NO. 45
AUGUST 1986

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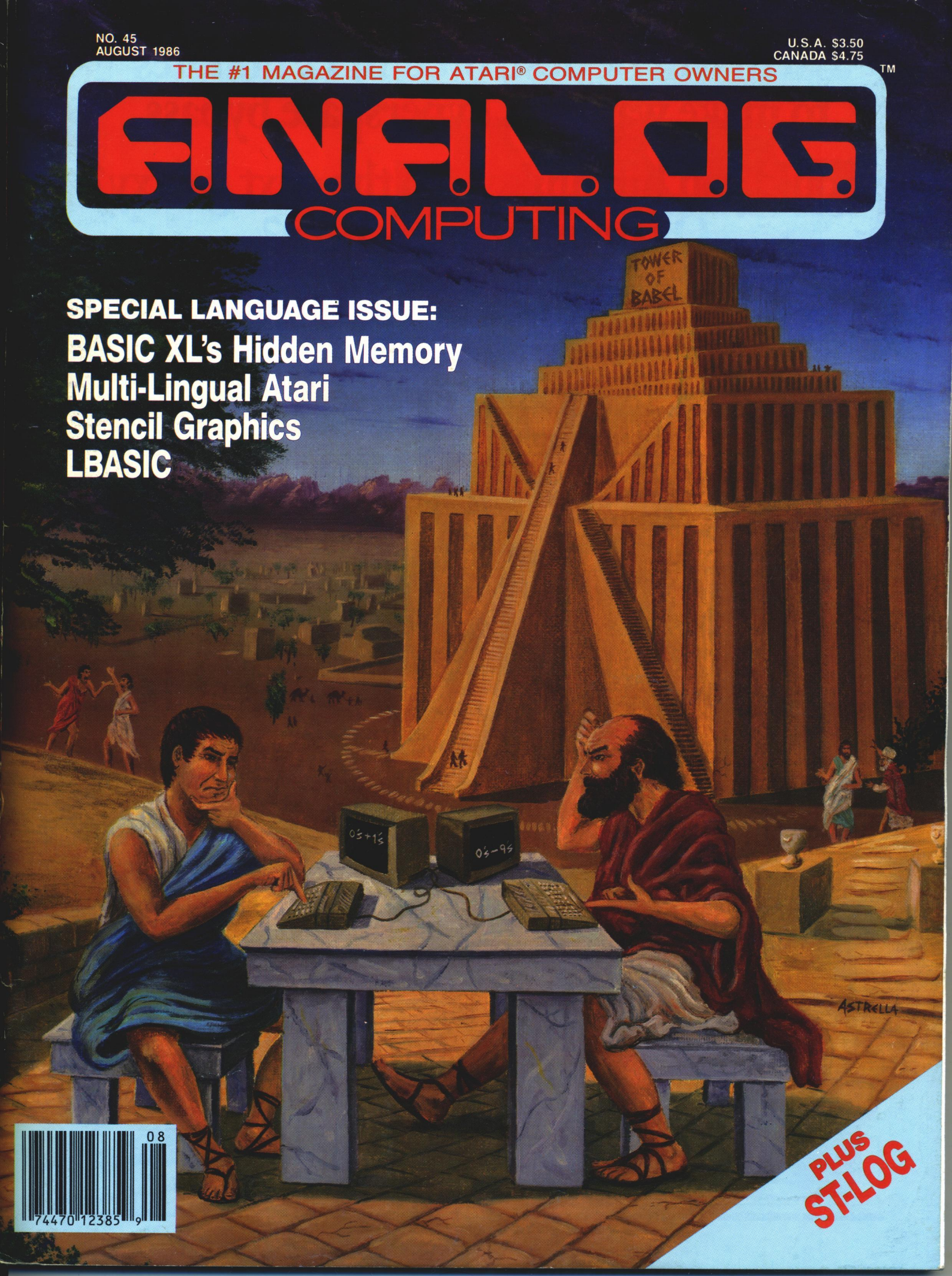
THE #1 MAGAZINE FOR ATARI® COMPUTER OWNERS

ANALOG COMPUTING™

SPECIAL LANGUAGE ISSUE:

BASIC XL's Hidden Memory
Multi-Lingual Atari
Stencil Graphics
LBASIC



PLUS ST-LOG

08
74470 12385 9

Earth will be destroyed in 12 minutes to make way for a hyperspace bypass.

Should you hitchhike into the next galaxy? Or stay and drink beer?

Slip the disk in your computer and suddenly you are Arthur Dent, the dubious hero of THE HITCHHIKER'S GUIDE TO THE GALAXY,™ a side-splitting masterwork of interactive fiction by novelist Douglas Adams and Infocom's Steve Meretzky. And every decision you make will shape the story's outcome. Suppose for instance you decide to linger in the pub. You simply type, in plain English:

>DRINK THE BEER

And the story responds:

YOU GET DRUNK AND HAVE A TERRIFIC TIME FOR TWELVE MINUTES, ARE THE LIFE AND SOUL OF THE PUB, THEY ALL CLAP YOU ON THE BACK AND TELL YOU WHAT A GREAT CHAP YOU ARE AND THEN THE EARTH GETS UNEXPECTEDLY DEMOLISHED. YOU WAKE UP WITH A HANGOVER WHICH LASTS FOR ALL ETERNITY. YOU HAVE DIED.

Suppose, on the other hand, you decide to:

>EXIT THE VILLAGE PUB THEN GO NORTH

In that case you'll be off on the most mind-bogglingly hilarious adventure any earthling ever had.

You communicate – and the story responds – in full sentences. So at every turn, you have literally thousands of alternatives. If you decide it might be wise, for instance, to wrap a towel around your head, just say so:

>WRAP THE TOWEL AROUND MY HEAD

And the story responds:

THE RAVENOUS BUGBLATTER BEAST OF TRAAL IS COMPLETELY BEWILDERED. IT IS SO DIM IT THINKS IF YOU CAN'T SEE IT, IT CAN'T SEE YOU.

Simply staying alive from one zany situation to the next will require every proton of puzzle solving prowess your mere mortal mind can muster. So put down that beer and hitchhike down to your local software store today. Before they put that bypass in.

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CIRCLE #101 ON READER SERVICE CARD

NO. 45 AUGUST 1986

THE #1 MAGAZINE FOR ATARI® COMPUTER OWNERS™

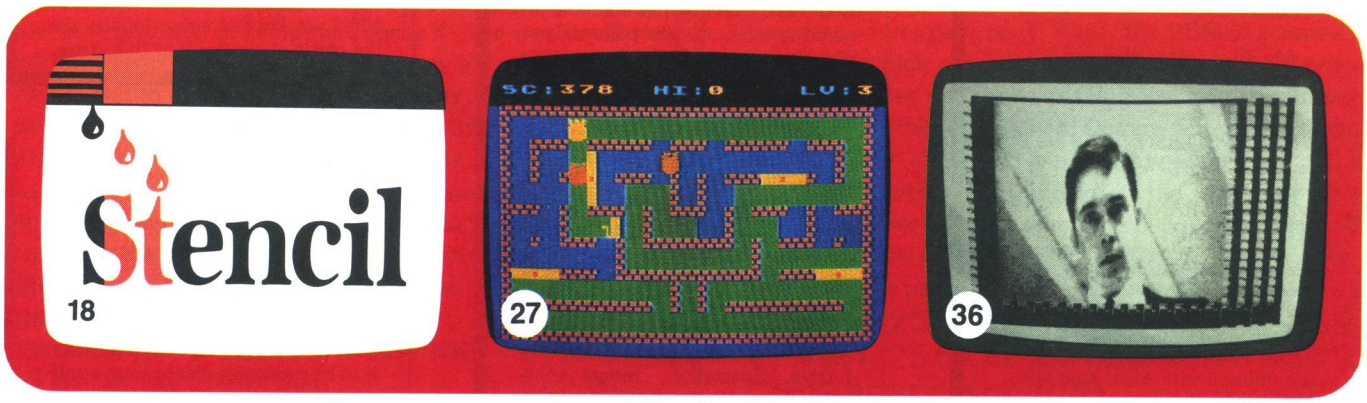
ANALOG COMPUTING

FEATURES

FEATURES *continued*

REVIEWS

COLUMNS



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

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

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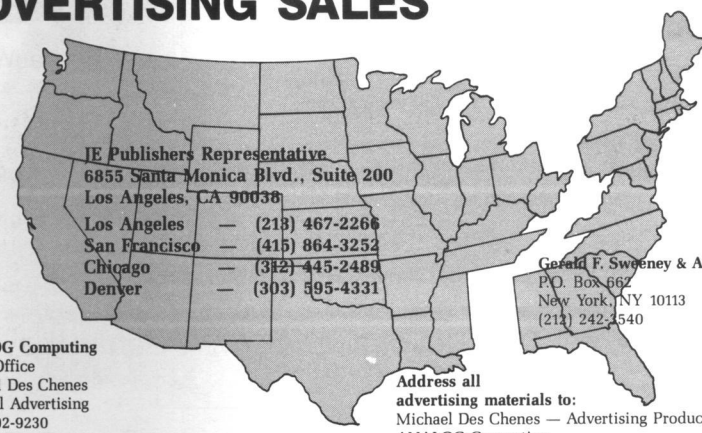

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AUTHORS

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

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OMNIVIEW XL/XE $59.95 (standard XL/XE computers)
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OmniWriter 80 by C. David Young OMNIVIEW CDY Consulting (214)235-2146 03/16/86
If you have never done 80 column word processing, you may not know what you are missing, but believe me, once you try it, you will never go back to 40 columns! You too can enjoy professional quality word processing on your ATARI 8 bit computer by installing an OMNIVIEW 80 columns enhancement. Check out these valuable features:

Environments: Letter/Data Perfect, Atariwriter Plus (130XE version), BASIC, DOS, MAC65, and many programs which use standard E: device. In addition, OmniWriter (a full feature 80 column word processor and text editor) and OmniTerm (an 80 column communication program with XMODEM, capture, macros, etc.) are provided with every OMNIVIEW sold. Also, OmniCalc (80 column spreadsheet) is planned for the near future.

Features: Besides crisp, legible 80 columns output, OMNIVIEW offers many other features. OMNIVIEW for the 400/800 has resident ramdisk handlers to support AXLON compatible ram upgrades up to 1 MB! Likewise, the OMNIVIEWs for the XL/XE computers have resident ramdisk handlers for XE compatible ram upgrades. Plus, the latter has its own 800 compatible OS with built in translator disk, reverse OPTION/BASIC selection, coldstart from the keyboard (reboot without losing contents of ramdisk), FASTCHIP floating point, and built-in 80 column ATRMON.

Requirements: 400/800 is plug-in. XL/XE will require soldering if OS is unsocketed. A non-composite monitor is recommended for serious 80 column work.

OMNIVIEW 400/800 $69.95 (400/800 computers)

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Simulated 80 column screen. OMNIVIEW's characters look a little different but are very clear and legible. Don't mistake OMNIVIEW for inferior 80 columns you may have seen!

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Call us before you buy elsewhere! We will match any legitimate price!

David Young OMNIMON (C)1986

```
PC NV-BDIZC AC X  Y  SP
EAF3  FE    01 FE 31 1F3
```

The lines above give you a taste of the amazing power that OMNIMON offers. All of the CPU's internal registers are displayed, giving you a snapshot of the execution of any program. From that point you have a wide assortment of versatile tools for manipulating the program, whether it be a commercial program you wish to modify or one that you are developing yourself. The power of OMNIMON stems from the fact that it is a resident part of the OS and in control of the interrupts. Nothing else for the ATARI offers this capability and all of these features: Display/Alter/Search memory in hex or char format, Disassemble/Assemble/Single Step/Move/Relocate/Compare/Binary Load/Sector Editing/Hex Conversion and much more! 400/800 version has resident ramdisk handlers for AXLON compatible upgrades to 1 MB!

OMNIMON (8K) **for 400/800** - **$99.95**
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FASTCHIP for 400/800 - **$19.95**
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Newell 256KXL with ram -**$69.95**
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128K board for 800 -**$99.95**

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CIRCLE #102 ON READER SERVICE CARD

EDITORIAL

Now that summer is upon us, we see a lull in the computer industry, as we do every year at this time. As one of our advertisers put it, "We have to wait until everyone comes back from fishing."

However, once autumn breezes in on us, we'll see an increase in activity—in both hardware and software sales. This brings me to the following point. Why is it that we've been seeing a large number of sales of the ST computers, but not similar numbers in ST software sales?

Either the buyers are mainly programmers intent on writing their own software, or the people buying the computers are getting their software by other means. I'll leave it at that for now.

In the meantime, I'll talk to the software companies and try to get feedback from them on this subject. I hope we don't see the same thing happen as did with the 8-bit software.

From the rumors and statements coming out of Atari Corp. these days, the 8-bits will be around for a long time (as we at **ANALOG Computing** always expected). Newly designed 8-bits sporting built-in drives and modems, plus better graphics and sound, are planned.

While I'm on the subject of new items, our next issue will bring you a complete report on CES. In the meantime, our crew in Chicago tells me Atari had a huge display. They were showing the XEP80, the new 80-column card/printer interface for the XE machines. It's supposed to be priced at under $80.

There was also talk at Atari about the XM1201, an affordable 1200-baud modem that will be compatible with most all computers, again with a remarkable price—$99.

As far as software's concerned, Atari has **Planetarium** and **Silent Butler** shipping to dealers now. Atari's now supporting third-party developers more strongly than ever, and it showed at CES.

ICD showed their 8-bit MIO device, with 1-meg RAMdisk, 80-column and hard drive interface capabilities. It will sell for only $349. ICD also showed off their new **SpartaDOS** cartridge.

This is only a fraction of what was shown at CES. Next month, we'll give you the full report.

If we go by the response we've been getting from our readers, and both the 8-bit and ST computer lines do as well as we expect, we'll have to spin off the **ST-Log** section sooner than planned.

Those of you who still use both machines, please don't panic. We'll offer a special combination package—at a special price—to give you **ST-Log** and **ANALOG Computing**, together. There will also be a similar package for the people who wish to receive the disk versions of both magazines.

One reader suggested that we publish three magazines, one for the 8-bit owners, one for the ST owners, and a completely separate magazine with articles and programs for both types of computers. That's overdoing it . . . at least, we think so (and so does our accountant)—for the present.

Here's the pitch: we feel we must ask you, our readers, for your feedback and ideas. We want you to tell us: (1) Should we continue to print **ANALOG Computing** and **ST-Log** as one magazine, but increase the total page count by 30 percent? (2) Should we separate the two periodicals completely? (3) And, if **ST-Log** is to be a separate publication, what do you think its frequency should be—quarterly, bimonthly, or monthly?

We *have* received mail on this subject, but maybe now those who haven't yet voiced their opinion will let us know how they feel. **ANALOG Computing** and **ST-Log** are here to help and inform *you*. In order to keep putting out the information *you* need, we need input—from *all* our readers.

This is an important chance to help shape your future Atari reading. We're counting on you . . . literally. Thanks.

Michael J. Des Chenes
Publisher
ANALOG Computing

READER COMMENT

To ST or not to ST. . .

I would like to commend Mr. DesChenes for his editorial of issue 43. I too think there should be no rivalry between the 8-bit and 16-bit Atari users.

After all, we Atarians owe a great deal to Jack Tramiel and his ST. If it hadn't been for Mr. Tramiel, Atari might not be in existence today. Mr. Tramiel's made some pretty impressive moves in the short time he's been on the Atari team.

Now, as far as the magazine goes. . . I'm not so sure I agree with **ST-Log**'s being a part of **ANALOG Computing**. I think, as the ST becomes more popular and its software more readily available, the **ST-Log** will have to become a separate entity.

For one, why should 8-bit subscribers be forced to pay for something they can't use, and vice versa? Subscription rates will go up because of the **ST-Log**, if they haven't already.

Second, **ANALOG Computing** has been an outstanding resource for the 8-bit Ataris since day one. I for one would like to see it stay that way. I think it only fair to both groups of users. Besides, there's already an abundance of multicomputer publications on the newsstands.

Cordially,
Gregory E. Hansen
Shawnee Mission, KS

I hope you never take the ST section out of **ANALOG Computing**. I don't own an ST (I own an Atari 130XE), but I do like to read about the ST, since it is part of Atari.

If you. . . made (the **ST-Log**) a separate magazine, I couldn't afford to subscribe to both, and I feel that I would be missing out on some important information about Atari. So please don't take **ST-Log** out of **ANALOG Computing**.

Yours truly,
Philip J. Kulpshas
Chicago, IL

In some respects you are your own worst enemy when it comes to your perception of the 8- versus 16-bit controversy.

First, you published an inflammatory editorial in your February 1986 issue (39). Second, you published a useless and humorless program called **Paperweight** in your April issue (41). Seems to me you're adding fuel to the fire!

The **ANALOG Compendium** is what I consider to be one of the best source books for Atari programs available. It is the reason I decided to subscribe to **ANALOG Computing**.

In general, I have been pleased with my decision. You publish good software, which is interesting and useful. However, there are some cases when you slip on your software, such as the one noted above. Shame on you!

Your isolation of ST material in **ST-Log** is a step in the right direction. Why not put any ST-related editorials there, too?

Your coverage of the 400, 800, XL and XE machines is certainly more plentiful. I suspect, though, that you may face a potential reduction in the overall quality of your software offerings for these machines. This is especially true if you persist in publishing **Paperweight**s.

