,70,73,76,69,32,84,79,32,68,79,32,68,79,87,78,1217
1830 DATA 76,79,65,68,63,155,84,89,80,69,32,102,105,108,101,110,4214
1840 DATA 76,79,65,68,63,155,84,89,80,69,32,102,105,108,101,110,4214
1840 DATA 76,79,65,68,63,155,84,89,80,69,32,102,105,108,101,110,4214 1830 DATA 76,79,65,68,63,155,84,89,80,69,32,102,105,108,101,110,4214
1840 DATA 97,109,101,46,101,120,116,32,38,32,80,82,69,83,83,32,1277
1850 DATA 210,197,212,213,210,206,58,155,4,87,79,82,75,73,78,71,4936
1860 DATA 46,46,46,155,4,253,73,78,86,65,76,73,68,32,67,72,2054
1870 DATA 65,82,65,67,84,69,82,32,83,69,84,32,70,73,76,69,1147
1880 DATA 33,155,80,82,69,83,83,32,82,69,84,85,82,78,32,84,1825
1890 DATA 79,32,84,82,89,32,65,71,65,73,78,46,155,4,80,82,1581
1900 DATA 73,78,84,69,82,32,78,79,84,32,82,69,65,68,89,46,1111
1910 DATA 155,80,85,84,32,73,84,32,79,78,32,76,73,78,69,32,601

1920 DATA 38,32,80,82,69,83,83,32,210,
197,212,213,210,206,155,4,1021
1930 DATA 89,79,85,82,32,71,69,77,73,7
8,73,47,69,80,83,79,1775
1940 DATA 78,32,78,79,87,32,72,65,83,3
2,67,85,83,84,79,77,1779
1950 DATA 32,83,69,84,155,73,78,83,84,65,76,76,69,68,32,38,1205
1960 DATA 32,82,232,57,227,58,69,65,68,89,32,84,79,32,85,83,2506
1970 DATA 69,46,155,80,82,69,83,83,32,211,212,193,210,212,32,84,9553
1980 DATA 79,32,69,88,73,84,44,32,79,84,72,69,82,87,73,83,1993
1990 DATA 69,155,89,79,85,32,77,65,89,32,82,69,66,79,79,84,1972
2000 DATA 69,155,89,79,85,32,77,65,89,32,82,69,66,79,79,84,1972
2000 DATA 32,83,89,83,84,69,77,32,87,73,84,72,32,84,72,69,1503
2010 DATA 155,87,79,82,68,32,80,82,79,67,69,83,83,79,82,32,1715
2020 DATA 79,70,32,89,79,85,82,32,67,72,79,73,67,69,44,32,503
2030 DATA 66,85,84,155,196,207,206,167,212,160,212,213,210,206,160,207,7860
2040 DATA 198,198,160,208,207,215,197,210,160,212,207,160,217,207,213,210,93
61 61
2050 DATA 160,208,210,201,206,212,197,210,161,155,4,125,96,96,96,32,8508
2060 DATA 71,69,77,83,69,84,83,32,66,1
21,32,77,97,116,116,104,3887
2070 DATA 101,119,32,82,97,116,99,108,
105,102,102,32,96,96,96,155,5554
2080 DATA 29,29,29,29,29,155,4,73,47,7
9,32,69,82,82,79,82,1161
2090 DATA 155,80,82,69,83,83,32,210,19
7,212,213,210,206,32,84,79,150
2100 DATA 32,82,69,83,84,65,82,84,32,8
0,82,79,71,82,65,77,2107
2110 DATA 155,4,125,160,199,197,205,20
1,206,201,175,197,208,211,207,206,8720
2120 DATA 160,195,228,58,223,59,200,19
3,210,193,195,212,150,204,207,193,196,
197,210,160,155,160,160,160,160,160,55 2140 DATA 194,249,160,205,225,244,244, 232,229,247,160,202,174,160,215,174,95 2150 DATA 160,210,225,244,227,236,233, 230,230,160,160,160,160,155,4,4462 2160 DATA 170,160,215,201,204,204,160, 206,207,212,160,215,207,210,203,160,86 2170 DATA 215,201,212,200,160,210,216, 175,205,216,160,211,197,210,201,197,91

2280 DATA 69,32,224,59,8,60,35,32,75,6
9,89,155,65,78,68,32,1895
2290 DATA 80,82,69,83,83,32,160,210,19
7,212,213,210,206,160,155,4,2543
2300 DATA 253,49,32,79,82,32,50,32,79,
78,76,89,33,155,4,224,3909
2310 DATA 2,225,2,70,52,0,0,0,0,0,0,0,0,0 0,0,0,0,3308

WANT TO SUBSCRIBE?

It's worth it.

CALL TOLL FREE 1-800-345-8112

In Pennsylvania — 1-800-662-2444

IT'S NOT JUST KID STUFF.

While we do have a wide selection of children's educational and entertainment software, we also have a rapidly growing list of personal, business and programming software for not only the Commodore and the Atari, but also for the Apple II Series and the IBM. So don't pass us by just because you think we're only for kids. We're for you, too.

We're having a special sale, with up to 80% off selected software. Call now for a complete list.

Call toll-free outside Texas: 1-800-433-2938 - Inside Texas call: 817-292-7396





WEDGWOOD RENTAL

5316 Woodway Drive Fort Worth, Texas 76133



CIRCLE #155 ON READER SERVICE CARD

READER COMMENT continued

tered, SAVE it back to disk or cassette. 22 REM revised by Kim GO1d 24 REM FEB. 86 26 REM CANADIAN VERS ION 160 NA\$=A\$(P*74-73,P*74):F OR X=N1 TO N20:IF NA\$(X,X) <>" THEN NEXT X ION 360 P=USR (ADR (FND\$), ADR (A\$),CNT,74,ADR(T\$),LEN(T\$)): FLAG=N0:RETURN 390 POSITION N9, N10:? "---POSITION N9, N11:? "-----":RETURN 440 POSITION N9,N10:? C\$:P OSITION N25,N10:? NA\$(64,6 7):POSITION N9,N11:? NA\$(6 480 IF EDIT AND T\$="" THEN POSITION COL,ROW:? CHR\$(B):T\$=A\$(P*74-73,P*74-50):G 0T0 530 560 IF EDIT AND T\$="" THEN POSITION COL, ROW:? CHR\$(B):T\$=A\$(P*74-49, P*74-N26): **GOTO 580** 610 IF EDIT AND T\$="" THEN
POSITION COL,ROW:? CHR\$(B
):T\$=A\$(P*74-N25,P*74-N11) :GOTO 630 640 POSITION N1, N16:? " enter province" 650 COL=N25:ROW=N10:L1=N4: GOSUB 250
GOSUB 250
660 IF EDIT AND T\$="" THEN
POSITION COL,ROW:? CHR\$(B
):T\$=4\$(P*74-N10,P*74-N7): **GOTO 680** GOTO GOO 670 IF LEN(T\$) (N2 THEN POS ITION N25,N10:? T\$;"-":GOS UB 120:GOTO 650 680 NA\$(64,67)=T\$:RETURN 690 POSITION N1,N16:? "GOO GO POSITION N1,N16:?"GOO 700 COL=N9:ROW=N11:L1=N7:G 05UB 250 710 IF EDIT AND T\$="" THEN POSITION COL, ROW:? CHR\$(B):T\$=A\$(P*74-N6):GOTO 750 7:13-H3 (P#74-ND):GUID 750
720 IF LEN(T\$) (N7 THEN POS
ITION N9,N11:? T\$;:FOR X=L
EN(T\$)+N1 TO N7:? "-";:NEX
T X:GOSUB 120:GOTO 700 730 REM THESE TWO LINES MU ST BE 740 REM DELETED FROM ORIGI 746 REM DELETED FROM ORIGI NAL PROGRAM 750 NA\$(68,74)=T\$:RETURN 1050 LPRINT " ";C\$;", ";N A\$(64,67):LPRINT " ";NA\$(68) 68)
1090 LPRINT LN\$;", ";FN\$;"
(64,67);" ";NA\$(68);LPRINT
1300 NA\$=" ":NA\$(74)=" ":N A\$(2)=NA\$:GOSUB 460:GOSUB
540:GOSUB 590:GOSUB 640:GO SUB 690
1310 POSITION N1,N16:? "
EVERYTHING OK? "
1350 IF CNT>N1 THEN A=USR(
ADR(SORT\$),ADR(A\$),74,24,C NT) 1510 IF P=CNT THEN A\$=A\$(N

1, (P-N1)*74):CNT=CNT+N1:GO
TO 760
1520 A\$ (P*74-73) = A\$ ((P*N1)
*74-73):SVE=N1:CNT=CNT-N1:
GOTO 760
1600 NA\$=" ":NA\$ (74)=" ":N
A\$ (N2)=NA\$
1610 GOSUB 460:GOSUB 540:G
OSUB 590:GOSUB 640:GOSUB 6
90:POSITION N1,N16:? " EV
ERYTHING OK? "
1640 A\$ (P*74-73,P*74)=NA\$:
SVE=N1:IF CNT=N1 THEN A=US
R (ADR (SORT\$), ADR (A\$),74,24
,CNT)
1680 FOR X=N1 TO CNT:? #N1;A\$ (X*74-73,X*74):NEXT X:C
LOSE #N1
1850 DIM A\$ (NA*74),NA\$ (74)
,T\$ (N25),B\$ (38),N\$ (N25),AD
\$ (N25),C\$ (N15),5\$ (N4),Z\$ (N
10),FND\$ (75),SORT\$ (152)
1900 INPUT #N1;NA\$:CNT=CNT
+N1:A\$ (CNT*74-73,CNT*74)=N
A\$:GOTO 1900
2050 DATA YOUR NAME,YOUR A
DDRESS,CITY,PROV,POSTALCOD
E
2060 POSITION N1,N1:? N\$:?

Note: This will now use 74 characters per field. Therefore, it is not compatible with the data from the original **Micro-Mail**. If you have a file on your disk called ADDRESS.DAT, delete if before running the revised **Micro-Mail**, or it will not work properly.

Sincerely, Mr. Kim Gold Stoney Creek, Ontario, Canada

Still more on Graph E's.

The change to **Graph E's** (issue 21) published in the March 1986 **Reader Comment** (issue 40), is very useful, but you can't rerun the program, since it overwrites the ML routine in Lines 1530-1680 of the original program. I think the easiest way around the problem is to relocate the print routine to the 128-byte block available at \$480. This can be accomplished by changing the following lines:

3620 RESTORE 3710:FOR B=1 TO 113:READ N:POKE 1151+B, N:NEXT B:DM=PEEK(88)+PEEK(89)*256:DM=DM+7640 3625 REM 3680 W=USR(1152,X,ADR(A\$), ADR(B\$)) 3725 DATA 233,40,133,202,1 44,13,76,151,4,230,207,76, 191,4,230,207,76,195,4,198, 203,76,151,4,230,205 3726 DATA 76,199,4,230,205 ,76,203,4,96

Sincerely, William V. Webb Akron, OH

XL Load * It.

Although Load * It (issue 39) is a fine utility, I was unable to use it with BA-SIC XL in my 800XL. Apparently, when the cartridge initialized, the AUTO-RUN.SYS file was bypassed. The following lines of code correct the problem: 550 DATA 255,255,0,6,77,6,173,31,208,41,4,240,10,169,18,141,33,3,169,6,141,34,3,96,251,243,51,246,33,6,1

ing lines of code correct the problem:

550 DATA 255,255,0,6,77,6,
173,31,208,41,4,240,10,169,
18,141,33,3,169,6,141,34,
3,96,251,243,51,246,33,6,1
63,246
560 DATA 51,246,60,246,76,
228,243,0,238,33,6,172,33,
6,192,18,208,10,169,0,141,
33,3,169,228,141,34,3,185,
5,6
570 DATA 160,1,96,82,85,78,
32,34,68,58,76,79,65,68,7
3,84,46,66,65,83,155,226,2,227,2,0,6,224,2,225,2,17,6,-1

I hope this will be useful to readers lucky enough to have BASIC XL.

Ken Moffat Seattle, WA

More DLI Maker corrections.

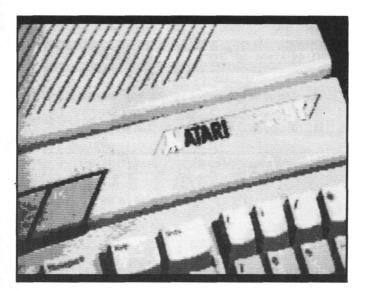
Here in the U.K., we get **ANALOG Computing** more than a little late at times, so you have probably already printed corrections for **DLI-Maker** from issue 38. But just in case you haven't...