Keep your 8-bit coverage on the right track—consistent with the quality of the material in the **ANALOG Compendium**.

Gordon C. Griswold, Jr.
Westfield, NJ

My family has owned an Atari 520ST personal computer for slightly more than four months. During that time, we have bought five issues of **ANALOG Computing**, and agree that it is the best of the Atari-dedicated monthly magazines.

In reading the **Reader Comment** column in **ANALOG Computing** (and other publications), I note an interesting conflict which has apparently developed between "old" (i.e., 8-bit) and "new" (i.e., 16-bit) Atari computer users.

The former are concerned that you and others will choose to abandon them in favor of the newer and more glamorous ST series.

The latter, particularly those of us who have never owned an Atari before (our family still has the very underrated Sinclair 2068 8-bit machine), are not at all interested in articles and programs on what they deem to be obsolete technology. Incidentally, this same conflict has arisen in our local Atari users' group. There is now a monthly "general" meeting and a separate monthly "ST" meeting. My son and I attend only the latter.

It seems clear to me, at least, that the obvious solution is an entirely separate monthly magazine devoted just to the ST. The Apple Macintosh has received such treatment.

Perhaps closer to home, archrival Commodore, itself the subject of specialized magazines, also has *Amiga World* as an independent periodical on its behalf. Moreover, this has occurred even though the Amiga's sales figures are substantially less than those of the ST.

While I greatly appreciate your **ST-Log**

—and, occasionally, *ST Resource* of rival *Antic*—it simply is not sufficient support for the growing number of ST owners. Considering that Atari Corp. has obviously staked its future on its new line of home computers, a monthly magazine dedicated just to the ST series does not appear to be an unreasonable request. I, for one, would love to see **ANALOG Computing** take up the challenge.

Sincerely,
William M. Feigenbaum
Amherst, NY

Sorry, Mr. Kulpshas, as you can see, opinion seems to be swinging toward separating our two magazines. We're looking into publishing ***ST-Log*** *under its own masthead by the end of 1986. Our loyal readers will be the first to hear more about any decision. Let us hear from you, please: shall we retain a page on ST developments and news in* ***ANALOG Computing*** *itself? —Ed.*

Wronged address.

In our ***ST Software Guide****, issue 44, we gave the wrong address for VIP Technologies. Their correct address is now: 132 Aero Camino, Santa Barbara, CA 93117 — (805) 968-9567. Our apologies. —Ed.*

Checking Checksums.

No! No! A thousand times, *no!* Not *just* the **BASIC Editor**, but the **BASIC Editor** *and* **Unicheck**, please!

Without a doubt, Clayton Walnum's new checksum **BASIC Editor** (issues 43 and 44) leaves all other similar programs in the dust, but I'm afraid it's a net step backward to eliminate **Unicheck** listings.

I've been avidly keying in **ANALOG Computing** programs since late 1982 (at 43, it's like building model planes as a kid, and I've learned a heck of a lot about programming in the process), and I have been increasingly delighted with the thoroughness and improvement in first **C:CHECK**, two **D:CHECK**s and, finally, **Unicheck** (issues 16 and 24, with updates in issues 31 and 39).

The **BASIC Editor** is fine for short listings, but for the more involved programs, such as **Home Shopper** and **Home Inventory** (both in issue 43), we really need **Unicheck**'s super-correct checksums.

More kudos to Clayton for his **M/L Editor** (issue 42). You've hit paydirt with this one, making *COMPUTE!*'s "MLX" look like a 1968 pocket calculator. I have a couple of minor revisions which I may send in, for those of us who are used to hitting the comma between typed data statements, but it's a dream to use.

Please continue to list the **Unicheck** checksum tables. Raise the subscription price a bit, if necessary (you're a little underpriced as is), but keep us loyal user/programmers *failsafe* out here.

Sincerely,
John H. Doyle
Atlanta, GA

Last words on Paperweight.

Just a note of thanks to Curt Cox for **Paperweight** (issue 41). I can't believe it. It is the most fun I have had with my Atari since FUN DOS.

I can't believe what I am reading in my favorite magazine from users who have taken **Paperweight** for real. Come on, folks, do you *really* believe **ANALOG Computing** would lead you astray—to destroy your machine? Get serious!

The first thing I did when I got **Paperweight** was to pass it around to our Atari users in I.M.A.G.E., and we had a lot of fun with it.

ANALOG Computing. . . keep up the super job.

Yours truly,
Dave Brehm
Mishawaka, IN

Several members of our users' group here in southern California, SBACE, have asked me to write you regarding your tongue-in-cheek program called **Paperweight**. Some of these very avid former supporters of your magazine were more than disgruntled by this article, supposed to be a joke for April Fool's Day.

In this vein, some have suggested that you should publish a program to destroy the reorder subscription forms for the magazine.

I wonder how this particular program would have been received by a young man or young lady who has just spent next year's allowance in buying an 800XL. Just as we have a responsibility to our membership to continue to help those with the 8-bit computers, I would think that your editorial staff should have filed this bit of "trash" in the proper receptacle. I think that the readers' comments were far too gentle with you.

As an officer of our users' group, when asked by a new member which magazine they should subscribe to, I would hesitate to recommend **ANALOG Computing** if this slovenly editorial policy continues.

I still have my 8-bit Atari next to my new 1040ST and still enjoy it as much as ever.

Sincerely yours,
Eugene Bienko, Vice President SBACE
Harbor City, CA

Gourmet update.

Thank you for your review of our product **The Computer Gourmet** (issue 43). On the whole, we felt the program was fairly and accurately described.

It may interest your readers to know that the one major complaint your reviewer had (namely, the difficulty in getting a summary of all the recipes on a disk) has been addressed in an updated version of the program. We have been shipping this new version since late 1985.

For owners of the previous version, we are still providing, free of charge, the listing of a BASIC program which will print a summary of the recipes on a disk.

Thank you again for your review and for your continued support of the 8-bit Atari computers.

Sincerely,
James Bayless, President
New Horizons Software, Austin, TX

A disk alternative — please!

I notice that I have become unwilling—or unable!—to spend the time I used to, typing in programs from your magazine. A disk subscription would be too expensive, in relation to the number of programs that I would like to have.

Therefore, I would like to know if ***ANALOG Computing*** is planning a second **Compendium**, which will also be available on disk. If not, another idea would be to have a disk of games and one of utilities, gleaned from past issues. Or you could

(Continued on page 114)

8-BIT NEWS!

NEW ATARI PRODUCTS

Spring COMDEX, held every year in Atlanta, promised several new products on the way for the Atari 8-bit machines.

The long-awaited Atari **80-column card** (actually a separate module) was shown in its "working prototype" form. This unit is fully compatible with every 8-bit, right down to the 400. The box plugs into your computer's joystick ports and functions with Atari software, like **AtariWriter**, **XE Term** and **Silent Butler**. Third-party software is currently being modified to be compatible, too.

Available this month for under $80.00. Imagine **Battlezone** played with this module's excellent, near-vector-like graphics. . .

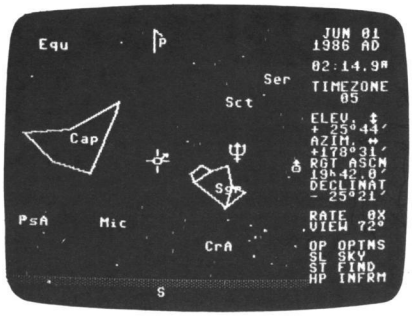
The **XMM801** dot-matrix printer runs at 80 characters per second and features both line and form feed, with friction and tractor capability. The printer plugs into the serial port and also prints Epson-type medium resolution graphics.

Software such as Broderbund's **Print Shop** is being adapted to run on the printer. Price is scheduled at $219.00, and the printer is currently shipping.

The **1200-baud modem** will be shipping this fall for under $100.00—and it's Hayes compatible. This auto dial/auto answer modem has an RS232 port on the back, as well as an Atari SIO port.

The **3½-inch drives** you've read about will run ADOS, a desktop quite similar to the ST's GEM system. These drives run twice as fast as the 1050, storing up to 327K. DOS will support up to 16 megabytes of disk storage.

In the rumor department, there was talk of a "console 8-bit." This super computer would have a high-memory XE, 3½-inch drives, a 1200-baud modem and an 80-column card—all built in.



THE CHECK WRITER

Printing, address listings and account balancing comprise the functions of **Check Writer**. The program provides the tools required to save you time—and put the burden of repetitive tasks on your computer's shoulders.

Check printing can be customized to your needs, then run off on a printer, utilizing continuous computer check forms. The program's on-line database maintains an ongoing list of names, addresses and phone numbers for clients or vendors, and can also display information in alphabetical order.

Check Writer retails for $24.77. From Xentech, P.O. Box 220218, El Paso, TX 79913 — (919) 541-6854.

CIRCLE #179 ON READER SERVICE CARD

LOOK TO THE SKIES

The Atari **Planetarium** is a sophisticated computer's-eye look at the universe. If you're new to astonomy, you'll find this program fascinating and easy to use.

If you're in the advanced stages of astro study, you'll appreciate the power of the program, along with the various ways it will assist your observing.

The **Planetarium** shows the regular cyclic positions of major objects in the Solar System, along with locations of over 1200 stars, all 88 constallations and over 300 deep-sky objects.

A HELP function identifies displayed objects, and a clock (which you may speed up) lets you view cosmic events as they unfold. You can scan examples of the skies to be seen 10,000 years into the future, or look at those 10,000 years past. **Planetarium** will even print out its screens to your printer.

The program comes with a map to assist in pinpointing your location on Earth, or any other location you wish to view the stars from. A sizeable (and impressive) manual is provided. The manual's abundance of detail will get you started, with plenty of diagrams covering both the program and astronomy in general.

Atari has also included ten ground objects. It's your task to find out where they are and when they exist(ed). One's the Golden Gate Bridge, but you'll only find it from the date of its construction until the 275-plus years it was designed to last.

Atari **Planetarium** is available for $49.95. Atari Corp., 1196 Borregas Avenue, Sunnyvale, CA 94086 — (408) 745-2021.

OTHER NEWS

Datasoft/IntelliCreations' latest offering, **221 B Baker Street**, is a graphics/text game that allows up to four players to join in.

You travel through the streets and alleys of Victorian London, gathering clues and attempting to break secret codes. These will eventually lead to the solution of some very intriguing cases. Sherlock Holmes and Dr. Watson will find this a big challenge.

Priced at $29.95. Additional cases will be available on disk for $14.95. IntelliCreations, Inc., 19808 Nordhoff Place, Chatsworth, CA 91311 — (818) 886-5922.

CIRCLE #178 ON READER SERVICE CARD

■ ■ ■

YEMACYB stands for yellow, magenta, cyan and black. This product allows you to print color hard copy, using a compatible black-and-white printer.

You'll need a color video display and a C.Itoh Prowriter, Epson MX-80/FX-80 or Gemini 10X/15X - SG 10/15, with tractor feed. You'll also need four color ribbons (yellow, red, blue and black). **YEMACYB** prints each color individually and allows up to 128 hues on any given screen dump.

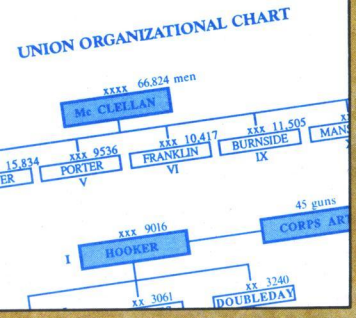
YEMACYB is $19.95, from Electronical Software Software, P.O. Box 8035, Rochester, MI 48063.

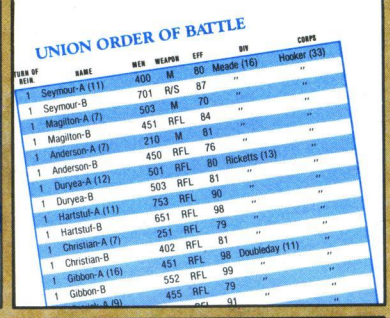
CIRCLE #177 ON READER SERVICE CARD

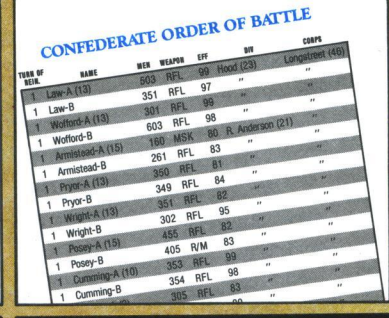
■ ■ ■

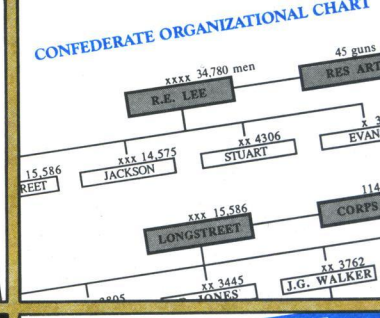
The **A.D.** 80-column driver for any Atari with 48K RAM or more replaces your 40-column screen editor with an 80-column version. Virtually any program that uses the *E:* device will function with **A.D.**

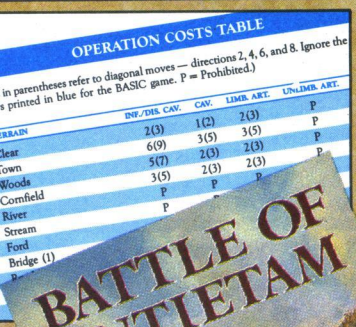
From: Out of the Blue Associates, 6250 W. Hargrove, #109, Las Vegas, NV 89107 — (702) 877-6263. CIRCLE #176 ON READER SERVICE CARD

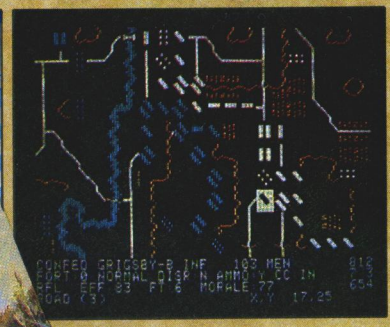


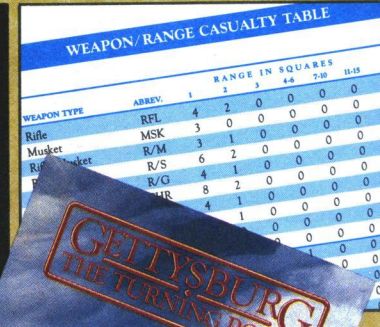


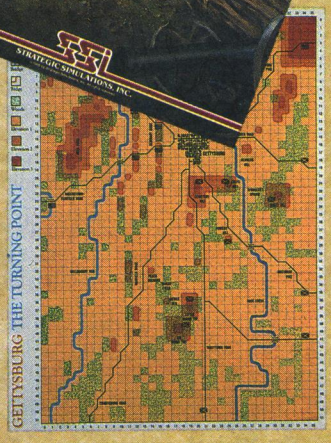












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The Multi-lingual Atari

A guide to programming languages for Atari 8-bit computers

by Arthur Leyenberger

For years, people have thought of Atari 8-bit computers as merely "game" machines. Indeed, they function superbly in this role. But beneath the hood of Atari 400, 800, XL and XE computers is a serious microprocessor, capable of handling any of more than ten programming languages, from the venerable BASIC (with several dialects) to the esoteric LISP.

In keeping with the theme of this month's **ANALOG Computing**, here is an overview of the programming languages currently available for 8-bit Ataris. The intent here is not to provide a tutorial on each language, but to increase your awareness of the Atari's potential.

Learning a new computer language is like learning anything else, and a good book will helping you get up and running. A brief description of some useful books on various computer languages is given in the sidebar to this article.

Machine language.

An Atari, or any computer, can only directly understand two states: off and on. These two electronic states are conventionally represented by the digits *0* (off) and *1* (on). Programming a microcomputer in binary form (using *0* and *1*) is called "machine language" programming.

Early microcomputers used front-panel switches to enter *0*s and *1*s into the memory locations, to form programs.

Light-Emitting Diodes (LEDs) on the front panel indicated the state of the memory locations. However, flipping switches to manually enter instructions into memory locations was tedious—and subject to error. Fortunately, Atari computers aren't programmed this way.

Assembly language.

Since machine language programs are almost impossible for humans to read, symbols are used to represent instructions. The symbols are called "mnemonics" (or memory aids), and the Atari 6502 microprocessor has a unique set of them.

Using mnemonics to write a program is called "assembly language" programming. The program that translates assembly language mnemonics into machine language object code is called the "assembler." Some assembler programs are capable of creating and using a collection of routines called "macros," and are therefore called "macro assemblers." A macro is a collection of one or more statements previously defined in the program, which may be called by a single mnemonic. A macro will cause one or more machine instructions to be assembled, and the binary code generated.

Although not as difficult to use and debug as machine language code, assembly language is still optimized for the machine, not the user. There are six different assembly languages for Atari computers (see Table 1). They vary in complexity, flexibility, size and ease of use.

If you're interested in learning to program in assembler, it's important to use a good book, since language packages themselves rarely have any tutorial information. In fact, this is true of any language mentioned in this article.

Disk operating systems.

A disk operating system (DOS) is the interface between the computer's main OS and the disk drives. The DOS contains all the system utilities used to format disks, copy files and entire disks, or make a back-up copy of the disk system.

Atari's 810 and 1050 drives use a single-density DOS (DOS 2.0S or DOS 2.5S). The 1050 is capable of running the dual-density DOS 3.0D. This DOS increases the drive's storage capacity to 127K bytes (about 1½ times the capacity of the 810).

The specific languages and application programs you use coexist with the OS that runs on the computer. Sometimes a specific application (like LJK's **Letter Perfect**) uses its own DOS. Usually, you can only run programs which use the DOS that comes with the computer. Indus and other double-density drives typically use their own DOS. For Atari computers, there's a plethora of other DOSs.

K-BYTE's DOS is an alternative to Atari's DOS 2.0S. It offers a greater level of control over devices and memory, and appeals mainly to advanced programmers.

One of the main differences between K-DOS and Atari DOS is that K-DOS is memory resident. Most of its features are readily accessible, at the expense of more memory. In fact, when a BASIC cartridge is inserted, the amount of memory available is approximately 7K bytes less than with Atari DOS. Part of the increased size is the due to the English error messages used instead of the less memory-consuming error numbers.

In addition to providing improved DOS commands, K-DOS contains a complete machine language monitor. You can examine and alter memory in either hex or ASCII format, or execute a machine language program in two ways. Also, certain DOS routines may be accessed by one-word commands.

K-DOS is no longer made, but may still be available in software "cut-out" bins. If you happen to find a copy selling for a few dollars, it may be worth purchasing.

TOP-DOS.

A useful DOS (one I'd recommend to anyone who does a lot of file manipulation) is TOP-DOS from Eclipse Software. TOP-DOS is completely compatible with Atari DOS 2.0S and contains a number of enhancements. Although TOP-DOS has many more features than does DOS 2.0, its memory-resident portion is the same size as that of Atari DOS 2.0.

If you'd like to be able to perform full-screen editing with DOS—just as you do when using Atari BASIC—you've got it. How about being able to see more of what you're doing on-screen? TOP-DOS gives you more than half the screen, since its compressed menu takes up less room. One more aid to keep you informed is the minimum of screen clearing.

Another useful TOP-DOS feature: commands requiring answering prompts and several lines in Atari DOS can all be put on one line. The wild card operators work (as they should) with COPY, DELETE and RENAME. And TOP-DOS lets you create command files, for a sequence of commands to be executed in one operation.

MYDOS.

MYDOS is an alternative DOS for the Atari. Produced by SWP, Inc. (makers of ATR8000), MYDOS is intended primarily for their machine, but will also work with Percom and other higher-density drives (double density and double sided).

The strength of this DOS lies in its power and ease of use. The program is not necessarily user friendly—you must know what you're doing, or you could trash an entire disk—but it *is* easy to use. Like TOP-DOS, it lets you enter multi-line, multi-keystroke commands on one line, with fewer keystrokes and far more clearly.

MYDOS takes both upper- and lowercase filenames, too. It's another "useful but not necessarily friendly" feature. Although you can predefine the density of the drive (and disk) you're using, MYDOS is smart enough to read a disk in a format other than that specified. When copying an entire disk with the "J" command, MYDOS is nice enough to automatically format the disk, unless you say otherwise.

SpartaDOS.

SpartaDOS has been around for a while. You may recall it's one of only two (MYDOS is the other) DOSs for 8-bit Ataris that allow you to create subdirectories, or date and time stamp your files.

The SpartaDOS Construction Set (or SDCS) consists of two "master" disks, one for 400/800s, the other for XLs and XEs.

With an Atari XE, SDCS can use the extra memory for a RAMdisk (it also works with the Axlon RAMPOWER card in an Atari 800).

A RAMdisk is simply the simulation of a disk drive in the computer's RAM memory, to increase the speed at which files are loaded and saved. The only drawback is that, when the computer's power is turned off, its memory is lost.

In addition to using the 130XE's extra memory as a RAMdisk, you can designate it as whatever drive number you want. Simply typing *RD130 D4:* will assign the extra memory as a RAMdisk labeled drive 4. This gives you about 507 free sectors.

SDCS works in either a menu mode or in what ICD calls the "command processor" mode. In the latter, all DOS commands must be issued directly. There's no menu to choose from, so you pretty much have to know what you're doing.

In menu mode, you can get a group of multiple pages with five commands across the bottom of the screen. There are four columns, to show filename, extension, protection status (similar to Atari DOS "LOCK" and "UNLOCK" parameters) and size.

The first column contains a horizontal pointer labeled *SELECT*. This pointer or cursor is moved up and down with the cursor control keys (no need to hold down the CONTROL key).

The SELECT key moves the bottom cursor through the displayed commands, and the OPTION key brings up a new menu page, with different commands at the bottom of the screen.

The HELP key is actually used to provide on-line descriptions of what the various commands do. In addition to the five menu screens available in menu mode, further commands can be issued from the keyboard and executed directly.

On the first menu page are the commands: "files," "copy," "erase," "rename" and "exit." One of the most useful features of this DOS is its ability to tag files for copying or erasing. If you want to erase or copy all the files on a disk, some DOSs let you use wild cards (*"D1:*.*"*). This would be fine if you wanted to copy all the files from drive 1 to drive 2.

But what if you wanted to copy only four of ten files on the disk, and their names were such that no combination of wild cards would let you do it in one operation? Using the tag feature of SpartaDOS, you would move the cursor down to each filename displayed on-screen and just hit the SPACE BAR.

The filename would switch to inverse video, to let you know it was tagged. Once all filenames to be copied are tagged, you press RETURN, respond to the *Destination Drive?* prompt, and your files will be copied. Erasing files works in a similar way; tag files, then issue the command.

SDCS also lets you create and use subdirectories, label your disks with a volume label and restore your deleted files with its "unerase" command. It also has a built-in RPM speed check for your disk drives, a batch file creation utility to chain DOS commands, the ability to date and time stamp your files (either with the internal clock or an add-on real-time cartridge), a binary file loader routine and the ability to use DOS functions from within BASIC.

BASIC (Beginners All-purpose Symbolic Instruction Code).

BASIC is the most popular of all computer languages. Not really one language, BASIC is a family of languages with a common core. The major differences between dialects are primarily a result of different graphic commands specific to a computer.

BASIC was invented in 1963 at Dartmouth College by Professors Kemeny and Kurtz, to enable non-computer-science students to use the school computer.

A BASIC program consists of statements on numbered lines, executed one at a time. The program can be made to jump around successive statements (or to other sections of the program), returning to execute the next program line. Control of the operation is executed via a few easily learned commands, like "PRINT," "GOTO," "READ" and "INPUT."

BASIC has become popular mainly because it's so friendly. Other computer languages are complicated and use unfamiliar words, symbols and syntax. BASIC speaks a very simple English, using a relatively small number of words which may be understood from the start.

BASIC does have some drawbacks, due to its inherent lack of structure. It's often said that, in BASIC, programmers have too much freedom to jump around. If a complex BASIC program isn't well documented with comments, it's difficult for even the author to understand. So, though simple, BASIC must be "spoken" with precision. It will not tolerate sloppiness and has a few ground rules that must always be followed.

There are three versions of BASIC for the Atari computer. Atari BASIC is the most popular and was the first available. It exists on an 8K ROM cartridge and is now built into Revision B of Atari XLs.

BASIC A+ by OSS.

The Atari 8K BASIC cartridge was originally developed by Optimized Systems Software (OSS). BASIC A+ is an extension of the original, with over forty additional functions. It comes on a disk and occupies approximately 16K of memory.

Many people feel BASIC A+ is the BASIC Atari should have released initially, if they hadn't been in such a hurry. In any case, BASIC A+ is easier to use than Atari 8K BASIC and allows the programmer to add structure to the programming. This is done with statements, like: IF. . .THEN. . . ENDIF and WHILE. . .ENDWHILE. The PRINT USING statement allows formatted output to either a printer or the screen.

Other improvements include TAB function, an INPUT statement to allow a self-trapping prompt (it will automatically re-prompt if the input causes an error), and

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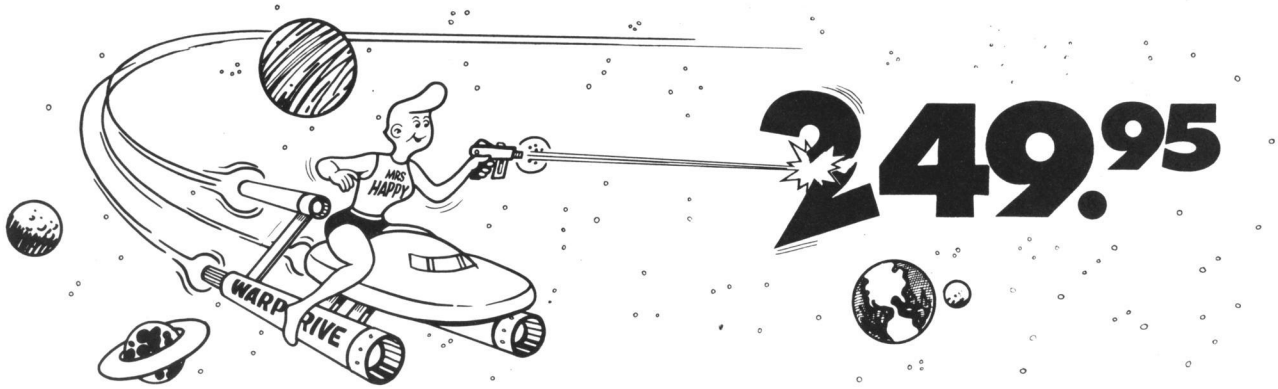

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the ability to use subscripts with the INPUT and READ statements.

Additional string handling functions are provided, like concatenation and the ability to search for a substring with the FIND function.

A couple of nice debugging functions are included. TRACE allows meaningful error messages to be displayed when testing a program. IF ERR is a function to test error conditions and direct program flow. Also, groups of lines may be deleted at once with the "DELETE" command.

One of the best features of BASIC A+ is its extensive set of player/missile (PM) graphics commands. These functions make PM graphics as easy to use as PLOT and DRAWTO. In addition to these fourteen commands, joystick commands have been redone, to be easier to use and provide better movement.

OSS has two other BASIC languages for the 8-bit Ataris, BASIC XL and BASIC XE. BASIC XL is really an upgraded BASIC A+, on a bank-selectable 24K super cartridge instead of a disk.

BASIC XL and BASIC XE.

BASIC XE was introduced by OSS for the Atari 130XE shortly after the computer came out, in 1985. BASIC XE takes advantage of the extra 64K RAM memory of the computer, so it can run only on an Atari XE. Similar to BASIC XL, BASIC XE comes on a bank-selectable ROM cartridge, with an "Extensions" file on disk.

When the language is booted up with the Extensions file, BASIC XE will allow 35K for variable memory and 65K for program storage when the "Extend" command is given. Once a program is extended and saved, you need not do it again.

An example of the language's good design is found in its commands for determining remaining memory. Like other BASICs, the "PRINT FRE(X)" command is used. When *X* is *0*, you can determine the amount of space for variables; when *X* is 1, the remaining program memory.

Like BASIC XL, BASIC XE has improvements over other BASIC languages. These deal mostly with string functions. String concatenation has been improved, so that it's really very simple to perform.

A statement such as *"A$=A$,B$,C$,CHR$(27)"* means "concatenate A$, B$, C$ and the ASCII code for Escape."

String arrays here are also vastly superior to those in Atari BASIC. They're dimensioned as numeric arrays are. For example, *DIM Y$(3,12)* will dimension an array with three elements, each twelve characters in length.

To display the first through the fifth characters of the second element, you would simply use *PRINT A$(2;1,5)*. The *PRINT A$(2)* would display the entire contents of the second element of the A$ array.

BASIC XE goes a step further than BASIC XL in providing a fast built-in sort command. The sort routine is very easy to use, and works on numeric and string arrays—and on all or part of the elements of those arrays.

A quick example—to sort a string array in ascending order, using just the first three characters of each element: *SORTUP ARRAY$ USING ;1,3.*

Both BASIC XL and XE have built-in DOS commands, so you can erase, list, rename, protect (lock) and unprotect (unlock) files from within BASIC—while you are using a program. When loading and saving files, either upper- or lowercase characters can be used; quotes aren't required. A nice touch.

BASIC XL and BASIC XE build on OSS's original, excellent BASIC A+. If you have an Atari XL or XE, these two provide the most powerful BASIC languages for 8-bit machines.

Atari Microsoft BASIC.

Atari Microsoft BASIC (which we'll call AMSB) comes in two flavors: a disk-based and a cartridge/disk version, Atari Microsoft BASIC II (AMSBII). They have the same capabilities, but AMSBII is preferred, because the cartridge is a more durable medium than a copy-protected disk.

A number of features in AMSB are implemented quite differently from those in Atari 8K BASIC. AMSB is a superset of Microsoft BASIC, containing Atari-specific features for sound and graphics. There is no syntax checking during line entry, so errors won't be apparent till the program's run.

Unlike Atari 8K BASIC, AMSB lets you choose the precision of numeric variables—single, double or integer variables are allowed. Math functions are performed in the interpreter, rather than in the OS floating point package, increasing the speed of calculations.

One of the strengths of AMSB is its ability to accept user-defined functions. Essentially, this allows the user to make up BASIC commands. Although there are no commands for joystick or paddle reading, they can easily be implemented with DEFined functions or PEEKs.

Perhaps the most significant difference between AMSB and other Atari BASICs is the way in which strings are handled. In Atari BASIC, strings are one-dimensional, must be DIMensioned and can be as long as memory allows.

AMSB does not require one-dimensional strings to be DIMensioned, allows a maximum string length of 255 characters and permits true string arrays. Other useful string functions are included—true concatenation, left, mid and right substrings, and substring search.

AMSB contains advanced "housekeeping" commands, like automatic line numbering, line renumbering and line deletion. Direct commands, interacting with DOS, are: "KILL" (delete a file), "NAME" (rename a file) and "LOCK/UNLOCK."

Other useful features allow you to trace a program's execution and pass the values of variables from one program to another. Additional or modified statements include WAIT (to halt a program for a specific amount of time), IF. . .THEN. . .ELSE (for better program testing), and the combining of PLOT and DRAWTO into one command—PLOT TO.

Pascal.

Pascal was invented by Kathleen Jensen and Niklaus Wirth, to demonstrate the principals of a structured language.

It's an easy language to learn, suitable for defining data structures needed for problem solutions. The language was named for Blaise Pascal, the French mathematician who invented one of the first mechanical computing devices.

Pascal allows data types (such as integer, real, and Boolean), but gives the programmer freedom to define new data types. New functions and procedures may be defined, and character data and strings may be manipulated.

This is a compiled language, but often not directly compiled into machine code. Instead, it compiles into an intermediate pseudocode called "p-code." The p-code is saved and, at run-time, is interpreted into the computer's machine code.

There are three implementations of Pascal for Atari computers. One used to be available from the Atari Program Exchange and may still be found. It's called the Atari Pascal Language System, based on standard Pascal and very similar to UCSD Pascal. There are some minor differences, involving the incorporation of graphics and sound capabilities.

Unfortunately, its use is limited; it requires two drives, was never officially supported by Atari, is extremely slow in compiling, and has no built-in editing.

The other two versions for the Atari are Draper Pascal and Kyan Pascal.

Draper Pascal.

Many folks have knocked Draper Pascal, because it doesn't conform to the official standard. It's not a full implementation of the language (either ISO or UCSD standards) and includes an abbreviated range of data types, a lack of number formatting and limitations on parameter passing. That's what it isn't. Here's what it is.

For one thing, Draper Pascal is close enough to the real thing to be suitable for learning the language, or for simple applications on the Atari. The language has machine-specific features, such as: disk management, I/O, string manipulation, BASIC-type graphics and sound, and ability to read joysticks.

There's also a CALL procedure, which allows you to easily access your own machine-language subroutines.

I'm not a fluent Pascal programmer by any stretch of the imagination, but I am familiar it and can write fairly simple programs. I was able to write, debug and run a small program with Draper Pascal in under 20 minutes from opening the package.

The conclusion is simple: if you must have Pascal for the Atari, Draper Pascal is the only game in town. Its relative power and ease of use make you feel you're coding for one of the "big rigs."

Kyan Pascal.

This one is a standard Pascal that allows you write new programs, or use previously written ones that conform to the standard guidelines. The code from these programs and program modules can be used directly from other machines.

A number of extensions to standard Pascal have been provided by this version, such as the ability to use high-resolution graphics, chaining of object code files, string handling commands and random file access. Unlike the other two versions of Pascal mentioned above, Kyan Pascal does not produce p-code, which requires an interpreter to run. Rather, it produces much faster-executing assembly code, which requires no interpreter.

The package comes with a non-copy-protected system disk and a manual of slightly over 100 pages. On the system disk is an editor, compiler, DOS 2.5 (with RAMdisk) and some graphic routines. The editor's a full-screen one, with search-and-replace and block-text-move features.

The compiler is relatively fast and lets you compile with or without generating an object file. In addition, error messages and listings can be sent to other devices, like a printer. When a compiling error is encountered, Kyan Pascal displays the suspect line and describes the error.

Assembler and run-time error messages are also provided. In some ways, the compiler's the best part of the system. It's a one-pass compiler which doesn't require linking in order to generate executable code.

Finally, the ability to use a RAMdisk to store the editor and compiler saves the programmer a lot of time. Switching back and forth from the editor to the compiler seems almost instantaneous.

C language.

The language called C was designed at Bell Laboratories to exist within the UNIX OS. It's a structured language with some similarities to Pascal. However, the entire program structure is built through the use of user-defined and standard functions.