60 REM the following modifications
65 REM remove any CHR\$(34)
and (155)
70 REM characters, which w
ill cause
75 REM errors in subroutin
e.
125 DIM PARM(100), KW(5,2)
1212 N=0:FOR I=1 TO LEN(DL
I\$):KEN=ASC(DLI\$(I,I))
1214 IF KEN=34 OR KEN=155
THEN KW(N,1)=I:KW(N,2)=KEN
:DLI\$(I,I)=CHR\$(0):N=N+1
1216 NEXT I
1262 IF N=0 THEN 1270
1264 ? #KI;"11090 ";:IF N>
1 THEN FOR I=0 TO N-2:? #K
1;"DLI\$(";KW(I,1);",";KW(I,1);")=CHR\$(";KW(I,2);"):"
;:NEXT I
1266 IF N>0 THEN ? #K1;"DL
I\$(";KW(N-1,1);",";KW(N-1,1);")=CHR\$(";KW(N-1,2);")"

Ken Ward Norwich, U.K.

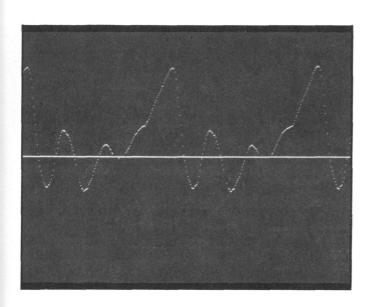
ATTENTION USER GROUPS and BBSs!

ANALOG Computing has received many requests for persison to include magazine programs in club libraries or
bulletin board systems. Our new policy (see page 3, staff
page) allows clubs or individually run BBSs to make available some ANALOG Computing programs, beginning in the
month on that issue's cover. Software from the July issue
can be made available July 1st. Programs reproduced must
state that they are from ANALOG Computing magazine.
For more information, call us at (617) 892-3488.



HippoVision Video Digitizer \$139.95

Creates digitized Degas and NEOchrome-compatible picture files using any standard composite video input (e.g. color or b&w camera, VCR, TV, etc. . .). Fast software updates the ST's screen 10 times per second, while the hardware frame-grabber snaps pictures in 1/60 of a second. Animation mode allows automatic sequential frame digitization. Black and white high contrast mode or up to 16 grey levels with color monitors. 320H X 250V resolution. Routine allows direct access to pixel data. NTSC, PAL, and SECAM compatible. Includes hardware, software, demos, and instructions.



Hippo ST Sound Digitizer \$139.95

Digitally sample, edit, mix, and play high-quality sounds with your ST. Mouse-based editing of waveforms, volumes, echos, and sound sequences. Real-time oscilloscope. Voice recognition demo. Four polyphonic sounds, multi-track. Normal sampling rate of 22,000 samples per second allows frequencies of up to 11Khz. Up to 40 seconds of sounds can be stored with 1 Meg of RAM. High-speed 8 bit analog-to-digital and digital-to-analog converters allow up to 400,000 samples per second. Use any standard audio input. Connect output to guitar amp or home hi-fi for increased fidelity. Input and output level controls. Includes hardware, software, sound library, microphone, power supply, cable, and instructions.

Our other products:

HippoWord	HippoW
HippoConcept Powerful multi-level idea processor. \$89.95	HippoC
HippoSimple Powerful database. Sort, merge, ten commands. \$49.95	HippoS
HippoSpell Word statistics plus a 30,000 word dictionary. \$39.95	HippoS
HippoPixel	HippoP
HippoFonts I Additional fonts for HippoWord. \$39.95	HippoF
HippoDisk Utilities Edit RAM, track & sectors. Recover data. \$49.95	HippoD
HippoRAMdisk Turn extra RAM into an ultra fast disk drive. \$34.95	
HippoBackgammon Animated color or B&W graphics. Robot players. \$39.95	HippoB
Hippo Computer Almanac	Нірро (
Hippo Jokes & Quotes Thousands of jokes, quotes, and puns. Not for children. \$34.95	Hippo J
HippoArt NEOchrome-compatible art files. Slide show program. \$39.95	HippoA
HippoClean Disk cleaning kit includes disk, fluid, and instructions. \$29.95	HippoC
Hippo EPROM burner Reads, verifies, edits, and burns most EPROMS. \$139.95	Hippo F
Hippo X-10 Powerhouse Control household 120V devices using existing wiring. \$139.95	Hippo X

Uncopyprotected and updated versions available.

Dealer Inquiries Invited. See your local dealer or order direct from Hippopotamus. VISA, Mastercard, COD, and institutional purchase orders accepted. California residents add local sales tax. Please include \$3 for shipping. Price, availability, and specifications subject to change without notice.



985 University Ave., Suite 12 Los Gatos, CA 95030 408/395-3190 Telex: 650-284-0701

ISSUE 1 VOLUME 1

DEMONSTRATION AND ADVERTISEMENT BY XLent Software

WINTER EDITION 86

I XLENT PRESENTS RUBRED COENTS

FEATURES

EXPAND/SHRINK ROTATE/MIRROR REFLECT- FLIP MULTI-FILLS ELLIPSE/BOX TRUE CIRCLE ICONIZE PIX 16X16 FONTS **48 TEXT SIZES** CREATE FONTS CONVERT ICONS AND MUCH MORE

HAS

CREATE PIX, TEXT, &/OR ICONS! USE other ware pix. Add 16x16 HI-RES PROPORTIONAL text. CONVERT other ware icons into TYPESETTER icons.



LEFT: ICON FROM PICTURE SHRINK

WHAT CAN TYPESETTER DO?

THIS NEWSLETTER AD IS JUST ONE EXAMPLE!! Create forms, labels, signs, letterhead, cards, OR HIGHLY DETAILED GRAPHICS FULL PAGE HARDCOPY! 48K controls over 490,999 pixels. FROM ALL OTHER ATARI SOFTWARE!! DIFFERENT

RIGHT: HIGHEST RES. PIX AND TEXT TOGE THER

Sky Natch Astronomy Club 123 33rd St Ridge, NY

More resolution than wost 8/16 bit computers!

130 XE Version on Same Disk MORE FEATURES!

ONLY AVAILABLE FOR ATARI COMPUTERS!!

+52.00 SHIPPING

95 + \$2 shipping for the 5205T

= -

COMPUTERS

EPSON, NEC, AND COMPATIBLES

INTEGRATED WARE

USE RUBBER STAMP SCREENS IN TYPESETTER AND PAGE DESIGNER

USE MEGAFONT II+ TO PRINT RUBBER STAMP SCREENS

USE CUSTOM FONTS IN ALL PROGRAMS

We can't list all of the features in RUBBER STAMP here. RUBBER STAMP is both a fast, fun graphics/text program AND a comprehensive program to integrate with TYPESETTER. RUBBER STAMP

IT

+\$2.00 SHIPPING

PAGE DESIGNER

FULL PAGE, MEDI DESIGN & PRINT MEDIUM RES. PROGRAM

ALL!!

"....a pretty nifty package..." CURRENT NOTES

DESIGN full-page printouts ON-SCREEN. COMBINE text, borders, & pix from other ware. EDIT in 40 or 80 columns. Mix 40 column Fonts Graphics Editor puts final touches on layout.

PAGE DESIGNER allows anyone QUICK, EASY layout for ADS, REPORTS, NEWSLETTERS, ETC. Two Graphics 8 screens show you EXACTLY how your design will look when printed.

Not the resolution of TYPESETTER, but PERFECT when highest resolution is not essential.

+ \$2.00 Shipping

ŢŖŖŖŖŶŖŖŖŖŖŖŖŖŖŖŖŖŖŖŖŖŖŖŖŖŖŖŖŖŖŖŖŖŖŖŖ

TEXT FILE PRINT IN ANY FONT

SCREEN PRINT IN TO 4 SIZES

...a good addition to anyone's library." -ANALOG COMPUTING

20 help

PRINT PROGRAM LISTING NITH SPECIAL CHARS.

If you are looking for a FAST PROGRAM LISTER that PRINTS ALL SPECIAL CHARACTERS, MEGAFONT is the program for you.

If you are looking for a VARIABLE SIZE PICTURE PRINTER, MEGAFONT II+ is for you.

COMING SOON for the ST

+ \$2.00 Shipping

24 HOUR ORDER PHONE

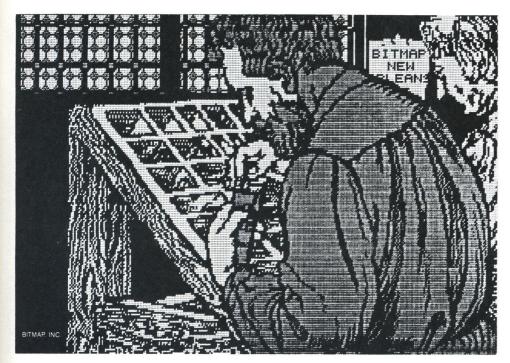
DEALER INQUIRIES NELCONE C.O.D.: Additional VA RES.: Add 4% tax

(703) 644-8881 P.O. BOX 5228, DEPT. Springfield, VA 22150

This ad was created by Ira Brickman using TYPESETTER & White Lion Software's GRAPHICS LIBRARIES CIRCLE #157 ON READER SERVICE CARD

32K Disk





Printing Utility

by Jan Iverson

Anything that's in ASCII format can be printed to the screen or printer by using DOS copy function. But why go to DOS, when a small utility program will do?

If you have a word processor like **PaperClip** or **SpeedScrip 3.0**, or any word processor that has the capabilities of printing to disk, you can print your files to disk, then call them up again to print to the screen or printer just as you saved them.

This utility assumes that your word processor has the default of a 75-character line length for a hard copy. Print to the disk under the name PRINT.PRT. For the screen copy, remove any centering commands and manually center these items. All other commands will be inoperative when printed to the screen. Format the text as follows: left margin(1), right margin(39). Print the text to the disk as PRINT.SCR.

After typing in this utility, save it to disk. If you have any AUTORUN.SYS maker, put it on the disk to autorun your utility.

For many of my programs, I like to type in the instructions and save the text to the back side of the disk with this utility. Then, when I give it to friends. they don't have to worry about what kind of word processor to use. Also, this would be an alternate way of sending letters through the mail for any of your Atari-owning friends.

Printing Utility continued

Ian Iverson is an applications programmer with Chevron Corp. She's been working with computers for eighteen years and is program chairman for her local user's group (DACE). She lives in Antioch, California, with her husband and three children.

Listing 1. **BASIC** listing.

10 REM *** DOCUMENT PRINT UTILITY *** 20 REM *** by Jan Iverson 1985 *** 30 DIM A\$(75),B\$(39) 40 LNCNT=0 50 GRAPHICS 0:TRAP 40000:TRAP 400 60 CLOSE #3:OPEN #3,4,0,"K:" 70 DL=PEEK(560)+PEEK(561)*256+4:POKE_D L-1,66:POKE DL+3,7:POKE DL+7,6:POKE DL +11,6:POKE DL+15,6 75 POKE 710,144:POKE 712,144:POKE 752,

CAL COM INC.

6820 Orangethorpe, Suite A P.O. Box 26O1 Silver Spring, MD 20902 Buena Park, CA 90620 (714) 523-5353 (301) 681-9121

HARDWARE 520ST (512K Memory) Monochrome Package

.....\$699.95

520ST (512K Memory) RGB Color
520ST 1024K Memory Upgrade (Includes Ramdisk Software) \$200.00
520ST ROMS \$ 25.00 SF314 Double Sided Drive \$239.95
Atari 130XE
Omniview XE/XL \$ 49.95 Omniview for 256K-800XL \$ 49.95
130XE With Omniview XE/XL Installed (with dual operating system) \$199.95
Newell 256K Upgrade for the 800XL (Includes Mydos 4.1)
Newell 256K Sector Copier (800XL/130XE)
Ramrod XL/XE (includes Omnimon)
Happy 810/1050 Enhancements
1050 Duplicator (The Ultimate Disk Backup!)
Happy 1050 Disk Drive (1050 Happy Enhancement Installed) \$299.95
ICD P:R: Connection Interface Module\$ 65.00
ICD R-Time 8 Cartridge
ICD Doubler with Sparta DOS Construction Set!
ICD US Doubler Installed in New 1050 Disk Drive)\$199.95
Atari 850 Interface (In Stock)\$109.95
Supra Microprint Printer Interface\$ 39.95
Supra 1150 Printer Interface
Volksmodem 12 (300/1200!) Includes ST or 850 Cable
Star Gemini 10X Printer (520ST or 8 Bit Compatible)
Star SG-10 Printer (520ST or 8 Bit Compatible)
520 ST SOFTWARE
CT Copy (Factors copy program available) Backs up all Atori F20CT

Software to dat																										
FoReM ST (BBS	Pι	0	gr	a	m	f	or	1	h	θ	S	т	!)	 						 		 			.\$	89.9
ST-Term (Version	1	.1)											 						 		 			.\$	34.9
Zoomracks																										
PASCAL by OSS														 								 ٠.			. \$	59.9
Sundog																										
Bratacas																										
Compulsive Copie																										

800/XL/XE SOFTWARE

Basic XE.........\$ 49.95
FOREM XE (Version 1.2A)....\$ 50.00
CUSTOM BBS PACKAGES AVAILABLE UPON REQUEST, CALL FOR INFOI VISA/MC accepted (add 4%), or send a cashiers check, money order, or call and order COD. Please add \$5.00 per order for shipping and handling. Sales Tax: CA add 6% — MD add 5%. CALL THE CAL COM BBS (24 HOUR 300/1200 BAUD): (301) 681-8933