There are no print or read statements, and input/output is also done by means of functions. I/O structure is performed through the I/O structure of whatever OS it's implemented on.

There are no line numbers in C. A program is written using an editor and can consist of several groups of separately compiled functions called "modules." A linker then links these modules together to form the actual program.

A C program always begins execution with the function main. This function can then call others. There are libraries of standard functions, as well as those previously defined by the user.

Global and local variables, arguments for the functions, and expressions to calculate and store data are allowed. C can call machine language routines when needed, in addition to any of the user-defined or standard functions.

C is available in two versions for the Atari: Tiny C and Deep Blue C. Tiny C (now known as C/65) is available from OSS, while Deep Blue C used to be available from APX (APX-20166).

LISP (LISt Processing language).

LISP was the first language used in artificial intelligence research. It has since been implemented on many computers, including the Atari.

There are two kinds of data types in LISP: atoms and lists. Atoms are LISP's basic entities. Any combination of alphabetic characters with any of the ten digits is an atom, as long as it starts with a letter.

A list is built up from atoms and other lists. A list consists of a left parenthesis followed by any number of atoms and lists, terminated with a right parenthesis.

The language has functions, variables and arithmetic operators, but looks strange to BASIC programmers.

LISP programs are themselves lists of LISP operators and data. It's very easy for LISP programs to change their own code (Logo shares this characteristic—see **The Dragon and the Turtle**, issue 41). All LISP functions can be applied to arguments. The language has many built-in functions, and the programmer can create his or her own.

There's only one currently available version of LISP for the Atari. It was published by Datasoft and may still be available.

FORTH.

FORTH is not an easy language to learn, since it's different from anything we're used to. In addition, its calculations are also done in Reverse Polish Notation (RPN).

We're all familiar with algebraic notation, since this is how we initially learned to add, subtract, divide and multiply. To multiply two numbers, say 5 and 7, we would write 5*7. In RPN, the operator comes *after* the numbers. We would write 5 7 *. It's called "Polish" notation because of the Polish mathematician Lukasiewicz. It's called "reverse" because, unlike Lukasiewicz's original logic, the operator comes last, not first.

It's sometimes called the "unfinished language," because the programmer has almost unlimited freedom to create new words or functions.

Everything in FORTH is a word. Though not very good as a number cruncher, it can link to subroutines in other languages for more complex math.

The programmer defines new words by using old ones. Very little original work is needed to write a new program, because the system uses all the work done before —as if it were part of the language.

FORTH is a structured language—no GOTOs or labels for statements. Since programs are later compiled into machine-readable code, very little memory space is needed. A full FORTH can fit into a 16K machine. . .and still have room for programs.

Plus it's inexpensive. The FORTH Interest Group (FIG) has made versions available for almost every computer, including the Atari.

FIG-Forth used to be available from the Atari Program Exchange (APX-20029), and Val-Forth was available from Valpar International. Val-Forth uses separate modules containing Atari-specific features, such as player/missile graphics, display list interrupts (DLIs) and sound capability. These modules are inexpensive and may be purchased separately, as you need them.

PILOT (Programmed Inquiry for Learning Or Teaching).

PILOT was the first language dedicated to computer-aided instruction, and has been implemented on many systems. This interactive language allows the program to look for a specific response from the user's input, then give advice or comment based on that response.

PILOT instructions are divided into four categories:

(1) Single-letter core instructions, standard for all versions of PILOT. Thus, the programs are portable from one machine to another, as far as what text appears on the screen.

(2) Instructions setting various kinds of parameters related to the computer, such as output ports, display speed, or memory location.

(3) File system instructions relating to storing and retrieving programs and data, on tape or disk.

The Atari version of PILOT includes "turtle graphics" (see below).

PILOT is probably the easiest language for the new computer user to learn.

Logo.

Logo is a subdialect of LISP. It's easy to use, yet sophisticated enough for higher instruction. Logo has a user-friendly graphics interface, which uses a device called a "turtle."

This is a figure the user can interact with, moving it over the screen, coloring it, and making it draw or erase lines.

Instructions to the turtle can be absolute or relative. For example, from the initial position, *GO 10* (relative) and *GOTO*

/, *10* (absolute) are equivalent. It's easy for children to learn the relative commands; they can mimic the responses of the turtle by acting out commands themselves.

More complex functions (programs) can be created, with which children can interact through simple keyboard responses. Children may learn color, direction, letters, words and sounds through this medium —and usually find it fun. It's a good way to introduce them to the computer.

Atari Logo is a good implementation, which, among other useful features, has the capability to manipulate and program up to four turtles.

Action!

Action! is another language from OSS, somewhat of a cross between Pascal and C. However, its similarity to BASIC will let experienced BASIC programmers convert with few problems. Action! is a proprietary product, currently available only from OSS.

The Action! system is composed of an editor, the language itself, a compiler and a monitor. The editor's used when the system first boots up from the cartridge, and lets you create and modify Action! programs. The editor contains two text windows that can be moved throughout the program. In addition to the scrolling window, it has features to search and replace, delete lines, or move blocks of lines.

The compiler is the heart of this language system. After the program's created, it must be compiled with the Action! compiler.

This transforms the relatively English-like program into machine language. "Include" statements used with the compiler allow several separate modules to be combined into one executable file.

This is useful to include previously written general purpose subroutines within a particular program. The include command can be nested up to six levels. An included subroutine can include another subroutine, which can include another, etc.

The monitor is the system's control section. From there, the editor or compiler can be called, a program run, or the session ended. Access to DOS is gained through the monitor, too.

The language itself is very structured. Like C, its procedures or modules are written separately, then grouped together. Expressions may contain arithmetic, bit-wise, or relational operators. Many powerful statements (such as IF. . .THEN. . .ELSE-IF. . .ELSE) are provided. Other useful statements include WHILE, UNTIL and DO loops.

Action!'s system also has a library of useful routines, including input, output, I/O support and system functions. I/O support routines are particularly useful for Atari programmers, as functions like Open, Close, XIO, Note, Point, Color, Sound, Stick and Paddle are provided.

A programmer experienced in the fairly unstructured world of BASIC may have some difficulty adjusting to Action! However, after a few hours, it all seems natural. Indeed, it may be more difficult going *back* to BASIC, after experiencing this speed and power.

Conclusion.

We've covered a lot of ground in this article. Ten languages have been discussed, some with several dialects. . .eighteen different ways to "talk" to your Atari. This clearly makes the Atari 8-bits competitive with other, more costly machines.

In addition to having the greatest game computer available, Atari owners also have a serious tool at their disposal. It can be a workhorse in application programming.

Each language has strengths and weaknesses. Some are better for scientific applications, while others are suited to the first-time computer user. Other differences (speed, graphics capability and ease of use) are also apparent. Table 2 provides a brief description of the capabilities and application of each language.

I hope I was able to interest you in learning at least one new language for your future programs.

Some program listings reproduced in **ANALOG Computing** may contain "strange" characters not shown on the keyboards of earlier Atari models. These are special characters which use the CTRL, ESC and "ATARI LOGO" (inverse) keys. Shown below is a list of these characters and the keystrokes used to get them.

```
--- CTRL ,
--- CTRL A
--- CTRL B
--- CTRL C
--- CTRL D
--- CTRL E
--- CTRL F
--- CTRL G
--- CTRL H
--- CTRL I
--- CTRL J
--- CTRL K
--- CTRL L
--- CTRL M
--- CTRL N
--- CTRL O
--- CTRL P
--- CTRL Q
--- CTRL R
--- CTRL S
--- CTRL T
--- CTRL U
--- CTRL V
--- CTRL W
--- CTRL X
--- CTRL Y
--- CTRL Z
--- ESC ESC
--- ESC CTRL UP-ARROW
--- ESC CTRL DOWN-ARROW
--- ESC CTRL LEFT-ARROW
--- ESC CTRL RIGHT-ARROW
--- CTRL .
--- CTRL ;
--- ESC SHIFT CLEAR
--- ESC BACK S
--- ESC TAB
--- INVERSE CTRL ,
--- INVERSE CTRL A
--- INVERSE CTRL B
--- INVERSE CTRL C
--- INVERSE CTRL D
--- INVERSE CTRL E
--- INVERSE CTRL F
--- INVERSE CTRL G
--- INVERSE CTRL H
--- INVERSE CTRL I
--- INVERSE CTRL J
--- INVERSE CTRL K
--- INVERSE CTRL L
--- INVERSE CTRL M
--- INVERSE CTRL N
--- INVERSE CTRL O
--- INVERSE CTRL P
--- INVERSE CTRL Q
--- INVERSE CTRL R
--- INVERSE CTRL S
--- INVERSE CTRL T
--- INVERSE CTRL U
--- INVERSE CTRL V
--- INVERSE CTRL W
--- INVERSE CTRL X
--- INVERSE CTRL Y
--- INVERSE CTRL Z
--- ESC DELETE
--- ESC INSERT
--- ESC CTRL TAB (CLR)
--- ESC SHIFT TAB (SET)
--- INVERSE SPACE
--- INVERSE
--- INVERSE CTRL
--- INVERSE CTRL
--- INVERSE |
--- ESC CTRL 2
--- ESC CTRL BACK S
--- ESC CTRL INSERT
```

BOOKS ON PROGRAMMING LANGUAGES.

The following is a brief selection from the dozens of programming books currently available. New books appear constantly, so be sure to check **ANALOG Computing** each month for announcements.

Assembly

The Atari Assembler, by Don and Kurt Inman. Reston Publishing, 1981.
This is a beginner's book, with emphasis on the Atari Assembler Cartridge. Contains problem exercises and answers.

How to Program Your Atari in 6502 Machine Language, by Sam Roberts. Hofacker Publishing, 1982.
This small book is written for the beginner or intermediate programmer.

Machine Language for Beginners, by Richard Mansfield. COMPUTE! Books, 1983.
This is a very comprehensive book on assembly language programming. Not Atari-specific, it also discusses 6502 for Apple, Commodore and Pet.

BASIC

Your Atari Computer (2nd Revised Edition), by Lon Poole, Martin McNiff and Steve Cook. Osborne/McGraw-Hill, 1982.
A general purpose book on the Atari, this is the most complete single reference for Atari 8K BASIC. Designed for beginners and intermediate users, it also contains a wealth of information on other topics: graphics, disk operating system, the cassette recorder and other peripherals.

The BASIC Handbook, 3rd Edition, by David Lien. Compusoft Publishing, 1986.
A virtual encyclopedia of BASIC, this book covers its implementation on dozens of computers. Its main use is in converting from one dialect of BASIC to another, although a very complete description of BASIC statements is included.

Atari Games and Recreations, by Herb Kohl, Ted Kahn, Len Lindsay and Pat Cleland. Reston Publishing, 1982.
I've used this as a textbook in an introduction to BASIC programming course. Its use of games as a method in learning how to program is a painless method for Atari 8K BASIC.

Inside Atari BASIC, by Bill Carris. Reston Publishing, 1983.
Packed with Atari's programmer's kit for a couple years, this is definitely introductory. It has a humorous and simple approach to programming, which works with both adults and children.

Armchair BASIC, by Annie and David Fox. Osborne/McGraw-Hill, 1983.
A very entertaining and thorough book on BASIC. Many examples are used to illustrate various programming concepts, and quizzes (with answers) are scattered throughout, to reinforce what's being learned.

Pascal

Problem Solving Using Pascal, by Kenneth Bowles. Springer-Verlag, 1977.
This very thorough textbook on Pascal takes the reader from simple concepts and routines to advanced concepts and algorithms. It's based on UCSD Pascal, but the Atari implementation is not too different.

C language

The C Primer, by Les Hancock and Morris Krieger. Byte Books, 1982.
This is an introductory book, probably the easiest to understand, since it doesn't assume any knowledge of C on the reader's part. It covers all of the important concepts in an entertaining way.

Learning to Program in C, by Thomas Plum. Plum Hall, 1983.
An excellent book on C programming for the intermediate. Although designed for the beginner, the C neophyte would do better to start with Les Hancock's book (above).

LISP

Artificial Intelligence, by Patrick Winston. Addison-Wesley, 1977.
The original, definitive book on Artificial Intelligence and the LISP language. Only the second half of the book is devoted to LISP, but concepts discussed in the first are helpful in understanding the language.

LISP, by Patrick Winston and Berthold Horn. Addison-Wesley, 1981.
This book is included in the Datasoft LISP package for Atari. It's highly technical, with many pages of bibliography and solutions to exercises.

FORTH

Starting Forth, by Leo Brodie. Prentice-Hall, 1981.
Designed for beginners and professionals, this book is thorough and humorous. A useful accompanying booklet describes differences between Fig-Forth (Val-Forth) and the implementation described in the text.

FORTH on the Atari: Learning by Using, by E. Floegel. Hofacker, 1983.
For those not sure they want to get too heavily involved with FORTH. A serial printer interface program is created in FORTH, as a learning exercise. It appears to be a German translation; the writing is rather awkward at times.

PILOT

Picture This!, by David Thornburg. Addison-Wesley, 1982.
Billed as an introduction to computer graphics for kids of all ages, it's that—and more. There are several versions, for different computers. Included with Atari's version is PILOT turtle geometry.

LOGO

Learning with Logo, by Daniel Watt. Byte Books, 1983.
Offers a thorough introduction to Logo. Although not specific to the Atari, there's enough here for anyone to learn the fundamentals, and go beyond. Appendices on Apple and TI Logo are included in the latest edition.

Table 1.

PROGRAMMING LANGUAGES FOR ATARI

Some of these products are no longer being officially produced and, therefore, are unavailable from the original source. However, the keen-eyed Atari programmer-to-be can probably find any of these products in mailorder magazine ads, local retail stores and flea markets.

No address is given for products by companies no longer in business. Original list prices are shown, but most products can be had for substantially less.

ASSEMBLY LANGUAGE

Atari Assembler-Editor ..... Cartridge $59.95
Atari Macro Assembler-Editor ..... Disk $89.95
Atari Corp., 1265 Borregas Ave., Sunnyvale, CA 94086

MAC/65 ..... Disk (with OS/A+) $80.00
MAC/65 Toolkit $29.00
Optimized Systems Software, 1221-B Kentwood Ave., San Jose, CA 95129
(408) 446-3099

MAE (Macro Assembler Editor) ..... Disk $169.95
Eastern House Software, 3239 Linda Drive, Winston-Salem, NC 27106

Synassembler ..... Disk $49.95
Synapse Software

Datasm/65 ..... Disk $89.95
Datasoft Inc., 9421 Winnetka Ave., Chatsworth, CA 91311

DISK OPERATING SYSTEMS

Atari DOS 2.0S, 2.5S ..... Disk With Atari 810 and 1050 Drives
Atari Corp., 1265 Borregas Ave., Sunnyvale, CA 94086

LJK DOS ..... Disk With LJK's Letter Perfect, Data Perfect and Spell Perfect
LJK Enterprises, 7852 Big Bend Blvd., St. Louis, MO 63119

OS/A+ ..... (Not Available) Disk $80.00

DOS X/L ..... Disk $30.00
Optimized Systems Software, 1221-B Kentwood Ave., San Jose, CA 95129
(408) 446-3099

BASIC LANGUAGE

Atari 8K BASIC ..... Cartridge $50.00
Atari Microsoft BASIC ..... Disk $89.95
Atari Microsoft BASIC II ..... Cartridge/Disk $89.95
Atari Corp., 1265 Borregas Ave., Sunnyvale, CA 94086

BASIC A+ ..... (Not Available) Disk (with OS/A+) $80.00
BASIC XL ..... Cartridge $60.00
BASIC XL Toolkit $29.00
BASIC XE ..... Cartridge/Disk $80.00
Optimized Systems Software, 1221-B Kentwood Ave., San Jose, CA 95129
(408) 446-3099

PASCAL LANGUAGE

Atari Pascal Language System
(APX-20102) ..... Disk (requires 2 drives) $49.95
Atari Program Exchange

Draper Pascal
Draper Systems

Kyan Pascal $69.95
Kyan Software, 1850 Union St. #183, San Francisco, CA 94123
(415) 775-9923

C LANGUAGE

Deep Blue C ..... Disk $39.95
Atari Program Exchange

C/65 - Tiny C ..... (Not Available) Disk $80.00
Optimized Systems Software, 1221-B Kentwood Ave., San Jose, CA 95129
(408) 446-3099

LISP LANGUAGE

The LISP Interpreter ..... Disk $124.95
Datasoft, Inc., 9421 Winnetka Ave., Chatsworth, CA 91311

FORTH LANGUAGE

QS Forth ..... Disk $79.95
Quality Software, 6660 Reseda Blvd., Suite 105, Reseda, CA 91335

ValFORTH ..... Disk (Modular) $39.95
Valpar International, 3801 E. 34th Street, Tuscon, AZ 85713

Extended fig-Forth (APX-20029) ..... Disk/Cassette $39.95
fun-Forth (APX-20146) ..... Disk $24.95
Atari Program Exchange

PILOT LANGUAGE

Atari PILOT ..... Cartridge (Complete Package) $129.95
Atari PILOT ..... (Cartridge & manual) $79.95
Atari Corp., 1265 Borregas Ave., Sunnyvale, CA 94086

LOGO LANGUAGE

Atari Logo ..... Cartridge $99.95
Atari Corp., 1265 Borregas Ave., Sunnyvale, CA 94086

ACTION! LANGUAGE

Action! Language System ..... Cartridge $80.00
Action! Toolkit $29.00
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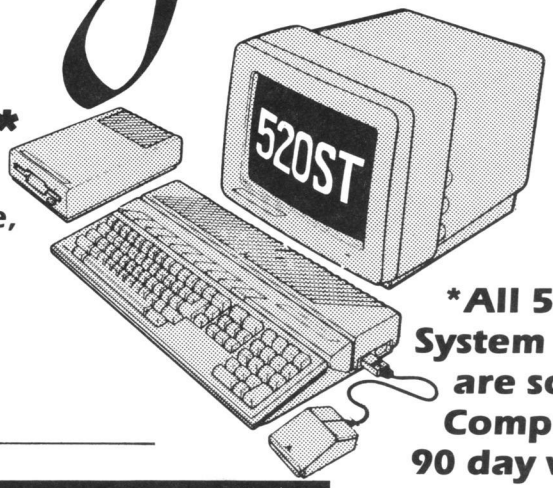

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Stencil Graphics

for special effects

by Ed Sisul

Ever try moving high-resolution pixels vertically or diagonally at high speed—using BASIC? It's usually tough, if not impossible, to do so from BASIC. . . It's even complex and difficult to achieve with machine language.