CIRCLE #158 ON READER SERVICE CARD

```
80 POSITION 3,2:? "documentation"
90 POSITION 25,5:? "PRINTING"
100 POSITION 7,9:? "P":GOSUB 460:POSIT
ION 8,9:? "R":GOSUB 460:POSITION 9,9:?
"E":GOSUB 460
 "E":GOSUB 460
110 POSITION 10,9:? "S":GOSUB 460:POSI
TION 11,9:? "S":GOSUB 460
120 POSITION 27,12:? "S":GOSUB 460:POS
ITION 28,12:? "t":GOSUB 460:POSITION 2
9,12:? "a":GOSUB 460
130 POSITION 30,12:? "r":GOSUB 460:POS
ITION 31,12:? "t":GOSUB 460
140 POSITION 5,16:? "Ezuse Software Co
Mpany (C) 1985"
150 IF PEEK(53279) (>6 THEN 150
160 GRAPHICS 0:POKE 752,1:? " PRINT T
0 (S)SCREEN OR (P)PRINTER"
 O (S)SCREEN OR (P)PRINTER"
  180 IF A=ASC("P") THEN 210
190 IF A=ASC("S") THEN 270
 200 GOTO 170
210 CLOSE #1:CLOSE #2:OPEN #1,8,0,"P:"
:OPEN #2,4,0,"D1:PRINT.PRT"
220 TRAP 40000:TRAP 260
230 INPUT #2,A$
240 ? #1;A$
  242 LNCNT=LNCNT+1
                  F LNCNT=66 THEN GOSUB 470:LNCNT=0
255
  244 IF
   : GOTO
 250 GOTO 230
255 IF PEEK(764)=33 THEN POKE 764,255:
? "K":GOTO 230
 256 IF PEEK(764)=28 THEN POKE 764,255:
GOTO 40
258 GOTO 255
260 CLOSE #1:CLOSE #2:GOTO 40
270 TRAP 40000:TRAP 420
280 CLOSE #2:OPEN #2,4,0,"D1:PRINT.SCR
":POKE 752,1:? "K"
290 INPUT #2,8$
300 POSITION 0,LNCNT:? B$
310 LNCNT=LNCNT+1
320 IF LNCNT=21 THEN LNCNT=0:GOTO 340
xxa GOTO 290
 330 GOTO 290
340 GOSUB 470
 350 IF PEEK(764)=33 THEN POKE 764,255:
? "K":GOTO 290
 360 IF PEEK(764)=28 THEN POKE 764,255:
360 IF PEEK(764)=28 THEN POKE 764,255: GOTO 40
370 GOTO 350
400 POKE 752,1:? "K"
410 POSITION 10,10:? "TURN ON YOUR PRO
NIER":FOR I=1 TO 500:NEXT I:GOTO 50
420 GOSUB 470
430 IF PEEK(764)=33 OR PEEK(764)=28 THEN POKE 764,255:GOTO 40
450 GOTO 430
460 FOR I=1 TO 22:50UND 0,I+45,10,8:NE
XT I:50UND 0,0,0;RETURN
470 POSITION 1,22:? "Press SPACE to C
                                                                                    SPACE to c
ontinue/ ESC to quit Warding
```

CHECKSUM DATA.

(see page 12)

10 DATA 970,968,218,763,406,611,538,75
5,612,282,360,950,113,101,48,7695
150 DATA 832,194,565,70,88,706,730,884
,9,258,396,177,711,441,607,6668
258 DATA 730,681,893,810,30,603,387,17
0,725,985,444,606,727,443,926,9160
420 DATA 981,457,719,119,160,2436

OLOR MONITO A

(Premium Quality)

- Built in Speaker & Audio
- For Video Recorders
- For Small Business Computers
- Apple Commodore -Atari - Aplus 3000 -etc.
- One Year Free **Immediate** Replacement Warranty



Resolution



14" Color Computer Monitor

*C64/Atari composite cable \$9.95

* C128 RGB/Composite 80 column cable \$19.95.

Add \$14.50 Shipping

14" RGB & COMPOSITE COLOR MONITOR

Allows use of C-128 and C64 mode - composite and 80 column RGB mode. Must be used to get 80 columns in color with 80 column computers. Specially designed for use with the C128's special composite video output, plus green screen only option switch. (add \$14.50 List \$399.00 **S**

12" MAGNAVOX (NAP) 80 COLUMN MONITOR

Super high resolution composite green screen monitor. 80 columns x 24 lines, easy to read, plus speaker for audio sound included. Fantastic value. Limited Quantities.

List \$129.00 Sale \$7095*

(Premium Quality)

 Beautiful Color Contrast

High Resolution

Sharp Clear Text

Anti-Glare Screen

40 Columns x 24 Lines

Front Panel Controls

Black Stripe Tube

List \$32900

Turn Your Monitor into a TV Set Without Moving Your Computer

Elegant TV Tuner with dual UHF/VHF selector switches goes between your computer and monitor. Includes mute, automatic fine tuning and computer-TV selector switches. Inputs included for 300 ohm, 75 ohm, and UHF. Can be used with cable TV and VCR's. Fantastic Value. Limited Quantities. (Includes loop antenna for UHF & RCA connecting cables)

15 Day Free Trial - 90 Day Immediate Replacement Warranty

•LOWEST PRICES •BEST SERVICE IN U.S.A. •ONE DAY EXPRESS MAIL •OVER 500 PROGRAMS •FREE CATALOGS

Add \$10.00 for shipping, handling and insurance. Illinois residents please add 614% tax. Add \$20.00 for CANADA, PUERTO RICO, HAWAII, ALASKA, APO-FPO orders. Canadian orders must be in U.S. dollars. WE DO NOT EXPORT TO OTHER COUNTRIES, EXCEPT CANADA. Enclose Cashier Check, Money Order or Personal Check. Allow 14 days for delivery, 2 to 7 days for phone orders, 1 day express mail! Prices & Availability subject to change without notice.

VISA — MASTER CARD — C.O.D. No. C.O.D. to Canada, APO-FPO

COMPUTER DIRECT

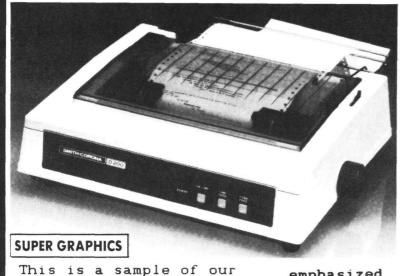
We Love Our Customers 22292 N. Pepper Rd., Barrington, Ill. 60010 312/382-5050 to order

Famous Smith Corona National Brand

PRINTER SA

Below Wholesale Cost Prices!!!

- ONE YEAR IMMEDIATE REPLACEMENT WARRANTY
- Speed: 120 or 160 characters per second Friction Feed/Tractor Feed Standard
- 80 character print line at 10 CPI
- 1 Line Buffer, 2K Buffer on 160 CPS Plus LQM
- Six pitches Graphics capability
- Centronics compatible parallel interface
- Features Bidirectional Print, Shortline Seek, Vertical And Horizontal Tabs



emphasized

There is standard data italic print. processing quality print

Check These Features & Prices

120 CPS 10" Printer

SALE

160 CPS + Letter Quality Mode 10" Printer

List \$499.00

SALE

(Apple — Atari — Etc.)

(IBM — Commodore)

near-letter-quality print.

Size/Weight

Height 5.04" Width 16.7" Depth 13.4" Weight 18.7 lbs. Internal Char. Coding ASCII Plus ISO

Print Buffer Size

120 CPS: 132 Bytes (1 line) 120/160 CPS Plus LQM: 2K No. of Char. in Char. Set 96 ASCII Plus International **Graphics Capability** Standard 60, 72, 120 DPI

Horizontal 72 DPI Vertical

10, 12, 16.7, 5, 6, 8.3, Proportional Spacing **Printing Method**

Impact Dot Matrix IBM \$89.00

SPECIFICATIONS

Char. Matrix Size

9H x 9V (Standard) to 10H x 9V (Emphasized & Elongate)

Printing Features

Bi-directional, Short line seeking, Vertical Tabs, Horizontal Tabs

Forms Type

Fanfold, Cut Sheet, Roll (optional) **Max Paper Width**

11'

Feeding Method

Friction Feed Std.; Tractor Feed Std.

Ribbon

Cassette — Fabric inked ribbon

Ribbon Life

4 million characters

Interfaces

Parallel 8 bit Centronics compatible 120/160 CPS Plus NLQ: RS232 Serial inc. **Character Mode**

 10×8 Emphasized; 9×8 Standard; 10×8 Elongated; 9 x 8 Super/Sub Script (1 pass)

Character Set

96 ASCII

11 x 7 International Char.

Line Spacing

6/8/12/72/144 LPI

Character Spacing

10 cpi normal; 5 cpi elongated normal; 12 cpi compressed; 6 cpi elongated compressed; 16.7 cpi condensed; 8.3 cpi elongated condensed; 5.12.5 cpi elongated proportional

Cartridge Ribbon — List \$19.95. Sale \$12.95.

– Interfaces -

Apple \$59.00

Atari \$59.00

Commodore \$39.95

Add \$14.50 for shipping, handling and insurance. Illinois residents please add 61/4 % tax. Add \$29.00 for CANADA, PUERTO RICO, HAWAII, ALASKA. APO-FPO orders. Canadian orders must be in U.S. dollars. WE DO NOT EXPORT TO OTHER COUNTRIES, EXCEPT CANADA. Enclose Cashiers Check, Money Order or Personal Check. Allow 14 days delivery. 2 to 7 days for phone orders. 1 day express mail! Prices & Availability subject to change without notice.

VISA — MASTERCARD — C.O.D. No C.O.D. to Canada or APO-FPO

COMPUTER DIRECT

We Love Our Customers 22292 N. Pepper Rd., Barrington, Ill. 60010

312/382-5050 to order

CIRCLE #159 ON READER SERVICE CARD

CALL 312-382-5050

Software Sale

Xerox

CALL 312-382-5050

(T) Tape, (C) Cartridge, (D) Disk.

GAMES

GAMES	
Electronic Arts	
A0684 DR. J & LARRY BIRD GO 1 ON 1 (D)	\$24.95
A0685 MOVIE MAKER (D)	\$23.95
A0686 SEVEN CITIES OF GOLD (D)	\$23.95
A0688 MUSIC CONSTRUCTION SET (D)	\$16.95
A0689 FINANCIAL COOKBOOK (D)	\$27 95
A0690 M.U.L.E. (D)	\$16.95
A0691 MURDER ON THE ZINDERNUEF (D)	\$16.95
Atari	
A0544 STAR RAIDERS (C)	\$14.95
A0545 MISSILE COMMAND (C)	\$14.95
A0546 GALAXIAN (C) A0547 DEFENDER (C)	\$14.95 \$14.95
A0548 DIG DUG (C)	\$14.75
A0549 DONKEY KONG (C)	\$16.95
A0555 PENGO (C)	\$16.95
A0556 MILLIPEDE (C)	\$16.95
A0557 JUNGLE HUNT (C) A0559 MOON PATROL (C)	\$16.95
AU300 FINAL LEGACY (C)	\$16.95
A0561 FOOTBALL (C)	\$14.95
A0563 TRACK & FIELD (C)	. \$14.95
A0562 TENNIS (C) A0563 TRACK & FIELD (C) A0564 EASTERN FRONT (C)	\$14.95
AU300 ADVENTURE WRITER (D)	\$19.95
A0567 STAR VOYAGER (D)	\$14.95
A0568 SARGON II (D)	. \$16.95
A0569 MS PACMAN (C) A0570 DONKEY KONG JR (C)	\$16.95
A0571 POLE POSITION (D)	.\$18.95
Broderbund	
A0514 MASK OF THE SUN (D)	\$24.95
A0515 OPERATION WHIRLWIND (D)	. \$24.95
A0516 SPELUNKER (D)	\$18.95
A0517 LODE RUNNER (D)	. \$20.95
A0502 STEALTH (D)	\$18.95
A0670 CHAMPIONSHIP LODE RUNNER (D)	. \$26.95
A0671 KARATEKA (D)	. \$23.95
Activision	
A0597 PAST FINDER (D)	. \$20.95
A0598 SPACE SHUTTLE (D)	. \$19.95
A0599 GHOSTBUSTERS (D)	\$19.95
A0666 MIND SHADOW (D)	. \$18.95
A0666 MIND SHADOW (D)	. \$19.95
	. \$18.95
Suncom	
A0190 PARTY QUIZ (D)	. \$14.95
A0194 GENT EDITION 3 (D)	. \$14.95
A0193 GENL EDITION 2 (D) A0194 GENL EDITION 3 (D) A0195 SPORTS EDITION (D)	\$14.95
AU170 EDUCATION EDITION (D)	. 314.95
A0197 BIBLE EDITION (D)	. \$14.95
	. \$14.95
Avalon Hill	
A0573 TGIF (D)	. \$16.95
A0574 FLYING ACE (D)	\$12.95
A03/0 B-1 NOCLEAR BOMBER (1)	. \$18.93
A0577 LEGIONNAIRE (D)	. \$20.95
A0578 TAC (D)	\$26.95
A0580 PANZER JAGD (D)	. \$20.95
A0604 FREE TRADER (D)	. \$19.95
A0605 EMPIRE OF THE OVERMIND (D)	. \$26.95
A0606 QUEST OF THE SPACE BEAGLE (D) A0607 CLEAR FOR ACTION (D)	\$22.95
A0608 PARIS IN DANGER (D)	. \$26.95
A0609 GULF STRIKE (D)	. \$22.95
A0504 GALAXY (D)	. \$16.95
AUSUS ANDROMEDA CONQUEST (D)	. \$16.95

Add \$3.00 for shipping, handling and insurance. Illinois residents please add 6% tax. Add \$6.00 for CANADA, PUERTO RICO, HAWAII, ALASKA, APO-FPO orders. Canadian orders must be in U.S. dallars. WE DO NOT EXPORT TO OTHER COUNTRIES, EXCEPT CANADA. Enclose Cashiers Check, Money Order or Personal Check, Allow 14 days for delivery. 2 to 7 days for phone orders. 1 day express mail!

VISA — MASTER CARD — C.O.D.
No C.O.D. to Canada, APO-FPO.

A0506 COMPUTER STOCKS & BONDS (D).....\$18.95

A0415 STICKYBEAR OPPOSITES (D).....\$19.95

A0416 STICKYBEAR ABC (D)	AC AC
BUSINESS	AC AC AC
A0201 ATARI WRITER (C) \$39.95 A0203 VISICALC (D) \$22.95 A0204 HOME FILING MANAGER (D) \$19.95 A0204 HOME FILING MANAGER (D) \$20.95 A0206 FILEWRITER (D) \$20.95 A0207 REPORT WRITER (D) \$19.95 A0208 MENU WRITER (D) \$19.95 A0210 HOME INTEGRATOR (D) \$19.95 A0210 HOME INTEGRATOR (D) \$19.95 A0211 SMALL BUS INVENTORY (D) \$11.95 A0212 SALESMAN'S EXPENSES (D) \$11.95 A0214 RETAIL INVOICE (D) \$11.95 A0215 TIMEWISE (D) \$14.95 A0216 PEACHTREE G/L (D) \$49.00 A0217 PEACHTREE A/R (D) \$49.00 A0218 PEACHTREE A/P (D) \$49.00 A0717 SYN CALC (D) \$32.95 A0718 SYN CALC TEMPLATES (D) \$14.95 A0718 SYN CALC TEMPLATES (D) \$14.95 A0672 APPT PLNR/WKLY SCHEDULE (D) \$12.95 A0673 ACCOUNTS RECEIVABLE (D) \$11.95	A00 A00 A00 A00 A00 A00 A00 A00 A00 A00
\$ynapse A0534 ENCOUNTER (D)	A0 A0 A0 A0 A0 A0 A0 A0
Epyx A0520 JUMPMAN (D) \$15.95 A0521 DRAGON RIDERS OF PERN (D) \$18.95 A0522 SUMMER OLY GAMES (D) \$24.95 A0523 PITSTOP II (D) \$24.95 A0524 BALL BLAZER (D) \$24.95 A0525 RESCUE ON FRACTULUS (D) \$24.95 A0693 KORONIS RIFT (D) \$24.95 A0692 THE EIDOLON (D) \$24.95	A0 A0 A0 A0 A0 A0 A0 A0
Strategic Simulations, Inc. A0601 SHOOTOUT AT OK GALAXY (D) \$17.95	A0 A0 A0

-P/-		
A0520 JUMPMAN (D)	\$15.	95
A0521 DRAGON RIDERS OF PERN (D)	\$18.	95
A0522 SUMMER OLY GAMES (D)	\$24.	95
A0523 PITSTOP II (D)	\$24	95
A0524 BALL BLAZER (D)	\$24	95
A0525 RESCUE ON FRACTULUS (D)	\$24.	95
A0693 KORONIS RIFT (D)	\$24.	95
A0692 THE EIDOLON (D)	\$24.	95
Strategic Simulations, Inc.		
A0601 SHOOTOUT AT OK GALAXY (D)	\$17.	95
A0602 DNIEPER RIVER LINE (D)	\$24.	95
A0603 SPACE COWBOY (D)	\$18.	95
A0527 FIELD OF FIRE (D)	\$24.	70
A0528 FORTRESS (D)	\$24.	75
A0529 COSMIC BALANCE (D)	\$24.	95
A0530 IMPERIUM GALATUM (D)	\$24.	95
A0531 RAILS WEST (D)	\$24.	95
A0532 TIGERS IN THE SNOW (D)	\$24.	95
A0533 50 MISSION CRUSH (D)	\$24.	95
A0590 BROADSIDES (D)	\$24.	95
A0591 COMPUTER QUARTERBACK (D)	\$24	95
A0592 COMPUTER AMBUSH (D)	\$34	95
A0593 COMPUTER BASEBALL (D)	\$24.	95
A0712 COLONIAL CONQUEST (D)	\$24.9	95
A0713 COMBAT LEADER (D)	\$23.9	95
A0714 KAMPFGRUPPE (D)	\$34.9	95
ζ/		

EDUC	ATION
EDUC	AIION
	Atari
(D)	A0420 ATARI MUSIC I (D)
(D)\$19.95	A0421 ATARI MUSIC II (D)
NCE (D) \$19.95	A0422 INTRO PROG I (Ť)
(D)\$19.95 \$19.95	A0423 INTRO PROG II (T)
) \$19.95	A0424 INTRO PROG III (T) \$14.95 A0425 ATARI LAB STARTER (C) \$44.95
,	A0426 ATARI LAB LIGHT MOD (C) \$33.95
	A0428 SKYWRITER (C)
	A0429 CONVERSATIONAL FRENCH (T)\$16.95
IESS	A0430 CONVERSATIONAL SPANISH (T)\$16.95
	A0431 MY FIRST ALPHABET (D)
\$39.95	A0433 TYPO ATTACK (C)
\$29.95	A0435 VERBAL MODULE SAT (D)\$29.95
R (D) \$19.95 \$20.95	A0435 VERBAL MODULE SAT (D)\$29.95 A0436 SAT SAMPLE PRETEST (D)\$17.95
\$20.95	A0437 MATH MODULE SAT (D) \$29.95
\$19.95	A0438 TOUCH TYPING (T)
\$19.95	A0439 JUGGLES RAINBOW (D)
\$19.95	A0442 TOUCH TABLET/SOFTWARE\$49.00
(D)	A0443 PAINT (D)
(D)\$11.95 \$11.95	A0443 PAINT (D)
\$11.75	A0316 LOGO (C)\$39.95
\$49.00	A0318 ASSEMBLÉR/EDITOR (C)\$19.95 A0319 MACRO ASSEMBLER (C)\$19.95
\$49.00	AUSTY MACRO ASSEMBLER (C)\$19.95
\$49.00	Spinnaker
\$32.95	A0444 LINKING LOGIC (C)
D) \$14.95 DULE (D) \$12.95	A0445 DANCE FANTASY (C)
(D)\$11.95	A0447 LOGIC LEVELS (C) \$16.95
))\$11.95	A0448 KINDERCOMP (D)
	A0449 FACEMAKER (D)\$16.95
	A0450 KIDS ON KEYS (D)
	A0451 GRANDMAS HOUSE (D)\$16.95 A0452 KIDWRITER (D)\$16.95
\$14.95	A0453 FRACTION FEVER (D)
\$18.95	A0454 IN SEARCH AMAZ THING (D)\$22.95
ORT (D)\$16.95 RICIAN (D)\$16.95	A0455 TRAINS (D)
INTDOWN (D) \$16.95	A0456 ALPHABET ZOO (D) \$16.95 A0457 AEROBICS (D) \$22.95
\$20.95	A0710 DELTA DRAWING (C)\$16.95
\$20.95	A0711 ADVENTURE CREATOR (C)\$16.95
\$25.95	American Educational Computer
\$25.95	A0459 VOCABULARY WORD BLDR (D)\$16.95
	A0460 GRAMMAR WRK USE SKILLS (D)\$16.95
\$15.95	A0461 WORLD GEOGRAPHY FACTS (D)\$16.95
RN (D)\$18.95	A0462 SPANISH VOCAB SKILLS (D)\$16.95
\$24.95	A0463 FRENCH VOCAB SKILLS (D) \$16.95
\$24.95 \$24.95	A0464 WORLD HISTORY FACTS (D) \$16.95 A0465 US HISTORY FACTS (D) \$16.95
(D) \$24.95	A0465 US HISTORY FACTS (D)
(D) \$24.95 \$24.95 \$24.95	A0467 US GOVERNMENT FACTS (D) \$16.95 A0468 A PLUS LEARN TO READ (D) \$24.95
	A0468 A PLUS LEARN TO READ (D)\$24.95
ns, Inc.	A0470 A PLUS READING COMPREHENSION (D) . \$24.95 A0471 COMPUTER LEARNING PAD \$37.95
AXY (D) \$17.95	A0418 BIOLOGY FACTS (D) \$16.95
\$24.95	A0493 ELEM SCIENCE 3 & 4 (D) \$16.95
\$24.95 \$18.95 (D)\$24.95	A0418 BIOLOGY FACTS (D) \$16.95 A0493 ELEM SCIENCE 3 & 4 (D) \$16.95 A0494 ELEM SCIENCE 5 & 6 (D) \$16.95 A0494 ELEM SCIENCE 5 & 8 (D) \$16.95
\$24.95	A0495 ELEM SCIENCE 7 & 8 (D)\$16.95
\$22.95	DLM
\$24.95	A0680 SPELLING WIZ (D)
)\$24.95 \$24.95	A0681 ALIEN ADDITION (D)\$19.95
)\$24.95	A0682 METEOR MULTIPLICATION (D)\$19.95
\$24.95	A0683 ALLIGATOR MIX (D)\$19.95
	Artworx
CK (D) \$24.95	A0738 LINKWORD LANGUAGE-SPANISH (D) \$17.95
\$34.95	A0739 LINKWORD LANG-FRENCH (D) \$17.95

ORDER TODAY

COMPUTER DIRECT We Love Our Customers

A0739 LINKWORD LANG-FRENCH (D) ... \$17.95 A0740 LINKWORD LANG-GERMAN (D) ... \$17.95

22292 N. Pepper Rd., Barrington, Ill. 60010

312/382-5050 to order

152K Lowest Price In The USA! 152K

ATARI® Computer System Sale

• Students • Word Processing • Home • Business



6070			
LOOK AT ALL YOU GET FOR ONLY \$379		INDIVIDUAL	SAVE
LIMITED QUANTITIES SYSTEM PRICE	LIST PRICE	SALE PRICE	OVER \$100
① Atari 130XE 152K Computer	\$249.00	\$13495	
Atari 1050 127K Disk Drive	299.00	15995	All 5 ONLY
3 Atari 1027 Letter Quality 20 CPS Printer	299.00	15995	\$37900
Atari Writer Plus Word Processer with Spell Checker	59.95	4995	.914
Atari BASIC Tutorial Manual	16.95	1295	SYSTEM

All connecting cables & T.V. interface included.

A Monitors sold separetly.

TOTALS

\$923.90

	Other Accessories	List	Sale	Add \$9.95 for
☆	12" Hi Resolution Green Screen Monitor	\$199.00	\$79.95	Connection Cables
☆	13" Hi Resolution Color Monitor	\$399.00	\$159.95	Add \$10 for UPS

CALL FOR 1027 PRINTER REPLACEMENT OPTIONS

15 DAY FREE TRIAL. We give you 15 days to try out this ATARI COMPUTER SYSTEM!! If it doesn't meet your expectations, just send it back to us prepaid and we will refund your purchase price!! 90 DAY IMMEDIATE REPLACEMENT WARRANTY. If any of the ATARI COMPUTER SYSTEM equipment or programs fail due to faulty workmanship or material within 90 days of purchase we will replace it IMMEDIATELY with no service charge!!

Best Prices • Over 1000 Programs and 500 Accessories Available • Best Service • One Day Express Mail • Programming Knowledge • Technical Support

Add \$25.00 for shipping and handling!!

Enclose Cashiers Check, Money Order or Personal Check. Allow 14 days for delivery. 2 to 7 days for phone orders. 1 day express mail! We accept Visa and MasterCard. We ship C.O.D. to continental U.S. addresses only. Add \$10 more if C.O.D., add \$25 if Air Mail.

COMPUTER DIRECT

SALE PRICE

We Love Our Customers 22292 N. Pepper Rd., Barrington, III. 60010 312/382-5050 to order

THE END USER

THIS MONTH:

An 8-bit color organ/ game controller, new ST languages and consumer regrets

by Arthur Leyenberger

Were you around in the late sixties... you know, the "psychedelic era"? Gosh, just the thought of black lights, Day-Glo colors and lava lamps takes me back to my innocent youth. Things were simple then. No personal, micro- or home computers to use, learn about and enjoy. We just had rock and roll, Boss 302 Mustangs and color organs.