Well, I'm going to show you a simple technique to achieve complex motion for special effects, done entirely in BASIC. To see a demonstration of the technique, type in Listing 1 (all the remarks may be omitted) and run it.

The demos are best viewed with your set's intensity adjusted so the background is totally black. Also, keep the room lighting turned down or off.

The second demo runs in a continuous loop. Use SYSTEM RESET to exit the program gracefully.

How it works.

What you just saw not only was done entirely in BASIC, but also uses no complex math. To see how it's done, restart the program by typing: *GOTO 1200*.

Surprised? It's so simple, you probably feel cheated. Anyway, now you know *why* it's called **Stencil Graphics**.

The idea for this technique came from the mention in *De Re Atari* (on page 4-9) of using a playfield mask to increase the static 8-bit size/resolution of a player in player/missile graphics. I've simply expanded the idea to use a mask as a stencil, which creates the illusion of vertical and diagonal motion when a vertical bar (one player) is passed behind it.

The general steps of the technique are:

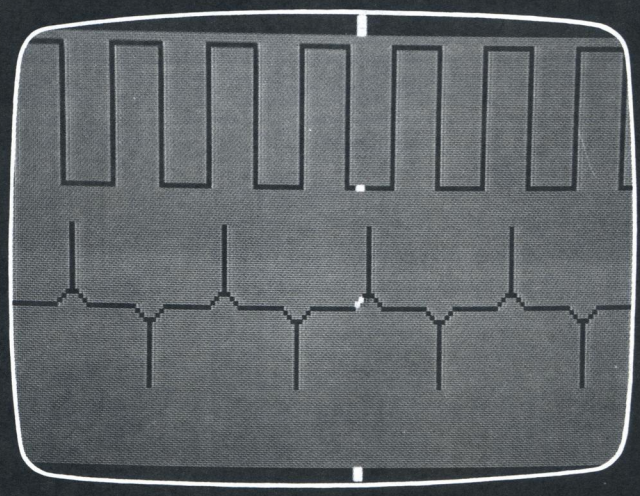
(1) Draw a mask, by filling the screen or selected area with a playfield color, and set the hue and luminance of this color to that of the background.

(2) Draw the stencil pattern with the background color, to "hide" the stencil.

(3) Create a vertical bar of appropriate height and width, using a player/missile graphics player.

(4) Set the playfield priority over the player and pass the bar horizontally behind the mask.

To be more specific about how it's done, let's step through the main stages of the "Applesauce" demo.



Stencil Graphics.

Line 160 — The display is set up in graphics mode 7.

Line 790 — The screen is blanked during the drawing process by setting all colors to black.

Line 490 — The mask is drawn in playfield color 3.

Lines 500 to 520 — The stencil for the gunshot pattern is drawn in color 0 (background).

Lines 530 to 670 — The apple is drawn in playfield color 1.

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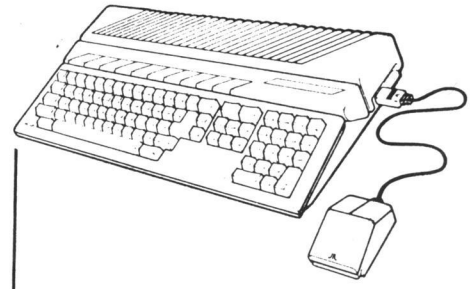

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Lines 680 to 730 — The stencil pattern for the apple splatter is drawn in color 0.

Lines 740 to 770 — The gun is drawn in playfield color 2.

Lines 820 to 890 — The player/missile graphics are set up as follows:

Line 850 sets up player 2 as a 5-bit wide bar, extending from the top to the bottom of the playfield.

Lines 860-870 set up player 1 as the gunshot flame.

Line 830 sets the priority with the POKE 623,2, so player 1 is in front of the mask and player 2 is behind the mask.

Lines 190 and 250 — The colors of the images are displayed.

Lines 260 to 320 — player 2 is swept horizontally across the screen, and its color is changed from white to red as it passes behind the apple.

Now use your imagination and create some dazzling displays of your own.

Ed Sisul has an BSEE and works for McDonnell-Douglas Astronautics Co. in St. Louis as the manager of failure analysis. He was a founding officer (secretary/membership chairman) of the McDonnel Recreational Computer Club which now has over 1000 members. He is also a member of the ACE St. Louis Area Atari Users Group.

The two-letter checksum code preceding the line numbers here is *not* a part of the BASIC program. For further information, see the *BASIC Editor II*, page 43.

Listing 1.
BASIC listing.

```
MF 10 N1=784:N2=862:N3=0:GOTO 150:REM SKI
   P OVER ROUTINES
FU 20 REM DELAY ROUTINE
JO 30 FOR D=1 TO DELAY2:NEXT D:RETURN
XL 40 REM BEEP ROUTINE
MM 50 SOUND 0,17,10,10
LR 60 FOR D=1 TO 4:NEXT D
MW 70 SOUND 0,0,0,0:RETURN
UY 80 REM SCOPE RUN ROUTINE
UY 90 FOR H=43 TO 200 STEP 2
DG 100 POKE 53250,H
GR 110 IF H=55 OR H=93 OR H=131 OR H=169
   THEN GOSUB 50
KP 120 FOR D=1 TO 1:NEXT D
XI 130 NEXT H:GOTO 90
OJ 140 REM SET THINGS UP
IC 150 DELAY2=500:FLAG=0:G=3
JD 160 GRAPHICS 7:GOSUB 790:POKE 709,10:P
   OKE 752,1:POKE 657,13:? "APPLESAUCE"
NY 170 POKE 656,1:POKE 657,12:? "(in 14 s
   ecs)"
SL 180 GOSUB 820:GOSUB 490
HA 190 POKE 708,68:POKE 709,6:POKE 712,0
AU 200 SOUND 0,30,10,14:FOR D=1 TO 25:NEX
   T D:SOUND 0,0,0,0
MZ 210 REM APPLE RUN
XY 220 POKE 657,17:? CHR$(210);CHR$(197);
   CHR$(193);CHR$(196);CHR$(217):GOSUB 30
WY 230 ? CHR$(125):POKE 657,18:? "AIM":GO
   SUB 30
HV 240 ? CHR$(125):POKE 657,17:? CHR$(198
   );CHR$(201);CHR$(210);CHR$(197):GOSUB
   30
LB 250 POKE 706,12:POKE 705,79
TY 260 FOR L=1 TO 35:SOUND 0,L,4,15:NEXT
   L
RN 270 FOR V=15 TO 0 STEP -G
CF 280 POKE 705,64+V:SOUND 0,L,4,V
CU 290 NEXT V:POKE 705,0
GI 300 FOR H=60 TO 122 STEP G:POKE 53250,
   H:NEXT H
GD 310 POKE 708,0:POKE 706,68
EE 320 FOR H=123 TO 200 STEP G:POKE 53250
   ,H:NEXT H
VF 330 POKE 706,0:POKE 53250,0:FOR D=1 TO
    DELAY2:NEXT D:IF FLAG THEN 430
UG 340 POKE 752,1:? CHR$(125):POKE 657,6:
   ? "SLOW-MOTION INSTANT REPLAY."
YB 350 FOR D=1 TO DELAY2:NEXT D:G=1
HP 360 POKE 706,68:FOR D=1 TO DELAY2:NEXT
    D:? CHR$(125)
DL 370 FOR H=200 TO 123 STEP -3:POKE 5325
   0,H:NEXT H
GB 380 POKE 708,68:POKE 706,12
FR 390 FOR H=122 TO 60 STEP -3:POKE 53250
   ,H:NEXT H
XI 400 FOR D=1 TO DELAY:NEXT D
DK 410 POKE 53250,250:FLAG=1:DELAY2=800:G
   OTO 220
JG 420 REM SCOPE SET-UP
GO 430 POKE 53249,0:POKE 53250,0:GOSUB 79
   0
AH 440 POKE 709,6:? CHR$(125):POKE 657,13
   :? "OSCILLOSCOPE"
UV 450 GOSUB 910
RG 460 FOR I=PMB+N1 TO PMB+N2:POKE I,3:NE
   XT I
DX 470 POKE 706,14:? CHR$(125):GOTO 90
RH 480 REM APPLE DRAW ROUTINE
TY 490 COLOR 3:FOR Y=0 TO 79:PLOT 0,Y:DRA
   WTO 159,Y:NEXT Y
VR 500 COLOR 0:FOR Y=38 TO 42 STEP 2
LO 510 FOR X=14 TO 72 STEP 2:PLOT X,Y:NEX
   T X:NEXT Y
VC 520 PLOT 74,38:PLOT 74,42
ML 530 COLOR 1:Y1=35:X2=82
LS 540 FOR X1=77 TO 74 STEP -1
MJ 550 Y1=Y1+1:X2=X2+1
QT 560 PLOT X1,Y1:DRAWTO X2,Y1
GW 570 NEXT X1
UY 580 FOR Y1=40 TO 41
FO 590 PLOT 74,Y1:DRAWTO X2,Y1
VQ 600 NEXT Y1:Y1=41
FE 610 FOR X1=75 TO 78
NO 620 Y1=Y1+1:X2=X2-1
QO 630 PLOT X1,Y1:DRAWTO X2,Y1
GR 640 NEXT X1
UX 650 PLOT 80,36:DRAWTO 80,34:PLOT 81,34
KY 660 PLOT 81,33:PLOT 82,33:PLOT 82,32
IZ 670 COLOR 3:PLOT 79,36:PLOT 81,36
XT 680 COLOR 0
YJ 690 PLOT 83,35:DRAWTO 120,0:PLOT 84,36
   :DRAWTO 140,0
TP 700 PLOT 85,37:DRAWTO 159,4:PLOT 86,38
   :DRAWTO 159,16
TI 710 PLOT 87,39:DRAWTO 159,28:PLOT 87,4
   0:DRAWTO 159,40
PH 720 PLOT 87,41:DRAWTO 159,52:PLOT 86,4
   2:DRAWTO 159,64:PLOT 85,43:DRAWTO 159,
   76
QB 730 PLOT 84,44:DRAWTO 140,79:PLOT 83,4
   5:DRAWTO 120,79
GQ 740 POKE 709,0:COLOR 2:FOR Y=37 TO 43
```

```
MB 750 PLOT 0,Y:DRAWTO 13,Y
MN 760 NEXT Y
ZU 770 PLOT 14,37:PLOT 14,43:? CHR$(125):
   RETURN
LB 780 REM BLANK SCREEN ROUTINE
PR 790 FOR N=0 TO 4:POKE 708+N,0:NEXT N:P
   OKE 710,N3
ZE 800 RETURN
JL 810 REM P/M SET-UP ROUTINE
HU 820 POKE 705,0:POKE 706,0:A=PEEK(106)-
   24:POKE 53249,0:POKE 53250,0
BI 830 POKE 54279,A:PMB=256*A:POKE 53277,
   2:POKE 623,2:POKE 559,46
WV 840 FOR I=PMB+640 TO PMB+895:POKE I,0:
   NEXT I
Z5 850 FOR I=PMB+N1 TO PMB+N2:POKE I,31:N
   EXT I
HY 860 RESTORE 870:FOR I=PMB+694 TO PMB+6
   98:READ A:POKE I,A:NEXT I
HT 870 DATA 192,240,254,240,192
IW 880 POKE 53257,0:POKE 53258,0:POKE 532
   49,62
ZW 890 RETURN
TN 900 REM SCOPE DRAW ROUTINE
IA 910 TRAP 1000
TP 920 COLOR 3:FOR Y=0 TO 79:PLOT 0,Y:DRA
   WTO 159,Y:NEXT Y
YU 930 COLOR 0:X=0
LZ 940 PLOT X,32:DRAWTO X,2
QW 950 X=X+12
ID 960 DRAWTO X,2:DRAWTO X,32
RA 970 X=X+12
PB 980 DRAWTO X,32:DRAWTO X,2
RL 990 GOTO 950
NU 1000 TRAP 40000:Y=59:HT=-15:SL=-3
QI 1010 FOR X=0 TO 114 STEP 38
XO 1020 PLOT X,Y
LJ 1030 FOR XX=0 TO 19 STEP 19
WL 1040 DRAWTO X+XX+10,Y
WS 1050 DRAWTO X+XX+13,Y+SL
XO 1060 DRAWTO X+XX+14,Y+SL
QG 1070 DRAWTO X+XX+14,Y+SL+HT
XU 1080 DRAWTO X+XX+14,Y+SL
YQ 1090 DRAWTO X+XX+15,Y+SL
BX 1100 DRAWTO X+XX+18,Y
XA 1110 SL=-SL:HT=-HT
VL 1120 NEXT XX:NEXT X:DRAWTO 159,Y:RETUR
   N
CB 1200 N1=780:N2=882:N3=4:GOTO 150
```

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M/L Editor

For use in machine language entry

by Clayton Walnum

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

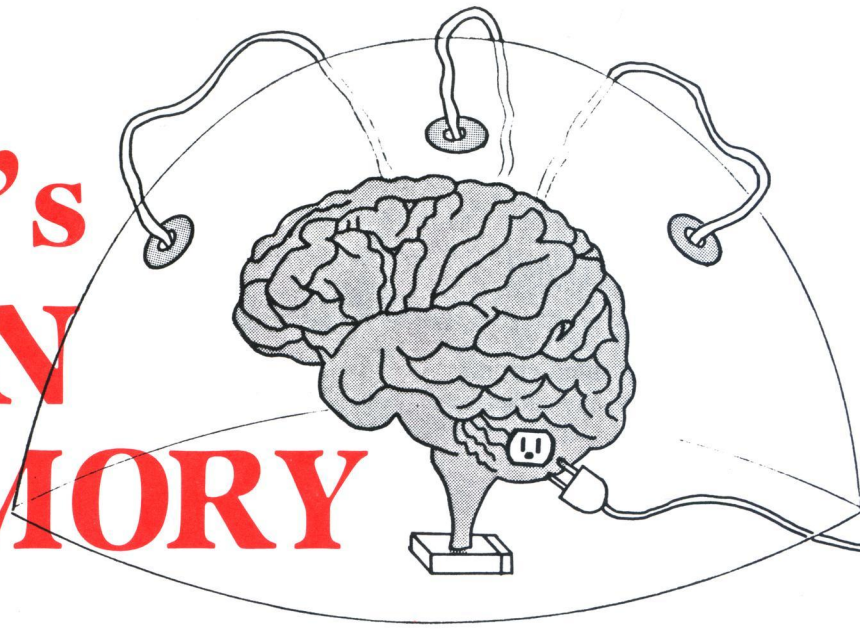
That's **M/L Editor**. Use it in good health.

The two-letter checksum code preceding the line numbers here is *not* a part of the BASIC program. For further information, see the *BASIC Editor II*, page 43.