Do you remember color organs? If you've forgotten—or think by now that I've finally lost my mind—I'll fill you in. A color organ is an electronic gizmo to turn sound into light. Well, actually, there's more than magic involved. A microphone converts sound into an electrical signal whose varying voltage is used to modulate one or several lights.

The fancy color organs of those days had several channels, each corresponding to a different frequency range. To the viewer, this meant bass notes might be represented by blue lights, mid-frequencies by green lights and high frequencies by red lights. To see one of these color organs in action, accompanied by loud rock music (it would also work with normal music, but who would bother?) was something best described as, well, far out.

A decade later, Atari was selling a product which did essentially the same thing. Instead of using Christmas tree lights strung inside a large box with a fresnel lens, the Atari product sent the output to your TV. Various patterns could be displayed on-screen, and the sound of the music would vary the intensity (brightness) of the picture. True Atari historians will know the name of this product.

Here it is, roughly another decade later, and we have another improvement on the basic color organ idea. (I'll bet you were wondering what I was leading up to, huh?) The **Sound Mouse**, by Soundsoft, Inc., is a color organ that uses the Atari 8-bit computer to display a graphic image on your TV or monitor screen. Movement of the graphics image is synchronized to the beat of the music.

Sound Mouse is a peripheral that allows your Atari to be controlled by sound. You can use it as a color organ or as a game controller. As a color organ, it functions as described above. As a controller, sounds like your voice or a clap can control on-screen activities.

Sound Mouse requires at least 48K of memory and connects to the computer's joystick port. Hardware consists of a microphone and electronics to input the proper signal to the joystick port. A sensitivity control on the unit itself allows you to tailor its use to the volume of the sound source.

The software consists of eighteen different graphics displays—including spirals, spheres, stars and snowflakes. These images may be displayed one at a time or shown continuously, via the

Arthur Leyenberger is a human factors psychologist and free-lance writer living in New Jersey. He has been an Atari enthusiast for four years. When not computing, he enjoys playing with robotic toys.

THE END USER continued

demo program. How fast the display colors change, the direction of movement, and how long a given display is shown can also be controlled by the user.

Although **Sound Mouse** will generally respond to all types of music, it performs best with music that has a pronounced bass beat. The effect is heightened by turning down the monitor screen brightness and room illumination.

Nine sound-controlled games are provided on the disk. Although the games aren't necessarily of commercial quality, they represent an interesting collection of challenges. All operate on the same theme, that is: you must make a noise at a certain instant to fire a "laser canon," squash bugs, measure your reaction time, or move a man in a maze.

One of the best aspects of **Sound Mouse** is that you can create your own graphics screens. Any graphics 10 screen will work, and the manual provides a short program that will save a user-created graphic screen to disk.

All in all, **Sound Mouse** is an interesting diversion. Not only is it a conversation piece, but it will bring back golden memories of color organs—to those who lived through that era.

Sound Mouse retails for \$29.95, from Soundsoft, Inc., Box 740, 10 Maple Avenue, Andover, NJ 07821.

Get the Raid!

The ST computer is becoming quite commonplace now. It's appearing in more homes, and the users are getting quite a bit of keyboard time under their collective belts.

TOS, the 520ST operating system, has been through a couple revisions, unbeknownst to users, and has settled down. But there are still a few bugs.

A comparison is often made between the Apple Macintosh and the Atari ST. Aside from the nonconstructive, "my computer is better than your computer" type of diatribe, it's worthwhile to look at the two machines and understand how each one implements certain features.

In this case, we're talking about how the computer either knows or doesn't know what disk is in the disk drive.

On the Mac, once a disk's been inserted into the drive, the user has lost control over its removal. The Mac's OS decides when it's safe to "eject" the disk, much like a toaster does with your morning toast.

The user may remove a disk, by selecting an item on a pull-down menu; out comes the disk. With this method, the Mac's OS always knows when a disk is in the drive—and what disk it actually is.

On the other hand, the Atari ST's OS doesn't know—or care—if a disk is in the disk drive. It may be the right disk, or it may be the wrong disk; it's immaterial to TOS.

Therein lies the problem. If you switch a disk on the ST during some type of disk operation (for example, a disk write), you could easily scramble the contents of that disk.

Here's an example of what not to do. Suppose you're using **ST-Writer** and have the program disk in the drive. The disk is write protected, because you don't want to accidentally erase or overwrite any of those files.

If you tell **ST-Writer** to save your file, you'll get a message in a dialog box saying that the disk is write protected. If, at that point, you (trying to be clever) insert the disk that you really want the file to be on, **ST-Writer** will save the file —but mess up the disk directory; it will look like the program disk's directory.

The bottom line is: don't ever switch disks in the middle of a disk operation, especially not a disk write operation. If you do...Well, you did back up the disk, didn't you?

Second FORTH.

Many Atari ST users know that the FORTH language is a very powerful, low-level computing language. "Low level" means it's optimized for the computer, rather than for humans.

This indicates that the language is a little more difficult to learn, but is much more powerful and faster than, say, BA-SIC. The Dragon Group, a small, West Virginian systems house, was the first company to market a product for the ST computer—4xFORTH.

The Dragon Group has announced that, after several months on the market, the original has been upgraded. Version 2 of **4xFORTH** is now available.

Extensive changes have been made for this new edition of the language. About one hundred new words have been added to the core FORTH vocabulary, including double precision integer math and printer control words. Also, the language now runs 25 to 30 percent faster than before.

Documentation has been upgraded, too. Changes in the manual include: 70

pages of new material, a 15 percent larger typeface for easier reading and a complete reworking of the contents.

The folks at the Dragon Group tell me that version 3 of **4xFORTH** is just about ready, as well. They claim that version 3 will be a milestone for FORTH languages; it's a self-optimizing system where the degree of optimization is controlled by the user.

According to the company, using the default level of optimization results in a halving of the *Byte* magazine Seive benchmark—from 19 to 10.26 seconds. The time for a million empty loops has dropped from 9.25 to 3.1 seconds.

Programming in FORTH is not for everyone; it uses a slightly different method of program statements and operators.

But, if you'd like to try programming in a powerful language—one which, according to the Dragon Group, has just become even more powerful, **4xFORTH** is worth investigating.

Speaking of Languages Dept.

If you're disgusted with ST-BASIC and ST-LOGO like I am, you'll be happy to learn that two additional languages have recently become available for the Atari ST. These just arrived, and I have not yet had time to start programming in either one. Still, I can assure you: each is an improvement over the "free-bie" languages that come with your ST computer.

Optimized Systems Software has long been a supporter of the 8-bit Ataris. They publish several fine languages — Action!, BASIC/XL and MAC-65, to name a few. Their **Personal Pascal** is a complete development system.

It goes beyond the standard Pascal, because it has extensions designed especially for the ST computer. Some features included in **Personal Pascal** are: GEM support, debugging options, code optimizer, compatible strings and an easy-to-use command to automatically perform compiling and linking.

Personal Pascal is OSS's first ST product and lives up to their usual standards in every way. The almost 300-page manual describes the built-in editor, GEM/Pascal library, compiler and linker, in a readable (and occasionally entertaining) way. Plenty of examples are used to illustrate the various topics presented. Personal Pascal costs \$80 and is available now, from Optimized Systems Software, 1221B Kentwood Avenue, San Jose, CA 95129 — (408) 446-3099.

The other recently introduced language for the 520ST is Fast/BASIC-M from Philon. What makes this programming language unique is that it's a compiled version of BASIC, closely resembling MicroSoft BASIC.

In addition to extremely fast execution of compiled code, Fast/BASIC-M features include the ability to perform calculations using either the highly accurate, binary-coded decimal format (BCD) or the high-speed IEEE standard format. Further, the separate compilation facility allows for modularization of code. Large applications can be broken down into modules which are individually compiled and recompiled as necessary, then linked together to form a complete program.

In this version of BASIC, array range checking can be turned on or off. User-written run-time libraries may be incorporated in programs, and the symbol table may be removed from the executable file, to keep down its size. On top of all this, the source code may be prepared for use with other Philon program development aids.

A 200-page manual accompanies the five disks. The documentation seems complete, containing sections on lexical rules, variables and constants, expressions, control statements, input/output, program segmentation, compiler operations and more. Appendices include: keywords, function table, run-time error codes, differences from other BASICs and Philon assembler documentation.

Philon's Fast/BASIC-M sells for \$129 and is available now, from Philon, Inc., Atari Division, 641 Avenue of the Americas, New York, NY 10011 — (212) 807-0303.

They've done it again!

Well, almost time to say good-bye once again. Just a minute, though; I've got one more thing to mention this month. First, let me take my blood pressure pill. Gulp, gulp, gulp. Okay, I'm ready now.

I've long respected Consumer Reports magazine, published by Consumers Union. For years, I haven't bought so much as a single toaster oven, dryer or electric razor without first consulting them. My balloon was burst a couple years ago, when they began preaching the Commodore dogma with nary a mention of the Atari 8-bit computer.

It seemed that nobody at Consumer Reports was savvy enough to realize that the Atari was easier to use, had just as much software, provided better graphics and sound, and was generally a better value than either the Apple or the Commodore 64.

Then they wised up. In 1985, the pronounced **AtariWriter** the best word processor for home use...a little late, but recognition, nonetheless. Now it seems that the folks at Consumers Union are up to their old tricks. Take the review of the Commodore 128 computer in their February 1986 issue—please.

After admitting that the C128 costs \$1100 for a full system with printer, the article goes on to recommend an Apple IIc or an IBM PCJr for people considering spending \$1000 to \$1500. No mention of the Atari 130XE or 520ST as alternatives can be found.

In a sidebar titled "Looking for a High-Tech Doorstop," Consumer Reports says, "A computer without software is no more useful than a doorstop." That's good advice, except they failed to look very hard for ST software. As of Christmas 1985, when they "found a number of games and word processing programs for the ST," there were dozens of titles available.

Based upon my own knowledge of locally available ST software, one could choose from five different word processors, four languages, at least five telecommunications programs, an excellent painting program, a couple dozen text and arcade games, and a host of utility, database and miscellaneous programs.

If Consumer Reports had done their homework, they would have had correct information for that issue.

By recommending a discontinued computer (the IBM PCJr) and an overpriced 8-bit model (the Apple IIc), Consumer Reports has, once again, demonstrated that they know irons and toasters far better than they do computers. In fact, given their less-than-average attempt at researching the computer market, I'm not sure I trust them with toasters anymore.

Since Consumer Reports accepts no advertising, we can't blame this blindness on their recommending only products advertised in their pages, as some magazines do. No, I guess the product testers at Consumers are just ignorant of what's happening in the computer market and what makes good sense.

For someone starting out in computing, who's willing to pay about \$1000 for a system, buying the 520ST is a smart move. High-powered processors like the

68000, icon-based user interfaces like GEM and inexpensive megabyte RAM memory are the wave of the future. *Anyone* who tells you differently is simply wrong.

Happy anniversary.

Congratulations to all you ANALOG Computing readers who enjoy reading the End User each month. This issue's column marks the start of our second year. Quite honestly, I enjoy bringing you news, information and, er, controversy each month.

As a computer advocate, I believe you have the right to get as much use, fun and enjoyment out of Atari computing as possible. That's why you're here each month. That's why I'm here. Until next time, have a good one.



CIRCLE #160 ON READER SERVICE CARD

COMPUTER WHOLESALE OUTLET TRADE-

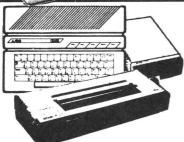


520ST PACKAGE

 520 Computer ● Mouse ● SF 354 Disk Drive Logo, Basic, 1st. Word, and Neochrome Sampler . B & W or color.

CALL FOR PRICE





130XE PACKAGE COMPLETE

130 XE Computer, 1050 Disk Drive, 1027 Letter Quality Printer, Atari Writer Plus.



65 XE PACKAGE

COMPLETE

65 XE Computer, 1050 Disk Drive, 1027 Letter Quality Printer, Atari Write Plus.

COMPUTERS

520 Computer with Modulator, Mouse, Logo, Basic, 1st Word and Neochrome Sampler CALL 130XF Computer..... 129.95 65XE Computer 99.95 800XL Computer 69.95

DISK DRIVES

Atari 1050 Disk Drive 149.95
SS/DD
Atari SF 354 360K
Disk Drive CALL
SS/DD
Atari SF 314 720K
Disk Drive CALL
DS/DD
Indus GT 199.95
SS/DD

MODEMS

MPP Supra
1000E 69.95
XM 301 CALL
Volksmodem
12 199.95
Volksmodem Cable
520ST to Modem 12.95
Volksmodem Cable
to C-64 or C-128 12.95

Not responsible for typographical errors. We reserve the right to limit quantities.

PRINTERS

Star Micronic SG10, Near Letter Quality ... 210.95 Power Type, Daisy Wheel 279.95 Gemini 10X..... 179.95 Atari 1027 Printer 139.95

MONITORS

Atari SC1224 12" RGB Color Monitor . . . 335.95 Atari SM124 12" Monitor 175.95 Commodore 1802 13" Color Composite Monitor...... 179.95 13" Color Composite Monitor 139.95 Thomson 14" RGB, Color, **Composite Monochrome** Monitor CALL Thomson 12" Monochrome, Green Screen with Speakers 79.95 12" Amber Goldstar Monitor 69.95

DISKETTES

-					_	_	_	-	_		_	_
		ss	/DI	Ο.						8	.9	5
N:	ash	nau										
		DS	/D	D.					. 1	2	.9	5
S	ony	,										
		SS	/DI	Ο.					. 2	27	. 9	15
S	n	/										
		DS	/D	D.					 . 3	35	.9	15

ACCESSORIES

Paper 2700 Sheets 39.9	5
Paper	
1000 Sheets 17.95	5
Includes Shipping	
Nibble Notch 7.9	5
Flip/File 10 4.9	5
Flip/File 60 14.9	
Pro 5000	
Joystick 11.9	5
Surge	
Protector 199	5

PRINTER INTERFACES

Ape Face						49.95
U-Print .						

PRINTER **RIBBONS**

SG10 & SG10C

Black								2.95
Red .								4.95
Blue .								4.95
Green	1							4.95

DUST COVERS

For All Models **Call For Price** And Availablity Scotch 51/4" Head Cleaning Kit 7.95

SOFTWARE

Software Titles Too Numerous To List Please CALL For Information and Prices

TO **ORDER** CALL

6 DAYS A WEEK 10 AM to 8 PM E.S.T.

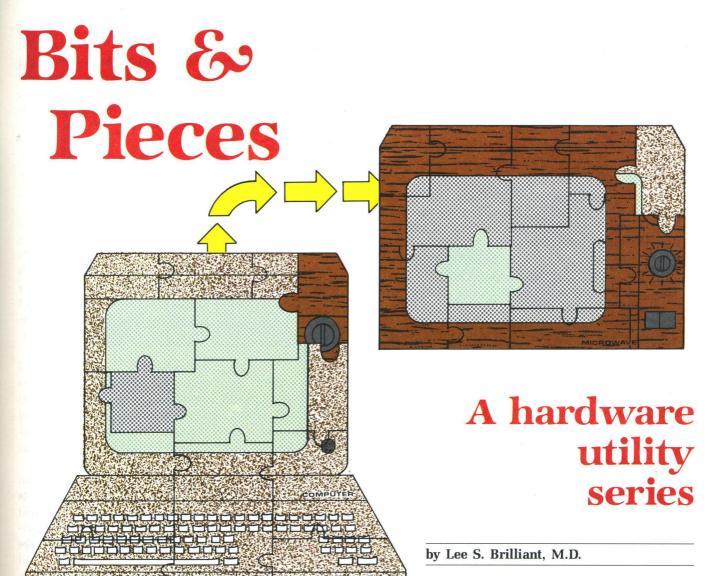


CUSTOMER SERVICE & NEW YORK ORDERS:

Call 516-488-2158 MAIL ORDERS TO: WORLD TRADE, EXECUTIVE OFFICES 2075 JERICHO TURNPIKE, NEW HYDE PARK, NEW YORK, 11040 MAIL ORDERS TO: WORLD TRADE, EXECUTIVE OFFICES

All C.O.D's above \$400 require 15% deposit. Check, Money Order, MC or VISA accepted / Call for shipping and handling information / NYS residents add applicable sales tax / Prices and availability are subject to change without notice / Air factory fresh merchandise with manufacturer's warranty. Dealers welcome. Call for recent price reductions and new rebate information. Order phones are open Mon.-Sat. 10AM-8PM E.S.T., Sun. 12PM-5PM. Customer Service: Mon.-Fri. 10AM-3PM. Returns must have return authorization. \$5 min. shipping charge.





A while back, a friend asked me: "Okay, so I buy this computer. What can it do for me?" "Well," I answered, "It can do lots of things—keep

your checkbook balance, do word processing, play games . . ."

"Yeah, yeah, I know, but I have an adding machine and a typewriter—I want to know what my computer can do!" What people really want to know is just what kind of appliance this computer device is. As a typewriter used for occasional correspondence, it's overly complex; as a pocket calculator, it's way over-priced.

So what can the computer do? With proper programming, it can manipulate words and numbers. Still, the real power of the inexpensive home computer cannot be realized without connecting it to the real world. Sure, a modem lets you reach out to other places, but what real-world work can your computer do without connection to everyday things? The computer can't turn a light on or off, warm up your coffee before you wake up or regulate your furnace for maximum efficiency. Or can it? Hooking up your Atari to do these things isn't that difficult—if you understand how it works.

The problem in building attachments is that most people don't know the basic lingo, or they lack the essential knowledge needed to do even simple electronic projects. Or, they're afraid to try for fear of hurting themselves (or their computers). Courses offered at local schools often don't cover the essential material needed.

But, never fear, all is possible! The purpose of this column is to introduce you to the world of digital electronics and give you a deeper understanding of how your Atari functions. Along the way, we'll construct several

ANALOG COMPUTING MAY 1986 / PAGE 125

Bits & Pieces continued

simple but useful projects to allow your computer to connect to the real world and do jobs for you.

The things a computer can do are limited only by your imagination, but some examples might give you a few ideas. Using a single joystick connection, you can turn up to sixteen appliances on or off.

You could set it up to run your sprinklers when the moisture content of the ground is too low. A security system built around a computer could turn lights and radios on and off randomly, within any pattern of times you choose. In fact, it could open and close the garage door (to add to the lived-in effect) or it could monitor all your windows and doors, then call your mother if someone breaks in and talk to her—at the same time it turns the heat up before you get home. Sound a bit far-fetched? Not at all. Interested? Let's get started.

Getting started.

Because a good working knowledge of BASIC (along with a smattering of machine language) will be needed, this series may be a bit advanced for beginners, but it shouldn't be beyond the scope of anyone interested in learning more about their Atari. It would also help to have some experience in electronics (soldering, etc.), but the most important thing needed is an insatiable desire to *tinker*.

To get started, we need to review the binary system. Since we humans have ten fingers, it only seems natural that we work in a decimal (or base 10) number system. For reasons we'll see later, computers work in base 2—hence binary. The way numbers work is independent of the base of the numbers. In decimal, the number 187 can be represented as follows:

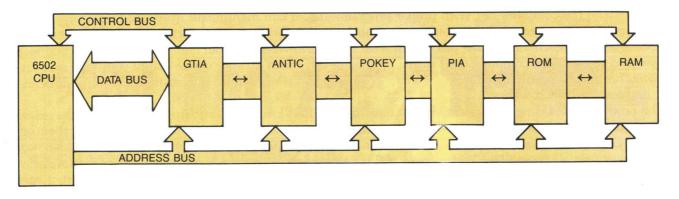
Notice that we have 1s, 10s and 100s columns, and each is bigger than the previous one by a multiple of 10. Binary works the same, but with 2s. There are 1s, 2s, 4s and 8s columns, and so on, each column increasing by a power of 2. The number 187 in binary is written like this:

The number 187 in binary is 10111011. If you didn't understand this, then I refer you to **Boot Camp** in **ANALOG Computing**'s issue 13, September, 1983. In computerese, each column in a binary number is represented by 1 bit of information, either a 1 or a 0. Eight bits form 1 byte and a half of a byte is (what else?) a *nibble!* Each byte can contain a number between 0 and 255. Try it yourself, 128 + 64 + 32 + 16 + 8 + 4 + 2 + 1 = 255.

What's the biggest number that can be held by 16 bits?—65535. In computerese, this is 64*1024, where each 1024 bytes is called 1K (K is the symbol for 1000 decimal). The Atari has 65536, or 64K individual memory locations, each holding 1 byte of information. By contrast, an IBM PC uses 20 address bits and can access 1,048,576 bytes.

Another word you need to know is bus. In human terms, a bus is a common carrier that runs to all parts of the city. In a computer, a bus is a set of wires that goes to all parts of the computer, sending or receiving common data needed by all the parts. There are three main busses: the address bus (which tells all parts of the computer which memory location the main processor wants to work with), the data bus (which carries the actual data to and from the processor) and the signal bus (which carries control signals).

Look at the block diagram of the Atari. Each of the sections has its own discrete numbered location between 0 and 65535. Each section, whether it is MEM-



Lyco Computer Marketing & Consultants



ON THESE IN STOCK PRINTERS



1	09	1			\$2	2	8

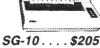
DIGITAL DEVICES



יט	GIIAL	DEVICES
	BUFFER	75
2K	BUFFER	89
4K	BUFFER	125

CITIZEN

Juki	6100	
	32 Serial	Board
	Tractor	
	Sheet F	eeder
Juki	6300	



SEIKOSHA

SP-1000UC (C-64) 169 SP-1000A Centronics 185

CORONA LP300 Laser Printer 200361 Toner Cartridge

BROTHER

2024L-P M1009-P

LEGEND

PANASONIC 109 3131 (NEW) 1092 3151 1080 (NEW) 1592 (NEW)

SILVER REED

C. ITOH Prowriter 8510 sp +	Call Call
15505 sp+ Printmaster	Call

TOSHIBA

EPSUN	
LX80 FX85 JX80 Homewriter 10 DX10 DX20 DX35 AP-80 HI-80 HS-80 HS-80 KS-80 NEW) LQ-800 (NEW) LQ-1000 (NEW)	209 333 Call 193 207 297 597 244 355 298 489 529 659

OKIDATA mate 10 mate 20	:79 CALL 214 348 563	880 1080 1380 1385 808	
	645		DI

DIABLO
D25 549
630 API 1599
630 ECS 1759
D 80 1F 2395
P 32 CQ1 699
P 3J 1749
C 150 999
DX:35 (NEW) CALL
AP-80 CALL

ST	Δ	R	1	V	u	(•	F	2		ì	u	1	CS
SG.			•	•	'	١	•	•		۰	4	•	•	205
SG-		C												219
SD-														367
SD-														438
SR-	15													469 578
SB-														589
Pov	Jeri	WE	10	١.										207

.29.95

351 Sheet Feede **MONITORS**

520 ST SOFTWARE

AMDEK

P1340 P351+ P341P P341S

300 Green	118	-
300 Amber	128	4
310 Amber IBM	155	ZVM 122A
Color 300 Audio	234	ZVM 123G
Color 500 Composite	369	ZVM 124 /
Color 600	397	ZVM 131 (
Color 700	495	ZVM 133
Color 710	569	ZVM 135 (
		ZVM 136 H
		ZVM 1220

ZENITH

ZVM 124 Amber IBM	
ZVM 131 Color	
ZVM 133 RGB	
ZVM 135 Composite	
ZVM 136 Hi Res Color	
ZVM 1220	
ZVM 1230	
71/14 1240	
	ZVM 131 Color ZVM 133 RGB ZVM 135 Composite ZVM 136 Li Res Color ZVM 1220 ZVM 1230

SIERRA ULTIMA II

VIP TECH	
VIP Professional 520ST VIP LITE 520St	
VIP Professional Amiga	

FTL GAMES Sundog..

ECH	
520ST	115
	65

TEKNIKA

MJ-10 Composite MJ-22 RGB

9	ZVM	124 Amber IBM	
7	ZVM	131 Color	
5	ZVM	133 RGB	
9	ZVM	135 Composite	
	ZVM	136 Hi Res Color	
	ZVM	1220	
	ZVM	1230	

INFOCOM (520ST) Wishbringer...... Zork I..... Zork II..... Zork III..... Deadline....

HABA

10 Megabyte	CALL
Hippo C Compiler	49.95
Check Minder	.49.95
Business Letters	.36.95
Wills	36 95

MODEMS

H	AYES	
Smartmodem	300	133
Smartmodem	1200	37
Smartmodem	1200B	34
Smartmodem	2400	. 598
Micromodem	IIE.	139

ANCHOR	
Volksmodem	. 5
Volksmodem 12	18

DRIVES

INDUS Atari

DISK NOTCHERS . . \$7.95!!