Listing 1.
BASIC listing.

```
AZ 10 DIM BF(16),N$(4),A$(1),B$(1),F$(15)
   ,F1$(15)
BN 20 LINE=1000:RETRN=155:BACK5P=126:CHK5
   UM=0:EDIT=0
GO 30 GO5UB 450:POSITION 10,6:? "Start or
    Continue? ";:GO5UB 500:? CHR$(A)
ZG 40 POSITION 10,8:? "FILENAME";:INPUT F
   $:POKE 752,1:? " "
FE 50 IF LEN(F$)<3 THEN POSITION 20,10:?
   "  ":GOTO 40
NF 60 IF F$(1,2)<>"D:" THEN F1$="D:":F1$(
   3)=F$:GOTO 80
KL 70 F1$=F$
TN 80 IF CHR$(A)="5" THEN 120
FD 90 TRAP 430:OPEN #2,4,0,F1$:TRAP 110
HQ 100 FOR X=1 TO 16:GET #2,A:NEXT X:LINE
   =LINE+10:GOTO 100
WM 110 CLOSE #2:OPEN #2,9,0,F1$:GOTO 170
VT 120 TRAP 160:OPEN #2,4,0,F1$:GO5UB 440
   :POSITION 10,10:? "FILE ALREADY EXISTS
   !!":POKE 752,0
ZU 130 POSITION 10,12:? "ERASE IT? ";:GO5
   UB 500:POKE 752,1:? CHR$(A)
VH 140 IF CHR$(A)="N" OR CHR$(A)="n" THEN
    CLO5E #2:GOTO 30
QG 150 IF CHR$(A)<>"Y" AND CHR$(A)<>"y" T
   HEN 130
BH 160 CLO5E #2:OPEN #2,8,0,F1$
IE 170 GO5UB 450:POSITION 10,1:? "NOW ON
   LINE: ";LINE:CHK5UM=0
GH 180 L1=3:FOR X=1 TO 16:POSITION 13*(X<
   10)+12*(X>9),X+2:POKE 752,0:? "BYTE #"
   ;X;": ";:GO5UB 310
KH 190 IF EDIT AND L=0 THEN BYTE=BF(X):GO
   TO 210
FY 200 BYTE=VAL(N$)
BU 210 POSITION 22,X+2:? BYTE;"  "
YZ 220 BF(X)=BYTE:CHK5UM=CHK5UM+BYTE*X:IF
    CHK5UM>9999 THEN CHK5UM=CHK5UM-10000
MS 230 NEXT X:CHK5UM=CHK5UM+LINE:IF CHK5U
   M>9999 THEN CHK5UM=CHK5UM-10000
IG 240 POSITION 12,X+2:POKE 752,0:? "CHEC
   K5UM: ";:L1=4:GO5UB 310
EW 250 IF EDIT AND L=0 THEN 270
QM 260 C=VAL(N$)
5Y 270 POSITION 22,X+2:? C;"   "
IL 280 IF C=CHK5UM THEN 300
DI 290 GO5UB 440:EDIT=1:CHK5UM=0:GOTO 180
LW 300 FOR X=1 TO 16:PUT #2,BF(X):NEXT X:
   LINE=LINE+10:EDIT=0:GOTO 170
FV 310 L=0
LG 320 GO5UB 500:IF A=A5C("Q") AND X=1 AN
   D  NOT EDIT THEN 420
PO 330 IF A<>RETRN AND A<>BACK5P AND (A<4
   8 OR A>57) THEN 320
TD 335 IF A=RETRN AND L=0 AND X>1 THEN 35
   0
JR 340 IF ((A=RETRN AND  NOT EDIT) OR A=B
   ACK5P) AND L=0 THEN 320
DW 350 IF A=RETRN THEN POKE 752,1:? " ":R
   ETURN
GG 360 IF A<>BACK5P THEN 400
5A 370 IF L>1 THEN N$=N$(1,L-1):GOTO 390
A5 380 N$=""
RE 390 ? CHR$(BACK5P);:L=L-1:GOTO 320
BB 400 L=L+1:IF L>L1 THEN A=RETRN:GOTO 35
   0
WX 410 N$(L)=CHR$(A):? CHR$(A);:GOTO 320
KN 420 GRAPHIC5 0:END
YT 430 GO5UB 440:POSITION 10,10:? "NO 5UC
   H FILE!":FOR X=1 TO 1000:NEXT X:CLO5E
   #2:GOTO 30
FD 440 POKE 710,48:50UND 0,100,12,8:FOR X
   =1 TO 50:NEXT X:50UND 0,0,0,0:RETURN
MY 450 GRAPHIC5 23:POKE 16,112:POKE 53774
   ,112:POKE 559,0:POKE 710,4
XR 460 DL=PEEK(560)+256*PEEK(561)+4:POKE
   DL-1,70:POKE DL+2,6
HW 470 FOR X=3 TO 39 5TEP 2:POKE DL+X,2:N
   EXT X:FOR X=4 TO 40 5TEP 2:POKE DL+X,0
   :NEXT X
ZW 480 POKE DL+41,65:POKE DL+42,PEEK(560)
   :POKE DL+43,PEEK(561):POKE 87,0
AC 490 POSITION 2,0:? "analog ml editor":
   POKE 559,34:RETURN
WZ 500 OPEN #1,4,0,"K:":GET #1,A:CLO5E #1
   :RETURN
```

Using BASIC XL's HIDDEN MEMORY



by Robert Opitz

BASIC XL is a tremendous tool, offering many improvements over Atari BASIC. One important enhancement is memory—the BASIC XL (and Action! and MAC/65) "super cartridge" allows access to the 8K of RAM behind the cartridge. Another product, DOS XL, takes advantage of this by storing itself partly behind the cartridge.

What? You don't have DOS XL? Well, neither do I. And there are few (if any) other products designed to take advantage of this space. I finally got tired of "wasting" 8K of memory and decided to learn how to use it. The task turned out to be a relatively easy one. As a starting point, I took Robert Luce's **XL-DOS** program from issue 24 of **ANALOG Computing** and did something similar for BASIC XL in my Atari 800.

Controlling the cartridge.

If you just want to use the program, skip this section. Manipulating the RAM at these addresses requires assembly language. We cannot use BASIC, as we're playing with the cartridge. The machine will lock up if you try.

BASIC XL uses the $D5 line to control itself—and to be controlled. This means that, if we store a number in some memory location from $D500 to $D5FF, the cartridge will be affected.

Note that it's the memory location, not the data, which is important here. Some locations will switch the lower BASIC ROM bank ($A000 to $AFFF) among three different possibilities. If bit 3 of the low byte is set (i.e., $D508 or $D5FF), the cartridge is disabled, and the RAM behind it is exposed. Thus, we can do an *STA $D5FF* to turn the cartridge off and use the RAM at these addresses. An *STA $D500* turns it back on again.

The assembly listing here was created with MAC/65. It modifies Atari DOS 2.0S so that the DUP.SYS part is stored in memory behind the BASIC XL cartridge. In addition, MEM.SAV is always active and is also stored behind the cartridge. When you type *DOS*, your BASIC memory is saved, and the DOS menu appears immediately.

This program is conceptually similar to Luce's, but the details differ. Copying the character set and disabling interrupts, which were done for his **XL-DOS**, are not necessary here, since we never turn off the operating system.

However, we don't have as much hidden memory as an 800XL, and we have to fit two 6K blocks into 8K of RAM. This is done by switching the hidden block, byte by byte, with the low-memory block when DOS is called. When control is to be returned to the cartridge, the process is repeated.

Using the program.

Type in the BASIC program, save it and run it. It creates a disk file called SUPDOS.OBJ. Now, go to DOS and load SUPDOS.OBJ with the binary load option. Then place an empty, formatted disk into the drive and write the DOS files to it. Make sure you mark this as BASIC XL DOS or super cartridge DOS.

Now, boot the new disk with your BASIC XL cartridge in place. You'll notice that the boot process takes a little longer, since DUP.SYS is also loading, then being stored behind the cartridge.

When the cartridge gets control, type in a few lines of BASIC code. Then type *DOS*. The DOS menu will appear immediately. Do something —a disk directory, perhaps— then return to the cartridge. You can see that your BASIC program is still there.

Admittedly, MEM.SAV is not extremely useful here. Some DOS functions are implemented directly in BASIC XL, while others (like COPY) destroy all of memory. But

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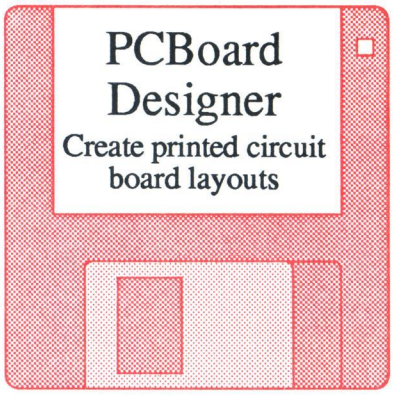

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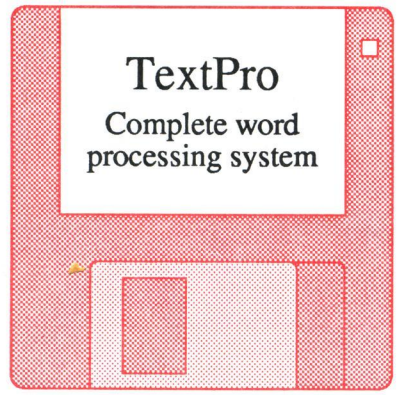

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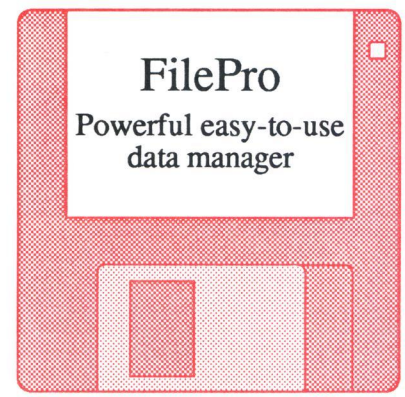

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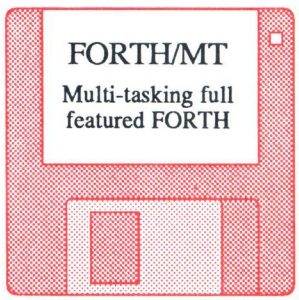

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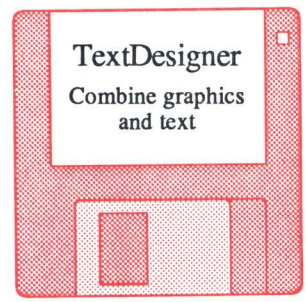

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you can get to the DOS menu quickly, and this does demonstrate a useful technique.

If you're looking for a place to stash a long assembly language program, and you have BASIC XL (or one of the other super cartridges), you might just look behind it.

Robert Opitz is a chemist working in Rochester, New York and has owned an Atari for three years. He became interested in microcomputers five years ago, when he discovered word processing while writing his thesis.

The two-letter checksum code preceding the line numbers here is *not* a part of the BASIC program. For further information, see the *BASIC Editor*, page 43.

Listing 1.
BASIC listing.

```
ON 100 ? CHR$(125):? "Super Cartridge DOS
   Creator"
ZF 110 ? "CHECKING DATA LINES"
KP 120 DIM A$(160):FIN=1
FW 130 LINECOUNT=10000
SH 140 DTOT=0:LINECOUNT=LINECOUNT+10
PT 150 FOR I=1 TO 8
RO 160 READ D:DTOT=DTOT+D
WW 170 IF D=256 THEN POP :FIN=0:GOTO 200
ZD 180 A$(LEN(A$)+1)=CHR$(D)
GJ 190 NEXT I
TU 200 READ CHECKSUM
FG 210 IF DTOT<>CHECKSUM THEN ? "ERROR IN
   LINE ";LINECOUNT:END
FS 220 ? "LINE ";LINECOUNT;" IS O.K."
JH 240 IF FIN THEN 140
NR 290 TRAP 360
AV 300 ? "ALL LINES CORRECT!"
KJ 310 ? "Printing file to disk as SUPDOS
   .OBJ"
SF 320 OPEN #1,8,0,"D:SUPDOS.OBJ"
KC 330 FOR I=1 TO LEN(A$)
GH 335 PUT #1,ASC(A$(I,I)):NEXT I
LH 340 CLOSE #1
OV 350 ? "SUPDOS.OBJ file created.":END
WF 360 ? "DISK ERROR!  MAY BE WRITE PROTE
   CTED."
OG 370 END
BG 10000 REM DATA STATEMENTS FOR SUPDOS.O
   BJ
DP 10010 DATA 255,255,122,21,124,21,76,19
   2,1066
TN 10020 DATA 23,70,23,116,23,141,255,213
   ,864
ZT 10030 DATA 169,0,133,212,169,0,133,214
   ,1030
LY 10040 DATA 169,29,133,213,169,160,133,
   215,1221
RQ 10050 DATA 162,17,160,0,177,212,72,177
   ,977
MM 10060 DATA 214,145,212,104,145,214,200
   ,208,1442
KS 10070 DATA 243,230,215,230,213,202,208
   ,236,1777
QP 10080 DATA 141,0,213,96,182,23,226,23,
   904
UW 10090 DATA 240,73,32,70,23,206,158,23,
   825
GC 10100 DATA 48,65,32,170,25,169,255,141
   ,905
MP 10110 DATA 158,21,141,157,21,162,16,16
   9,845
EG 10120 DATA 47,157,68,3,169,24,157,69,6
   94
PU 10130 DATA 3,32,164,21,32,70,23,169,51
   4
DG 10140 DATA 0,141,157,21,96,19,24,21,47
   9
DA 10150 DATA 24,56,176,36,58,24,63,24,46
   1
CI 10160 DATA 206,157,21,76,117,32,115,24
   ,748
CT 10170 DATA 118,24,32,180,25,96,63,25,5
   63
AJ 10180 DATA 66,25,32,70,23,96,50,31,393
OS 10190 DATA 52,31,83,85,80,256,587
```

Listing 2.
Assembly listing.

```
;*******************************
;**                           **
;**    SUPERCARTRIDGE DOS     **
;**     BY ROBERT OPITZ       **
;**       4/10/85             **
;**                           **
;*******************************
;
;O.S. EQUATES
;
ICBAL   =   $0344
ICBAH   =   $0345
;
;DOS EQUATES
;
DUPFLG  =   $159D
OPT     =   $159E
GFLOAD  =   $15A4
MEMFLG  =   $179E
RRDUP   =   $1801
DUPSYS  =   $182F
CLOSX   =   $19AA
CLOS20  =   $19B4
DOS     =   $2075
;
;PROGRAM EQUATES
;
MSAV    =   $1D00
SAVEDUP =   $A000
LOW     =   $D4
HIGH    =   $D6
CART.ON =   $D500
CART.OFF=   $D5FF
;
;  DOS PATCHES
        *=  $157A
;
        JMP DUPINIT
;
        *=  $1746
;
SETSWT
        STA CART.OFF ;DISABLE CART
        LDA #MSAV&255 ;SET UP
        STA LOW      ;INDIRECT
        LDA #SAVEDUP&255 ;POINTERS
        STA HIGH
        LDA #MSAV/256
        STA LOW+1
        LDA #SAVEDUP/256
        STA HIGH+1
        LDX #17      ;SWITCH
;
; MEMORY SWITCH ROUTINE
;
SWITCH
        LDY #$00
RESWT
        LDA (LOW),Y ;PUT LOW BYTE
        PHA         ;ON STACK
        LDA (HIGH),Y ;SWITCH 1ST BYTE
        STA (LOW),Y
        PLA         ;LOW BYTE OFF
        STA (HIGH),Y ;AND STORE IT
        INY
        BNE RESWT   ;NEXT BYTE
        INC HIGH+1
        INC LOW+1
        DEX
        BNE RESWT   ;NEXT PAGE
        STA CART.ON ;ENABLE CARTRIDGE
        RTS
;
        *=  $17B6
;
        BEQ RRDUP
GOOD    JSR SETSWT  ;DO MEM.SAV
        DEC MEMFLG  ;SHOW MEM SAVED
        BMI RRDUP   ;ALWAYS
;
;  COLDSTART ROUTINE
;
DUPINIT
        JSR CLOSX   ;CLOSE IOCB
        LDA #$FF    ;CONDITION DOS
        STA OPT     ;FLAGS TO LOAD,
        STA DUPFLG  ;NOT RUN DUP.SYS
        LDX #$10    ;USE IOCB 1
        LDA #DUPSYS&255
        STA ICBAL,X
        LDA #DUPSYS/256
        STA ICBAH,X
```

```
            JSR SFLOAD   ;LOAD DUP.SYS
            JSR SETSWT   ;AND MOVE IT
            LDA #$00     ;SHOW DUP NOT
            STA DUPFLG   ;IN MEMORY
            RTS
;
            *=  $1813
;
            SEC          ;SKIP THIS
            BCS CONT     ;SECTION
;
            *=  $183A
;
CONT        DEC DUPFLG   ;SHOW DUP IN MEM
            JMP DOS      ;AND RUN IT
;
; MEMSVQ TELLS DOS IF MEM.SAV
; IS ACTIVE (Y=1)
;
            *=  $1873
MEMSVQ      JSR CLOSIO   ;CLOSE IOCB
            RTS          ;RETURN Y=1
;
; RESTORE SAVED MEMORY
;
            *=  $193F
;
LDMEM1
            JSR SETSWT
            RTS
;
;  CHANGE DOS MENU TITLE BAR
;  TO SUPERCARTRIDGE VERSION
;
            *=  $1F32
;
            .BYTE "SUP"
;
            .END
```

Roll 'Em!

by Brian Strand

Roll 'Em! is a fast-paced maze game written in Action! You control a paint roller and try to paint all of the corridors in ten different mazes—while avoiding three fireballs. Your roller will be destroyed if they touch you, but you can temporarily escape by using the revolving doors scattered throughout the mazes.

Typing it in.

Type in Listing 1, then check your work with **D:CHECK in Action!** (issue 44). Save the program under the name MAKMAZFI.ACT, then compile and run it. This will create a file on disk called ROLLEM.MAZ, which contains data for the mazes.

Next, clear the editor. Type in Listing 2 and verify your typing with **D:CHECK in Action!**. Save this file under the name ROLLEM.ACT. Do not compile it from memory!

After saving Listing 2, clear the editor and enter the monitor. Type *C "ROLLEM.ACT"* and RETURN. This will compile **Roll 'Em!** from disk. When it compiles successfully, type *W "ROLLEM.OBJ"* and *RETURN*, to save the object code to disk.

To run **Roll 'Em!**, enter the monitor and type *D* and hit RETURN, to enter DOS. Select option L and type *ROLLEM.OBJ*, then RETURN. **Roll 'Em!** will load and run au-

tomatically. (The disk you are running the game from must have the file ROLLEM.MAZ on it.)

Playing Roll 'Em!

Before you start a game, you may choose which maze you want to begin with. Use a joystick plugged into port 1. Pull the stick toward you to go to the next maze; push it away from you to go to the previous maze. Push the trigger to start a game.