ACTIVISION

39.95

ACTIVISION	(ATARI)
Hacker	15.75
MindShadow	15.75
Ghostbusters	15.75
Great Am. Race	15.75

A OTH (10101) (5000T)

ACTIVISION (52051)
Borrowed Time	29.75
Hacker	26.75

DISKETTES

DENNISON	
ELEPHANT 51/4" SSSD.	11.99
ELEPHANT 51/4" SSDD.	
ELEPHANT 51/4" DSDD.	
PREMIUM 51/4" SSDD	
PREMIUM 51/4" DSDD	15.99
VERBATIM	
51/4" SSDD	13.99
51/4" DSDD	19 99

BONUS

51/4" SSDD. 51/4" DSDD

19.99

8 99

Volksmodem 12	186
ATARI	
130XE 65XE 800XL	CALL

65XE 800XL 520ST 1050 Drive 1027 Printer 850 Interface SF314 Drive

GLENTO)P
ST Logo Book	15.95
MARK of UNICORN	(520ST)
HEX	
MINCE	129.95
PC/InterComm	99.95
SOFTECHI	VICS
Timelink	75.00
Rhythm	39.95

MICHOPPOSE (Atari)

miorior nost (Atan)	
Kennedy Approach21.75	
Crusadé in Europe24.75	
Decision in Desert24.75	
Solo Flight20.75	
Nato Commander20.75	
Spitfire Ace18.75	
F-15 Strike Eagle20.75	

Crusade in Europe24.75
Decision in Desert24.75
Solo Flight20.75
Nato Commander20.75
Spitfire Ace18.75
F-15 Strike Eagle20.75

SUB LOGIC (Atari) Flight Simulator II....32.75 Night Mission Pinball....20.75

The Print Shop	28.95
Graphics Library	18.95
Graphics Library II	19.50
Graphics Library III	19.50
Bank St. Writer	42.75
Whistler's Brother	18.95
Spelunker	18.95
Stealth	18.95
Serpent's Star	24.95
Mack of the Cun	24 05

BRODERBUND (Atari)



Sf354 Drive Sm804 Printer Atari Writer ROM Atari Writer PLUS

TO ORDER

VISA

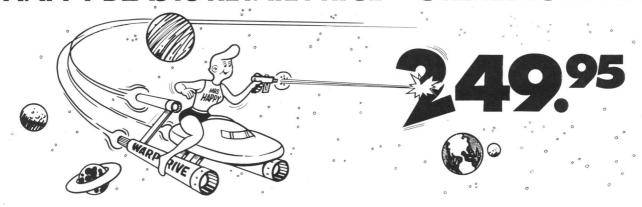
or send order to Lyco Computer P.O. Box 5088 Jersey Shore, PA 17740

RISK FREE POLICY

In-stock items shipped within 24 hours of order. No deposit on C.O.D. orders. Free shipping on prepaid cash orders within the continental U.S. Volume discounts available. PA residents add sales tax. APO. FPO. and international orders add \$5.00 plus 39% for priority mail service. Advertised prices show 4% discount for cash, add 4% for MasterCard or Visa. Personal checks require 4 weeks' clearance before shipping. Ask about UPS Blue and Red label shipping, Alm merchandise carried under manufacturer's warranty. Free catalog with order. All items subject to change without notice.

Customer Service 717-494-1670

ATARI DISK DRIVE OWNERS . . . HAPPY BLASTS RETAIL PRICE—ORDER TOLL FREE!



THE FAMOUS HAPPY ENHANCEMENT NOW ONLY \$149.95 for 1050 order number HC1G, for 810 order number HC8G

Makes your disk drive read and write faster, and allows you to execute the HAPPY WARP SPEED SOFTWARE. Available only for ATARI 1050 and 810 disk drives. 1050 version allows true double density plus the original single and enhanced density. PRICE INCLUDES WARP SPEED SOFTWARE BELOW, installation required.

HAPPY WARP SPEED SOFTWARE REV 7 (not sold separately)

Includes the famous HAPPY BACKUP and COMPACTOR which are the most powerful disk backup utilities available for your ATARI computer, plus MULTI DRIVE which allows high speed simultaneous reading and writing with up to 4 HAPPY ENHANCED drives, plus SECTOR COPIER which is the fastest disk copier that supports the 130XE RAMDISK, plus the WARP SPEED DOS which improves ATARI DOS 2.0s to allow fastest speed, plus HAPPY'S DIAGNOSTIC which allows comprehensive disk drive testing.

HAPPY 1050 CONTROLLER \$64.95 order number HC2G

For use with HAPPY ENHANCED 1050 disk drives only. Allows easy access to HAPPY 1050 slow and fast speeds and ultimate control of disk drive write protect, including writing to disk back side and protecting valuable data disks. Printed circuit board has switches and write protect indicator LED, installation required.

GET YOUR FAVORITE HIGH SPEED DOUBLE DENSITY DOS

Both of these disk operating systems support the fastest speed with both HAPPY 810* and 1050, and with HAPPY 1050 you get true double density. WARP SPEED DOS XL is HAPPY's own version of OSS DOS XL, and includes under cartridge, under ROM and AXLON RAM disk version, and is order number HC4G at \$29.95. TOP DOS version 1.5 from ECLIPSE SOFTWARE has more menu driven features, operates in all three densities, supports the 130XE RAMDISK, and is order number HC6G at \$39.95. *Note: 810 requires upgrade below.

810 VERSION 7 UPGRADE \$49.95 order number HU3G -XXXX

Allows older 810 HAPPIES to use newer software. Includes custom plug in IC and rev 7 WARP SPEED SOFTWARE. Same price for all HAPPY 810s registered or not. When ordering replace XXXX in part number with the serial number of your HAPPY COMPUTERS manufactured 810 board, or with a 2732 or 2532 which corresponds to the EPROM part number in your HAPPY 810 socket A102 of your side board modified HAPPY (not made by HAPPY COMPUTERS), installation required. Upgrade not needed for new 810 HAPPYS and serial number over 8000.

SUPER PACKAGE SPECIALS

Get a HAPPY 1050 ENHANCEMENT and CONTROLLER and WARP SPEED DOS XL for just \$199.95 order number HS5G, or get the same with TOP DOS 1.5 instead of DOS XL for just \$214.95 order number HS7G. If you already have the 1050 ENHANCEMENT you can get the HAPPY 1050 CONTROLLER and WARP SPEED DOS XL for \$74.95 order number HXL9G, or get the HAPPY 1050 CONTROLLER and TOP DOS 1.5 for just \$84.95 order number HTD9G. For other specials and dealer pricing call (408) 779-3830.

All prices include UPS shipping in USA, add \$10.00 for shipment outside USA. California residents add sales tax. No extra charge for credit cards or COD, VISA or MASTERCARD accepted. Our toll free number is an order taking service, not our line. To ORDER ONLY call (800) 538-8157 outside California, or (800) 672-3470 inside California, ask for extension 817 and have your credit card, part number and quantities ready. Toll free hours 6 am to 12 pm Mon.—Fri., 8 am to 8 pm Sat. & Sun., Pacific Time. For answers to questions call HAPPY COMPUTERS at our number below. Office hours 9–5 Mon.—Fri. Pacific Time.

HAPPY COMPUTERS, INC. * P.O. Box 1268 * Morgan Hill, CA 95037 * (408) 779-3830

ORY, PIA, ANTIC, POKEY or GTIA, constantly monitors the patterns of 1s and 0s on the address bus to see if it's the one being called. If it is, then the individual byte being called places itself on the *data* bus and looks to the signal bus, to see whether it is to send its contents or receive new contents. After it gets the signal, it does its job, then goes off the data bus and waits. In this way, the processor is giving and getting data constantly, 1.79 million times a second.

Figure 1 — Bus route.

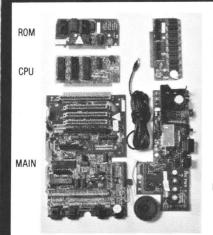
This flow of data in Figure 1 is controlled by commands coded in machine language. For example, if you run the following program in BASIC, you'll install a machine language program at location 1536. You may have seen similar listings in other programs. When you run this machine language program via the USR function, the processor goes to location 1536 and executes the code there.

10 FOR 5=1536 TO 1539:READ D:POKE 5.D: MEXT 5 20 DATA 169,65.133.203 The first command is a 169. The processor turns on the address bus with the 16-bit binary number 0000011000000000 (1536). The memory device at location 1536 comes onto the data bus. The processor sends a read signal and the binary number 10101001 (169) is loaded onto the data bus by memory location 1536.

The processor receives this number and interprets it as a command to load a specific location within itself (called the A register) with the number at the next memory cell (LDA in assembly code). It places 00000110000000001 on the address bus and sends a read signal. Location 1537 comes on-line and sends 0100001 (65) up the data bus to the processor, where it's placed in the A register.

The next memory cell is read, and the command 10000101 (133 or STA in assembly) is read from location 1538. This command tells the processor to store the contents of the A register, but, before it can do this, it must read location 1539 to see where to store the contents of A, so 00000110000000011 goes

ATARI 810 DISK DRIVE LESS CASE \$120.00



16K RAM

New Spare Parts For Atari 800/400/810

800 PCB Sets Main, CPU, 10K OS, Power & RAM \$40 Less RAM chips \$30

POWER

(\$) Prices in parenthesis (\$) are less I/O Cable and Power Pak. Add \$10.00 each.



\$140.00 (\$120.)

B&C 810

B&C 810 w/Happy \$220.00 (\$200.)

New Replacement Printed Circuit Boards (PCB) w/parts					
800 Main \$10 16K RAM \$10 810 side w/DS\$40					
800 Power \$5 10K OS \$10 810 Analog \$10					
CPU w/GTIA. \$10 810 Power \$15					
800 XL \$50 1200 XL \$35					
Power Paks 800/810 \$15 ea 800 XL Power \$25 ea					
Limited quantity used 800 cases & cast shields \$30 ea					
Hard to find Integrated Circuits					
IC \$5. ea GTIA, 800 ANTIC, 800 CPU, XL CPU, POKEY, 6520					
PIA, 6507, 444, 6532, 6810, 810 ROM C					
IC \$10. ea XL ANTIC, MMU, XL/XE OS, BASIC C, 850 ROM B.					
1050 ROM 1771					

Complete working 810 Less case \$120.0	00 (\$100.)
With B&C Black Anodized Case \$140.0	
With Case and Happy Upgrade \$220.0	
810 PCB Set w/side, DS, Power, Analog	\$60
810 Drive Mechanisms Tandon or MPI	\$60
Field Service Manuals 800/400, 800XL or 810	. \$25. ea
For 1050 or 1200XL \$20 ea 1025, 1027, 825, 850	
Diagnostic Cartridges Computer or Disk	. \$25. ea
520ST, 130XE, 800, 800XL, 810, 1050, 1030	\$CALL
OSS BASIC XE For 130XE	\$70
Aventure International Gold Series	\$40
Pilot, Basic, Manuals \$5. ea. LOGO ref. manual \$10	
★Special ★ Happy Upgrades 810 or 1050	\$150 ea

B[&]Computervisions

(408) 749-1003

3283 Kifer Rd., Santa Clara, CA 95051
Hours: Tuesday-Friday 10am-6pm/Sat. 10am-5pm
Terms: Calif. Res. add 7% sales tax. No orders under \$20.
We ship UPS COD, Prepaid or MC/Visa. Add shipping (minimum \$5.)

De Re Atari \$10

Rits & Pieces continued

down the address bus and 1539 responds by sending 11001011 (203 decimal) up the data bus.

Now the processor knows what it's supposed to do and where, so it puts out 0000000011001011 on the address bus (203 decimal). This time it puts the contents of the A register, 01000001 or 65 decimal, onto the data bus, then sends a write signal on the read/ write control wire.

Memory location 203 comes alive and receives the number 65, placing it into its 8 bits. Numbers are placed on the bus by putting either 0 or 5 volts onto each of the eight data wires that make up the data bus. Similarly, there are sixteen wires in the address bus.

Perhaps this seems deep, but it's the basis of mache programming. In BASIC, it would be:

10 A=65 20 POKE 203.A

On the microscopic level, this is how the computer functions. (I know I haven't explained how to control your toaster—but have patience.) Next month,

SUPER 3D PLOTTER II

By: R. Constan ¢ 1985

* * BEYOND BELIEF! * *

If you have any interest in 3D computer animation and image design, get ready to watch your so-called "game machine" out-perform every 8-bit machine on the market today! SUPER 3D PLOT-TER II is a complete 3D image design, display, and animation package for your Atari computer. Thanks to some new and very powerful "natural" algorithms developed by Elfin Magic, detailed hi-res images can be rotated and maneuvered at an amazing projection rate of 3 to 6 screens per second! This is the kind of animation that was considered impossible for an Atari. Believe it!! THIS PROGRAM ALLOWS MORE REAL TIME CONTROL THAN ANY CURRENTLY AVAILABLE 3D SYS-TEM FOR ANY-8 BIT MACHINE. SUPER 3D PLOTTER II also contains two full-featured, memoryresident editors: Enter your images via numeric data, or right on the screen with a joystick! Here are just some of the truly amazing features of this package.

- UNSURPASSED 3D PROJECTION SPEED
- TRUE HIDDEN SURFACE ELIMINATION AND SOLID (COLOR, FILL) PROJECTION.
- SUPER HI-RES PRINTOUT TURNS YOUR DOT-MATRIX PRINTER INTO A PEN PLOTTER!
- PRICE: ONLY \$39.95 N.Y. RESIDENTS ADD SALES TAX
- 2 EXTENSIVE EDITORS, PACKED WITH UTILITIES, FOR ULTIMATE DESIGN FLEXIBILITY.
- EASY DISK FILE SAVING, LOADING AND MERGING OF IMAGES.
- SCREEN "OVERLAY" AND "SAVE" FEATURES FOR INFINITE IMAGE EXTENSION, AND TOTAL COMPATIBILITY WITH MOST DRAWING PROGRAMS.