During a game, you can push SELECT to speed the game up and OPTION to slow it down. Push START to return to the attract mode. You can press the trigger or a key on the keyboard to pause the game. Hitting the trigger or key again will resume it.

You start with three lives and get another for every 1000 points that you earn.

When the game begins, a short tune will play. Control your roller with the joystick. You can move the stick in the direction you'll want to go *before* you get to the turn, and the roller will turn as soon as it reaches the corner.

The revolving doors can be both friends or enemies. You can block the fireballs with the doors and escape, but you must paint under all the doors completely. Since they give no indication of whether they've been painted under or not, a screen may look finished when it really isn't. The only thing to do is check all the doors until you find any you didn't paint under.

Making mazes.

I purposely made mazes very easy to create, so that you can make your own. To make it even simpler, draw your mazes on graph paper first, then convert to numbers. Figure 1 shows an empty grid.

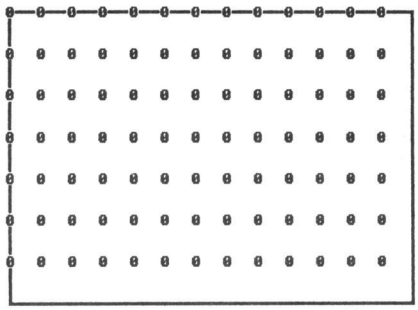

Figure 1. — An empty grid.
Vertical and horizontal lines = Wall; 0 = Grid point.

For each grid point (each *0* in Figure 1) add: 1 if a wall extends right from that point; 2 if a wall extends down from that point; 4 if that point is the center for a horizontal revolving door; and 8 if that point is the center for a vertical revolving door.

Figure 2 gives some examples, while Figure 3 shows a completed maze.

Some rules to keep in mind are:

(1) Never put any revolving doors on row 1 or column 1. If the roller goes off the screen, strange things will happen.

(2) Never completely enclose any areas with walls so it would be impossible to paint them and finish the screen.

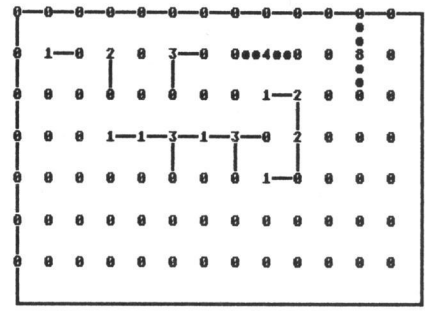

Figure 2. — Different grid point values.
Vertical and horizontal lines = Wall;
0-8 = Grid point; Solid dots = Door.

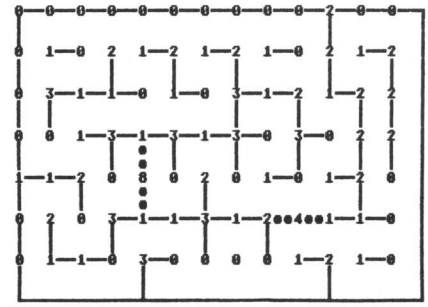

Figure 3. — A completed maze.
Vertical and horizontal lines = Wall;
0-8 = Grid point; Solid dots = Door.

(3) Never put any *1*s on row 1 or *2*s on column 1 (i.e., in the border). If you do, **Roll 'Em!** will think you're using up two blocks of paintable area—which you aren't—so the maze would end early.

Note: If you want to violate rule 2, carefully calculate the number of blocks you're rendering unpaintable, and violate Rule 3 enough to make up for the discrepancy. The maze will then be playable.

(4) It's not wise to put a revolving door where it will cover a wall when it's flipped. If you must, at least make sure that it doesn't cover walls with both of its arms (making it impossible to reflip), unless you want a "one-time" door.

To insert your new maze into the game, load in MAKMAZFI.ACT and put your maze in with the rest. Number it, then increment the variable NUM in the first line, so the program will know how many mazes to save. Save the program, compile and run it, then run **Roll 'Em!**

Well, there you have it. Have fun making mazes!

---

*Brian Strand is 14 years old and has been homeschooled all his life. He has used the 800XL for about one-and-a-half years and discovered Action! last February. He has worked with the TRS-80, Apple II, Vic-20 and IBM PC for about five years. **Roll 'Em!** was his first completed Action! project.*

Listing 1.
Action! listing.

```
;Maze file generator for Roll 'Em!
;By Brian Strand
```

```
;       CHECKSUM DATA
;[C5 30 80 BA 10 28 E5 17
; AD ]

BYTE num=[10]
BYTE ARRAY mazes=[

;#1

  0 0 0 0 0 0 0 0 0 0 0 0 0
  0 3 0 1 1 0 1 0 1 1 0 1 2
  0 0 0 4 1 0 2 2 1 0 4 0 0
  1 0 2 1 0 2 1 0 2 1 0 2 1
  0 0 1 0 2 1 1 1 0 2 1 0 0
  0 8 1 0 1 1 3 3 1 0 1 0 8
  0 1 1 1 1 0 0 0 1 1 1 1 0

;#2

  0 0 0 0 0 0 0 0 0 0 0 0 0
  0 1 0 3 1 0 3 0 4 0 1 1 2
  0 2 8 0 3 1 0 1 0 2 8 2 0
  0 1 0 1 0 1 1 1 0 2 1 0 2
  0 3 0 1 2 1 1 1 0 2 1 2 0
  0 0 8 2 1 1 2 1 0 0 8 0 2
  0 1 0 1 1 0 1 0 4 0 1 1 0

;#3

  0 0 0 2 0 0 2 0 0 2 0 0 2
  0 3 0 0 1 0 0 3 0 0 3 0 0
  1 2 2 0 4 2 1 2 2 1 2 8 1
  0 0 1 2 0 1 2 0 1 2 0 1 2
  0 1 0 0 3 0 0 1 0 0 3 0 0
  0 8 2 1 2 2 0 4 2 1 2 2 1
  0 0 1 2 0 1 2 0 1 2 0 1 2

;#4

  0 0 0 2 0 0 0 0 0 0 0 0 0
  0 2 4 2 8 2 3 2 1 0 2 1 2
  0 3 0 2 2 3 0 2 1 0 1 0 0
  0 2 3 0 2 0 1 2 4 0 1 1 2
  0 0 3 1 1 0 8 2 1 1 0 2 2
  0 8 0 0 2 4 0 1 2 8 2 0 0
  0 0 2 8 0 1 1 0 0 0 1 0 4

;#5

  0 0 0 0 0 0 0 2 0 0 0 0 0
  1 0 2 2 3 0 1 2 3 0 2 1 0
  0 1 0 2 0 3 0 2 0 3 1 2 3
  1 1 2 0 3 0 2 3 0 2 2 2 0
  0 2 1 1 2 2 0 0 3 0 0 1 1
  0 2 3 0 0 2 1 1 2 1 1 3 0
  0 0 0 1 0 1 3 0 0 1 0 0 1

;#6

  0 0 0 0 0 0 0 0 0 0 0 0 0
  0 3 1 1 1 1 0 3 1 1 1 1 2
  0 2 1 0 8 2 1 0 3 0 1 0 2
  0 2 0 3 0 0 3 2 0 2 1 0 2
  0 2 1 0 0 1 0 1 0 1 0 4 0
  0 2 1 2 4 0 1 0 8 0 2 0 2
  0 1 0 1 1 1 1 1 1 1 1 1 0

;#7

  0 0 0 0 0 0 0 0 0 0 0 0 0
  0 1 2 1 0 3 0 3 0 3 1 1 0
  0 2 1 0 0 0 1 2 2 0 1 0 2
  0 0 3 0 8 2 4 0 0 2 4 0 0
  0 1 2 1 0 3 0 2 8 0 2 1 2
  0 2 0 8 1 0 3 0 0 2 1 2 0
  0 1 1 0 1 0 0 1 0 1 0 1 0

;#8

  1 1 1 1 1 1 3 3 1 3 0 0 0
  0 2 1 2 1 2 1 0 2 0 2 3 2
  0 3 0 0 2 1 0 1 3 0 0 1 0
  0 0 2 1 0 1 0 2 0 1 0 3 2
  0 2 0 1 2 1 0 0 2 1 0 1 0
  0 3 0 2 0 3 0 1 3 0 2 3 2
  0 0 1 0 1 0 3 2 0 2 0 1 0

;#9

  0 2 0 2 0 0 0 0 0 0 0 0 0
  0 2 2 2 1 2 2 2 3 0 4 0 4
  0 2 2 2 3 1 3 3 1 2 0 0 0
  0 2 2 2 0 1 0 1 0 0 4 0 4
  0 0 2 0 2 1 2 3 0 2 0 0 0
  1 1 1 0 1 3 3 3 3 0 4 0 4
  0 1 1 1 1 0 0 0 1 0 0 0 0

;#10

  0 0 0 0 0 0 0 0 0 0 0 0 0
  1 3 0 2 2 3 0 3 0 0 0 0 0
  0 2 0 3 2 3 0 3 0 3 2 3 8
  0 0 0 0 0 1 0 1 0 0 0 1 0
  0 0 0 0 1 1 2 3 1 0 3 1 0
  0 1 1 0 8 1 2 2 1 2 1 1 2
  0 0 0 0 1 1 0 1 1 0 1 1 0

 ]
CARD a

PROC MakeMazes()

Open(1,"D:ROLLEM.MAZ",8,0)
PutD(1,num)
FOR a=0 TO 91*num DO
  PutD(1,mazes(a))
OD
Close(1)

RETURN
```

●

Listing 2.
Action! listing.

```
; ROLL 'EM!
; By Brian Strand

;       CHECKSUM DATA
;[9C 11 C4 7B 66 89 73 D7
; E7 5E 08 29 C9 FA 74 77
; 1B 44 D6 D6 E9 49 1D 76
; F5 D3 35 85 FE 44 20 5D
; A6 7F DC 4C 3C 28 54 CF
; A5 A4 E1 6F 62 86 A9 88
; 87 EC C6 80 B5 FB 72 E5
; B6 B4 EC 35 FB EC ED C0
; C6 9B D3 1E 41 C7 07 3E ]

SET $000E=$4000
SET $0491=$4000

BYTE
 rcen=[136],brx,bry,wallb=[129],
 colorc,revxor=[2],im=[1],topf=[10],
 fm=[0],aa,a,b,c,d,revb=[2],stop=[0],
 firelen=[16],ok,paintc=[4],hit,dir,
 wallc=[7],tc,chlen=[80],dmask,ddir,
 cdir,stopx=[0],rdoor,ff=[0],life=[3],
 pdir=[0],consol=$D01F,psflag=[0],
 dist,vol,tune,df,scr=[0],nsc,index,
 stopm,durat,attract=77,key=764
INT
 xx,yy

INT ARRAY
```

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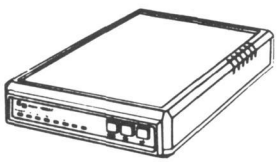

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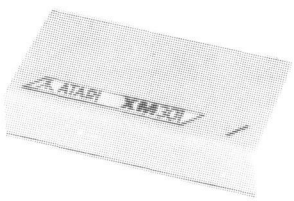

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```
 xadj=[0 0 65535 65534 1 2 0 0],
 yadj=[65534 65535 0 0 0 0 1 2],
 xfm=[65535 1 0 0],yfm=[0 0 65535 1],
  xa=[65535 2 0 0], ya=[0 0 65535 2]

CARD
 pm,scad,ac,dliptr=512,score=[0],
 nb,bc,hi=[0],xtra,dv
BYTE ARRAY brush=[
  240 240 240 240 240 240 240 247
  247 244 244 244 244 244 252 252
   15  15  15  15  15  15  15 239
  239  47  47  47  47  47  63  63
  255 255 255 255 255 255 255 255
    3   3  31  31  16  16  16  16
   16  16  16  16  31  31   3   3
  255 255 255 255 255 255 255 255
  ],
 chset=[
  207 207 207   0 252 252 252   0
  170 170 170 170 170 170 170 170
  170 170 170 170 170 170 170 170
  255 255 255 255 255 255 255 255
    0   0   0   0   0   0   0   0
  170 170 170 170 170 170 170 170
   85  85  85  85  85  85  85  85
  170 170 190 190 190 190 170 170
    0  24  24  24   0   0   0   0
    0  24  24  24  24   0  24   0
  ],
 fireim=[
  146 219 222 239 126 126 255 255
  255 255 255 255 255 255 126  60
   83 126 119 230 255 126 255 255
  255 255 255 255 255 255 126  60
  ],
 moves(4),firex(4),firey(4),pd(4),
 fxdir(4),fydir(4),prevf(4),turn(4),
 vals=$2500,skipf(4),rt(128),
 cngx=[0 0 1 1],cngy=[1 1 0 0],
 tvals=[13 14 7 11],tops=[0 5 10 20],
 dirs=[1 2 4 8],sc=[2 3 0 1],
 masks=[63 191 223 239
        247 251 253 254],
 notes=[47  40  45  47  53  47  45
        47  53  60  53  47  53  60
        40 120 115 110 105 100  95
        90   0 120 115 110 105 100
        95  90   0  85  80  75  70
        65  60  55   0  85  80  75
        70  65  60  55   0],
 durats=[2   2   2   2   1   1
         2   2   2   2   1   1   2
         4 255   9   9   9   9   9
         9   9   9   9   9   9   9
         9 255   9   9   9   9   9
         9   9   9   9   9   9   9
         9   9   9   9 255],
 durtable=[5  10  20  40  80  15  30
           60 120   1   2   3   4]

PROC dli=*()
[72 169 180 141 10 212 141 24 208
 169 22  141 23 208 169 112 141 26
 208 104 64]
RETURN

PROC Wait(CARD wval)
CARD wl
FOR wl=1 TO wval DO OD
RETURN

PROC PMMove(CARD pmb,adr
            BYTE pn,px,py,len)
CARD padr

px==+48
py==+32
padr=pm+768+pn*256
Zero(padr+py-10,len+20)
MoveBlock(padr+py,adr,len)
Poke(53247+pn,px)

RETURN

PROC Plotc(BYTE xc,yr)
CARD scoff
scoff=yr*40+xc Poke(scad+scoff,colorc)
RETURN

BYTE FUNC Locatc(BYTE xc,yr)
CARD scoff BYTE sval
scoff=yr*40+xc sval=Peek(scad+scoff)
RETURN(sval)

PROC Music()
BYTE note
IF stopm=0 THEN
  durat==-1
  IF durat=0 THEN
    index==+1
    IF durats(index)=255 THEN
      stopm=1 RETURN
    FI
    durat=durtable(durats(index))
    note=notes(index)
  FI
  Sound(0,note,dist,vol)
ELSE
  Sound(0,0,0,0)
```

```
FI
RETURN

PROC Puthw(BYTE xleft,y)
nb==-2 colorc=wallb
Plotc(xleft+1,y) Plotc(xleft+2,y)
RETURN

PROC Putvw(BYTE x,ytop)
nb==-2 colorc=wallb
Plotc(x,ytop+1) Plotc(x,ytop+2)
RETURN

PROC Puthdoor(BYTE xc,yc)
colorc=rcen Plotc(xc,yc) colorc=revb
Plotc(xc-2,yc) Plotc(xc-1,yc)
Plotc(xc+1,yc) Plotc(xc+2,yc)
RETURN

PROC Putvdoor(BYTE xc,yc)
colorc=rcen Plotc(xc,yc) colorc=revb
Plotc(xc,yc-2) Plotc(xc,yc-1)
Plotc(xc,yc+1) Plotc(xc,yc+2)
RETURN

PROC DrawMaze()

Zero(scad+40,920)
bc=0 nb=684
FOR ac=40 TO 79 DO
Poke(scad+ac,wallb)
Poke(scad+840+ac,wallb)
OD
FOR ac=40 TO 920 STEP 40 DO
Poke(scad+ac,wallb)
Poke(scad+ac+39,wallb)
OD
FOR ac=160 TO 760 STEP 120 DO
FOR aa=3 TO 36 STEP 3 DO
Poke(scad+ac+aa,wallb)
OD
OD
FOR ac=0 TO 90 DO
  b=ac/13 c=ac-(b*13)
  IF vals(ac+91*scr)#0 THEN
  d=vals(ac+91*scr)
  IF (d&1)#0 THEN
    Puthw(c*3,1+b*3) FI
  IF (d&2)#0 THEN
    Putvw(c*3,1+b*3) FI
  IF (d&4)#0 THEN
    Puthdoor(c*3,1+b*3) FI
  IF (d&8)#0 THEN
    Putvdoor(c*3,1+b*3) FI
  FI
OD
RETURN

PROC FlipDoor(BYTE centx,centy)
BYTE aa

FOR aa=0 TO 7 DO
  colorc=Locatc(centx-xadj(aa),
          centy-yadj(aa))!revxor
  Plotc(centx-xadj(aa),centy-yadj(aa))
OD
stopm=0 index=31 durat=1 vol=7 dist=10
df=1
RETURN

PROC RevDoor(BYTE startx,starty)
BYTE p0,p1,p2,p3,r0,r1

IF cdir=0 OR cdir=1 THEN p0=startx
  p1=starty-1 p2=startx p3=starty+2
ELSE p0=startx-1 p1=starty p2=startx+2
  p3=starty FI

r0=Locatc(p0,p1)
r1=Locatc(p2,p3)
IF r0=rcen THEN
  FlipDoor(p0,p1) ELSE FlipDoor(p2,p3)
FI
RETURN