Don't be fooled by the low price! This package is usable in professional 3D C.A.D. applications, and this ad does not permit space for a fair description! Send S.A.S.E. for more info, or send check or money order to

Eltin Manic

23 Brook Place, E. Islip, NY 11730

FOR ALL 8-BIT ATARI COMPUTERS WITH 48K AND DISK DRIVE PRINTER OPTIONAL



-SOFTWARE WITH IMAGINATION-

CIRCUIT DATABASE II

This is an enhanced version of the electronic circuit (SCHEMATIC) drawing program I presented in the Nov. 1984 issue of ANALOG Computing. This program allows easy design and editing of electronic circuits, and storage of up to 60 complete, labeled diagrams on a single side of a disk! This new version includes several added circuit symbols, plus a special "TEXT TO HI-RES" converter, which produces neat, vertical printouts on any dot-matrix graphics printer having a ver tical printhead. The editor is so friendly, you can almost draw your circuits on screen faster than you could scribble them out with pencil and paper. And, it's written in plain, listable Atari BASIC, with full documentation on all machine language routines (USR calls), so you can use them in your own programs. CIRCUIT DATABASE II is a must for anyone concerned with the electronics field, from weekend hobbyist to professional. In fact, in today's world of fast-moving technology, it is almost unthinkable that you (or your children) will never be exposed to electronic circuits in some form. Now, you can be ready-and at a price you can't resist

ONLY \$12.95!

OR SEND S.A.S.E. FOR MORE INFO AND SAMPLE PRINTOUTS

we'll look at how computer logic works and how transistors function, and use the computer to sense outside events.

Onward and upward.

Now, to tweak your interest, let me outline the next few articles and what they'll cover. Number 2 will explain how computer logic and the joystick ports work, and get into alternate input devices. We'll see how to use pushbuttons to create a multi-player guiz game like those we see on TV.

Article 3 will explain how to reverse the joystick ports to control outside electrical devices, such as lamps and appliances. The fourth in the series is a construction article for a wireless home controller to regulate home electrical systems—lights, stereos, TVs and your coffee pot. In the fifth episode of this never-ending soap opera, we'll revisit the joystick input and build a high-speed optical sensor and a light pen, while explaining about the trigger lines.

I bet you never imagined there could be so much written about something so small, but we're not done yet! We can now apply what we know about input and output to build a simple and inexpensive realtime clock/calendar that will let your Atari report the correct date and time whenever you power up.

Finally, the last article on joysticks will cover how paddle inputs can be used for many kinds of sensors and level detectors. Included is a new kind of joystick, which can give instant cursor movement, useful for text editing and drawing programs.

Additionally, this column will cover how to use all the other peripheral connectors, including the serial port with the cassette recorder, and how to use the interrupt lines. We'll also cover the audio-video connector and show the proper way to build connector cables for amplifiers and monitors. Finally, there's the power plug on the XL/XE computers. Here, we can build a backup power supply to prevent memory loss in case of power failure. Sounds like a lot of fun to me! See you next month.

An Obstetrician-Gynecologist by day, Lee Brilliant, M.D. turns into a bug-eved computer monster by night. He started on computers in August 1983 with TI 99/4A and rapidly graduated to Atari. He's programmed Apple, TI, Commodore and IBM, but prefers his old 800. His favorite pastime is tearing computers apart to see how they tick. Of course, he uses a scalpel!



NDEX TO ADVERTISERS



READE	R SERVICE #	ADVERTISER	PAGE #	READ	ER SERVICE # ADVERTISER	PAGE #
112	Allen Macroware		26	103	Games Computers Play	5
146	Alpha Systems .		94	163	Happy Computer	128
109	American TV			156	Hippopotamus Software	113
168	Applied Compute	er	132	166	InSoft, Corp.	132
147	Applied Technolo	gies, Inc	97	162	Lyco Computers	127
105	Astra Systems	 		115	Magna Systems	41
116	At-A-Glance		42	169	MichTron	OBC
	Athena Software			101	Microprose	IFC
140	B&C Computervi	sions	86, 129	154	Microtyme	110
110 .**	Big Ben Games .			121	Newell Industries	48
161	Big L			117	New Horizons Software	42
113	Black Patch			119	Orion Software	48
158	CAL COM		116	149	Protecto	118, 119, 120
120	Centurian Enterp	rises	48	104	S.S.I	7
153	Coast to Coast .		109	151	San Jose Computer	103
139	Compucat			_	Senecom	101
107	Computability			108	Softview Concepts	88
152	Computer Creation	ons	104	145	Software Discounters	90
167	ComputerEyes		132	143	Sourceflow Media	20
160	Computer Games	Plus		144	Southern Software	12
141		1		171	Software Inc.	12
148	Computer Mail O	rder		111	TNT Computing	22
118	Computer Palace		46	155	Wedgwood Rental	111
	COVOX Inc		29	114	White House Computer	34
106	Duplicating Techn	nologies	16, 17	122	Xentech	48
149	Electronic One		101	142	Xetec	86
165	Elfin Magic		130	147	XLent Software	118

This index is an additional service. While every effort is made to provide a complete and accurate listing, the publisher cannot be responsible for inadvertent errors.

InSoft, Corp. **ST Software** C Tool Boxes

Math Tool Box #1 \$59 A library of math functions including matrix solving and manipulation.

Search/Sort Tool Box #2 \$59 A library of searching and sorting functions.

Graphic Tool Box #3 \$59 A library of graphic functions including 2D, 3D zoom and scale.

InSoft's disc-based magazine for the ST

\$45/6 mos. \$70/12 mos.

Shipping - \$5 per item ordered

InSoft, Corp. P.O. Box 180 Boston, MA 02123 (617) 739-9012

CIRCLE #167 ON READER SERVICE CARD

ComputerEyes™

CALL TOLL FREE 1 (800) 523-2445, x48 In PA (800) 346-7511, x48



- Make Custom T-SHIRTS
- Take Computer Portraits
- Interface to ANY Standard Video Source (ex. VCR, Video Camera, etc.)

Computer Eyes™ for ATARI 800, 800XL, 130XE \$109.00 Software interface to: Panasonic/Ikegami Commercial grade B/W video camera 159.00 Special Hook-up cabling with UNDERWARE ribbons to make custom heat iron-on transfers for T-Shirts, scarves, etc......12.00

Also Available for APPLE and C-64

HAL Systems, PO Box 293, Scotch Plains, N.J. 07076

* * DEALER INQUIRIES INVITED * * *

CIRCLE #168 ON READER SERVICE CARD



16220 Frederick Rd., Gathersburg, MD 20877 (301) 948-0256

Terms: Visa/MC/Choice/Amex. Prepaid orders shipped free. COD orders accepted. All orders shipped UPS. Open 7 days a week. MD residents add 5%

CIRCLE #169 ON READER SERVICE CARD

source

for all 52OST

Back Issues



Send your check or money order to **ANALOG Computing Back Issues**, P.O. Box 625, Holmes, PA 19043. MasterCard and VISA orders, call 1-800-345-8112 (in Pennsylvania, 1-800-662-2444).



Back issues on 51/4-inch disk

\$12.95 each, plus \$3.00 shipping and handling. Issues 35 and up are available in this format.

Magic Palette PuLse in Action!

ISSUE 27 ● English Error Messages in BASIC ●Instant Renumber ● MicroCheck Part 1 ● Adventure at Vandenberg ● Screenmaker

ISSUE 28 • MicroCheck Part 2 • TwoGun • Cascade • Monthly Mortgage Calculator

• Demon Birds • MicroDOS XL ISSUE 29 • RAMCHECK • Revive Dragonlord • XL Expansion Connector • Cheep Talk

ISSUE 30 • Loan Shark • Z-Plotter • BASIC Burger • ANALOG TCS Guide

Boulder Bombers

ISSUE 31 • Unicheck • R.O.T.O. • Lunar Patrol • ATASCII Animation • Lazer Type

• Atari Clock • Personal Planning Calendar

ISSUE 32 • Supereversion • DOS III to DOS 2 conversion • Color the Shapes

• Home-made Translator • Cosmic Defender • 520ST

ISSUE 33 • An Intro to MIDI • Note Master • Syntron • BASIC Bug Exterminator • Assemble Some Sound • C.COM • Mince (ST)

ISSUE 34 • Dragon's Breath • Multiple Choice Vocabulary Quiz • Elevator Repairman

Assemble Some Sound Part 2

ISSUE 35 (also on disk) • Hide and Seek • Printers Revisited • Bonk • Turtle 1020 • G:

ISSUE 36 (also on disk) ● Sneak Attack ● Maze War ● Nightshade ● Solid Gold Input Routine ● Rafferty Run

ISSUE 37 (also on disk) • Speedski • Index to ANALOG Computing (15-36) • Master Disk Directory . Halley Hunter . Bank Switching for the 130XE

ISSUE 38 (also on disk) ● Color Alignment Generator ● Incoming! ● DLI Maker ● Air Hockey ● ST Color Palette

ISSUE 39 (also on disk) • Super Pong • Unicheck (updated) • C-Manship Part 1 Program Helper
 Adventurous Programming Part 1
 ST Software Guide ISSUE 40 (also on disk) • Clash of Kings • Micro-Mail • Koala Slideshow Program

 Adventurous Programming Part 2
 Mouser ISSUE 41 (also on disk) • Treasures of Barboz • D&D Character Generator II Part 1

• ST-Log • Paperweight • Adventurous Programming Part 3

Issues 12, 14, 15, 16, 17, 18, 19, 20, 21 and 22 are also still available.



NEW for the ST . . . from MichTron

UTILITIES made for speed, efficiency, and simplicity.

KISSED Debugger by Keith Enge
Announcing the ultimate programmer's tool: this complete debugger
features full screen editing, tracing and execution options, "timed" break-
points, independent screens, dynamic relocation, assembler-disassembler,
decimal/hay conversions over 40 commands a help key and more!

DOS SHELL Utility by Timothy Purves

DOS Shell makes your ST mimic the MS-DOS command structure. All the familiar MS-DOS commands are available from GEM. Add the extra power of "global" file commands, multiple-file manipulation and batch files to your Atari.

CORNERMAN Utility by J. Weaver Jr.

Clear off your cluttered desk! This single utility gives you an electronic notepad, calculator, address/phone book, phone dialer, ASCII chart, clock and even a "15 squares" game. Install Cornerman as a desk top accessory and it's available almost everywhere!

ECHO Environment Controller by Timothy Purves

This software/hardware combination lets your ST control electric appliances. ECHO regulates thermostats, dims incandescent lights, and has a timer program that even takes weekends and holidays into account. It's perfect for security and energy conservation. ECHO uses inexpensive X-10 remote plug-in modules, so it's completely wireless!

D.F.T. Transfer Utility by Timothy Purves

Transfer files between your Atari ST and IBM computers. With this program and your own modem or direct-connect cable, you can convert all your important ASCII data files quickly and reliably, without retyping.

THE ANIMATOR Graphics Utility by Keith Enge

Now you can animate pictures made with Degas or Neo. Add flair to business presentations or make your own movies for fun! For the Atari ST (Degas and Neo not included) \$39.95

PERSONAL MONEY MANAGER by Jonathan Kring

This easy-to-use database keeps track of your personal finances from yearly budget to checking records in up to 999 accounts. And it supplies a variety of well-organized reports.

Last month's features:

MichTron UTILITIES			
Business Tools	200+ Business Forms, Letters, Contracts	\$39.95	
M-DISK	RAM-Disk Emulator	\$39.95	
MI-TERM	Communications Program	\$49.95	
SOFT SPOOL	Printer Utility	\$39.95	
CALENDAR	Desktop Appointment Calendar	\$29.95	
MI-DUPE II	Fast, Easy File Duplication	\$39.95	
BBS	Complete Bulletin Board System	\$49.95	

GAMES designed to be fast, colorful, and exciting.

TIME BANDIT Arcade Game by Dunlevy & Lafnear

Explore medieval dungeons, western frontiers and future worlds in one game! Each of 18 worlds has over 15 levels and is a game in itself! This fast-action arcade game even has a built-in adventure: pilot Starship Excalibur as you try to rescue its vanished crew. Great sound, beautiful graphics and hundreds of screens: the conquest of Time awaits!

MAJOR MOTION Arcade Game by MacKenzie & Sorenson

Race down the highway in this exciting spy-chase arcade game. Enemy drivers, deadly helicopters and gaping potholes threaten to destroy you. Defend yourself with smoke screens, machine guns, oil slicks and missiles, or escape down branching roads and treacherous rivers.

GOLD RUNNER Arcade Game by Dave Dies

As Commander of the Lode-Runners, you must infiltrate underground mines in search of gold and adventure. Use wit and skill to escape with the loot. Over 50 screens with narrow paths, steep ladders, dangling ropes and hidden traps will challenge your reflexes and test your logic.



SOLITAIRE Strategy Game by J. Weaver Jr.

Five classic card games: play Solitaire, Klondike, or Poker Squares by yourself, or test your strategy against the computer's in Cribbage. And if friends want to play, it's four against the house in Blackjack! The rules are accurate and the graphics amazingly realistic. Take a refreshing break from arcade games without missing any of the fun and excitement.

Last month's features:

MUDPIES Arcade Game (requires color monitor) \$39.95 FLIP SIDE Strategy Game \$39,95 LANDS OF HAVOC Arcade Game (requires joystick) \$19.95

All reasonably priced, with more coming every day. Ask for our latest catalog!





576 S. TELEGRAPH, PONTIAC, MI 48053 ORDERS AND INFORMATION (313) 334-5700