PROC ChkWall(BYTE dir,door)
BYTE xs1,ys1,xs2,ys2,byt1,byt2

xs1=brx RSH 2+xa(dir)
xs2=xs1+cngx(dir)
ys1=bry RSH 3+ya(dir)-1
ys2=ys1+cngy(dir)
byt1=Locatc(xs1,ys1)
byt2=Locatc(xs2,ys2)
df=0
psflag=0
IF byt1=revb AND byt2=revb OR
   byt1=rdoor AND byt2=rdoor THEN
  IF door=1 THEN
    RevDoor(xs1,ys1)
  FI
  stop=1 RETURN
ELSEIF byt1=0 AND byt2=0 THEN
  psflag=1 stop=1 RETURN
ELSE
  IF byt1#paintc AND byt1#0 OR
  byt2#paintc AND byt2#0 THEN
    stop=0 ELSE stop=1
  FI
FI
```

```
 RETURN

 PROC MvPlr()

 attract=0
 brx==+xx bry==+yy
 PMMove(pm,brush+im*16,1,brx,bry,16)
 RETURN

 PROC DoPaint()
 BYTE pb1x,pb2x,pb1y,pb2y,b1,b2,ns

 IF cdir=0 OR cdir=1 THEN
   pb1x=brx RSH 2
   IF cdir=1 THEN pb1x==+1 FI
   pb1y=bry RSH 3-1
   pb2x=pb1x pb2y=pb1y+1
 ELSE
   pb1y=bry RSH 3-1
   IF cdir=3 THEN pb1y==+1 FI
   pb1x=brx RSH 2
   pb2y=pb1y pb2x=pb1x+1
 FI
 colorc=paintc
 b1=Locatc(pb1x,pb1y)
 b2=Locatc(pb2x,pb2y)
 ns=0
 IF b1=0 THEN ns==+1 FI
 IF b2=0 THEN ns==+1 FI
 score==+ns
 xtra==+ns IF xtra=1000 THEN
   life==+1 Position(19,0)
   PrintBD(6,life) xtra=0
 FI
 bc==+ns
 Plotc(pb1x,pb1y) Plotc(pb2x,pb2y)
 RETURN

 BYTE FUNC ChkfWall(BYTE x,y,dn)
 BYTE x2,y2,c1,c2,ok

 x==RSH 2+xa(dn) y==RSH 3+ya(dn)-1
 x2=x+cngx(dn) y2=y+cngy(dn)
 c1=Locatc(x,y) c2=Locatc(x2,y2)
 ok=1
 IF c1#0 AND c1#paintc OR c2#0 AND
   c2#paintc THEN ok=0 FI
 RETURN(ok)

 PROC GetfDir(BYTE fn,fx,fy)
 BYTE aa,bb,cc,dd,tv

 dmask=0+ChkfWall(fx,fy,0)*1
 dmask==+ChkfWall(fx,fy,1)*2
 dmask==+ChkfWall(fx,fy,2)*4
 dmask==+ChkfWall(fx,fy,3)*8

 aa=prevf(fn) tv=tvals(aa)!15
 IF dmask#tv THEN
  dmask==&tvals(prevf(fn))
 FI

 IF fx=brx THEN
   IF fy<bry THEN
     ddir=8
   ELSE
     ddir=4
   FI
 ELSE
   IF fx<brx THEN
     ddir=2
   ELSE
     ddir=1
   FI
 FI

 ddir==&dmask
 IF ddir=0 THEN
   IF fy<bry THEN
     ddir=8
   ELSE
     ddir=4
   FI
 FI
   ddir==&dmask
   IF ddir=0 THEN
     FOR aa=0 TO 3 DO
       ddir=dirs(aa)&dmask
     IF ddir#0 THEN EXIT FI
     OD
   FI
 IF ddir=8 THEN dir=3
 ELSEIF ddir=4 THEN dir=2
 ELSEIF ddir=2 THEN dir=1
 ELSEIF ddir=1 THEN dir=0
 FI
 prevf(fn)=dir
 fxdir(fn)=xfm(dir) fydir(fn)=yfm(dir)
 RETURN

 PROC MvFire(BYTE fn)
 INT xd,yd

 skipf(fn)==+1
 IF skipf(fn)=tops(fn) THEN
   skipf(fn)=0
   RETURN
 ELSE
   IF (firex(fn)&3)=0 AND
      (firey(fn)&7)=0 THEN
     GetfDir(fn,firex(fn),firey(fn))
   FI
   firex(fn)==+fxdir(fn)
   firey(fn)==+fydir(fn)
   ff==!1
   PMMove(pm,fireim+ff*16,fn+1,
          firex(fn),firey(fn),firelen)

   xd=firex(fn)-brx yd=firey(fn)-bry
   IF xd>-4 AND xd<4 AND
      yd>-8 AND yd<8 THEN hit=1 FI
 FI
 RETURN

 PROC Getnd()
 BYTE wmask,s,tdir
 BYTE ARRAY mu=[4 8 1 2]

 DoPaint()
 wmask=0
 FOR aa=0 TO 3 DO
  ChkWall(aa,0)
  wmask==+stop*mu(aa)
  IF aa=cdir AND stop=0 THEN
    cdir=255 FI
 OD

 s=Stick(0)!15 s==&wmask
 IF (s&12)#0 THEN s==&12 FI
 tdir=0
 IF s THEN tdir=s
 ELSE ChkWall(pdir,0) IF stop=1 THEN
   tdir=mu(pdir) ELSE tdir=0 FI
 FI
 IF tdir THEN
  IF tdir=1 THEN cdir=2
  ELSEIF tdir=2 THEN cdir=3
  ELSEIF tdir=4 THEN cdir=0
  ELSEIF tdir=8 THEN cdir=1
  FI
  pdir=cdir
  ChkWall(cdir,1)
  IF psflag=1 THEN index=15
    durat=1 stopm=0 vol=2 dist=8
  ELSEIF df=0 THEN stopm=1 FI
 FI
```

```
stopx=0
IF cdir=255 AND tdir=0 THEN stopx=1 FI
xx=xfm(cdir) yy=yfm(cdir)
IF cdir#255 THEN im=cdir FI

RETURN

PROC NewScrn()
BYTE a,b

scr==+1
IF scr>nsc-1 THEN scr=0
  dv==-50 IF dv<50 THEN dv=50 FI
FI
SndRst()
Wait(30000)

a=180
WHILE a<192 DO
Poke(dli+2,a)
Sound(0,255-a,10,8)
Wait(1200)
a==+1
OD
Wait(2000)
a=127
WHILE a>111 DO
Poke(dli+2,a)
Sound(0,a-64,10,8)
Wait(1200)
a==-1
OD
a=48 WHILE a>40 DO Sound(0,a,10,8)
 Wait(1200) a==-1 OD
Wait(2000)
SndRst()
Wait(60000)
DrawMaze()
Poke(dli+2,180)
tune=1
RETURN

PROC Setup()
im=0 hit=0 brx=76 bry=96
firex(1)=4 firey(1)=96
firex(2)=76 firey(2)=24
firex(3)=148 firey(3)=96
prevf(1)=Rand(4) prevf(2)=Rand(4)
prevf(3)=Rand(4)
rdoor=paintc!revxor
Poke(704,22) Poke(705,36)
Poke(706,38) Poke(707,52)
SetColor(0,2,6) SetColor(1,12,6)
SetColor(2,7,4) SetColor(3,3,4)
SetColor(4,0,0)
Zero(pm+1024,1024)
RETURN

PROC PushTrig()
Position(0,1)
PrintD(6,"push trigger to play")

DO
brx=Rand(160)
bry=Rand(160)
MvFire(1) MvFire(2) MvFire(3)
Wait(500)
a=Stick(0)
IF a=13 THEN scr=scr+1
  IF scr>nsc-1 THEN scr=nsc-1 ELSE
    DrawMaze() FI
ELSEIF a=14 THEN scr=scr-1
  IF scr=255 THEN scr=0 ELSE
    DrawMaze() FI
FI
UNTIL STrig(0)=0 OD
RETURN

PROC PlaySet()

Zero(scad,40)
PMMove(pm,brush+(im*16),1,brx,bry,16)
PMMove(pm,fireim,2,firex(1),
  firey(1),16)
PMMove(pm,fireim,3,firex(2),
  firey(2),16)
PMMove(pm,fireim,4,firex(3),
  firey(3),16)
Position(0,0) PrintD(6,"SCR")
PrintCD(6,score)
Position(8,0) PrintD(6,"HI:")
PrintCD(6,hi)
Position(16,0) PrintD(6,"LVE")
PrintBD(6,life)
colorc=paintc
a=brx RSH 2 b=bry RSH 3-1
Plotc(a,b) Plotc(a+1,b)
Plotc(a,b+1) Plotc(a+1,b+1)

RETURN

PROC MakeRandt()
BYTE ARRAY flags(128)

Zero(flags,128)
FOR c=0 TO 127 DO
  a=Rand(128) b=flags(a)
  IF b=1 THEN
    DO a==+1 IF a=128 THEN a=0 FI
    UNTIL flags(a)=0 OD
  FI
  flags(a)=1 rt(a)=c
OD
RETURN

PROC Dissolve()
BYTE ARRAY tempp(16)

MoveBlock(tempp,brush+im*16,16)
MakeRandt()

FOR a=0 TO 127 STEP 2 DO
  b=(rt(a)/8) c=rt(a)-b*8
  tempp(b)==&masks(c)
  PMMove(pm,tempp,1,brx,bry,16)

  b=(rt(a+1)/8) c=rt(a+1)-b*8
  tempp(b)==&masks(c)
  PMMove(pm,tempp,1,brx,bry,16)
  MvFire(1) MvFire(2) MvFire(3)
  IF consol=6 THEN life=0 SndRst()
     RETURN FI
  b=rt(a) Sound(0,b,0,6)
  Wait(450)
OD
SndRst() stopm=1
RETURN

PROC Die()

life=life-1
Position(19,0)
PrintBD(6,life)
Dissolve()
RETURN

PROC Title()

Position(5,0) PrintD(6,"ROLL )EM*")
PushTrig()
RETURN

PROC PlayTune()
 index=255 durat=1 dist=10 vol=8
 stopm=0
 DO Wait(500) Music() UNTIL stopm=1 OD
```

```
RETURN

PROC Ready()
Position(7,1) PrintD(6,"READY*")
RETURN

PROC MainLoop()

fm=0
DO
 Setup() PlaySet() Ready()
 IF tune=1 THEN tune=0 PlayTune()
 ELSE Wait(60000) FI
 Zero(scad+20,20)
 DO
   Music()
   Position(3,0)
   PrintCD(6,score)
   IF bc>=nb THEN NewScrn() EXIT FI

   Wait(dv-50)
   IF key#255 OR STrig(0)=0 THEN
     key=255
     SndRst()
     DO UNTIL STrig(0)#0 OD
     Wait(25000)
     DO UNTIL key#255
       OR STrig(0)=0 OD
     key=255
     DO UNTIL STrig(0)#0 OD
   FI
   IF (brx&3)=0 AND (bry&7)=0 THEN
     Getnd()
   FI
     IF stopx=0 THEN MvPlr() FI
   Music()
     MvFire(1) MvFire(2) MvFire(3)
   IF hit=1 THEN
     Die() Wait(30000) EXIT FI
   IF consol=6 THEN life=0 SndRst()
      EXIT FI
   IF consol=5 THEN dv==-10
     IF dv<50 THEN dv=50 FI FI
   IF consol=3 THEN dv==+10
     IF dv>450 THEN dv=450 FI FI
 OD
cdir=0 pdir=0
UNTIL life=0
OD

Zero(pm+1024,255)
RETURN

PROC Init()

Close(2)
Open(2,"D:ROLLEM.MAZ",4,0)

nsc=GetD(2)
FOR ac=0 TO 91*nsc DO
vals(ac)=GetD(2)
OD
Close(2)

b=Peek(106)-8 Poke(106,b)
MoveBlock(b*256,57344,1023)
MoveBlock(b*256+8,chset,chlen)

a=Peek(106)-16 Poke(106,a)
Graphics(17)
ac=PeekC(560)
FOR aa=7 TO 28 DO
Poke(ac+aa,4)
OD
Poke(ac+6,134) Poke(54279,a)
Poke(53277,3) Poke(559,62) Poke(623,1)
pm=a*256 Zero(pm+1024,1024)
scad=PeekC(88)
Poke(756,b)
Zero(scad+80,839)
dliptr=dli Poke(54286,192)
index=255 stopm=0 durat=1
RETURN

PROC GameOver()

PushTrig()
RETURN

PROC Game()

Init() DrawMaze() Setup() Title()
DO

  DrawMaze() score=0 xtra=0 tune=1
  dv=450
  MainLoop()
  IF score>hi THEN hi=score FI
  Position(11,0) PrintCD(6,hi)
  GameOver()
  life=3
OD
RETURN
```

●

THE WEST COAST COMPUTER FAIRE

by Matthew J.W. Ratcliff

Given the opportunity to cover the West Coast Computer Faire for **ANALOG Computing**, I jumped at the chance. Before leaving for San Francisco, I decided to get in a little spring training at the St. Louis Computer and Business Equipment Showcase. Both expositions were produced by The Interface Group, who did an admirable job.

The Showcase is primarily a business show, where vendors demonstrate their products and boost sales. One of the show's unique features was the "Hands-On Demo Room." There were many different systems in this room. You could get your hands on a machine and test run software or computers of interest. No sales pitches were allowed in this area. Atari was represented by BASIC Computer Services (BCS), with a 520ST system. You could get some "rodent time" in on the likes of **Neo-Chrome**, **DEGAS**, **1st Word**, and more.

There were about fifty booths at the Showcase. Business seemed most brisk at the discount software booths. Atari was well represented by BCS and Atari Computer Enthusiasts (ACE) of St. Louis.

The BCS booth was really cooking with several ST systems. One was running all the popular ST demos from the previous CES and COMDEX. Another was cranking out full-color dumps of **DEGAS** pictures (with a small BCS ad at the bottom, of course) on an Epson JX80 printer. The excellent color picture dump program was created by one of the "Randall crew" of St. Louis, who really made Atari look good. In fact, on local TV news coverage, one report began with a closeup of their 520ST running the **Neo-Chrome** parrot animation demo.

The ACE booth gained its fair share of attention with a 130XE running some of the popular CES demo programs. They let the interested public know: there's excellent technical support for Atari computers in the St. Louis area—*free!*

One young lady who stopped at ACE's booth to look at the demos was asked if she had an Atari. "Yes," she replied, "I have A-toy." Will Atari ever shake its game machine image? This was discussed in depth at the Faire's conference with the Tramiels.

The hacker's show.

The Faire is a true hacker's show. Before the movie *War Games* and bad press caused by pirates, a hacker was known as a "knight in shining silicon." He could hack an operating system down to its bare bits and bytes, making a machine perform pure magic—never before thought possible.

A hacker is one who knows how to "thumb in" a program, a bit at a time; one who can look at "hex dumps" and read the code as plainly as a novel, rich with description on weaving a mysterious tale about the electronic jungle within. Hackers were never thought of as crooks or pirates, a common misuse of the term in the industry these days.

David Small of Data Pacific Inc. preserved the chivalrous image at the Faire, with the introduction of his **MacCartridge**. He and Data Pacific president Joel Rosenblum unveiled the product at the San Leandro Computer Club's booth.

The **MacCartridge** is simply a standard ST ROM cartridge, sporting a pair of Macintosh operating system 64K ROM chips. Joel's Mac was sacrificed, in order to provide the ROMs. It's legal to archive software for personal use, but only software recorded on perishable magnetic media. ROMs cannot be copied without a license. The ST cartridge's ROMs must come from a Mac.

Software now running on STs includes **MacPaint**, **MacWrite** and more, archived on an ST disk. Copyright laws do not specify that archived software must be recorded on the same media, in the same format. Data Pacific was meticulous in obeying the laws.

David began to entertain the idea of running Mac software on the ST in April of 1985 and tackled the project that November. He first created debugging tools, to help him figure out why he was constantly crashing. Once that was done, he began to get a glimpse into the Mac world, dormant on the ST cartridge at that time.

Then he began writing code. Christmas had come and gone; all he could get was the little "sad Mac" frowning face that says there's something "brutally wrong with your Macintosh." Of course there was something wrong; it was running on different hardware!

As he traced through the development process, he finally got a *Welcome to Macintosh*, then he was stuck. The mouse and keyboard wouldn't work. The two machines had vastly different interrupt structures to compensate for.

David sat down in front of his machine to fix the problem. He worked from 6 a.m.

(Continued on page 38)

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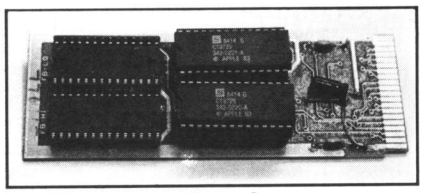
until 3 a.m. the next morning. When he assembled the code, there were *no errors!* Amazingly, it worked the first time!

The **MacCartridge** requires no hardware modifications to your 1040ST, or 1-meg enhanced 520ST. The code used to "softwire" the Mac OS into the ST is 7000 lines of assembly code, about 24K of object code. The ST with **MacCartridge** is 20% faster in all operations than the Mac, according to David's tests. (The ST is an 8-megahertz machine; the Mac, 4.)



MacCartridge.

The final version of **MacCartridge** will have the Apple 64K OS and 24K of David Small's "softwiring" code to hook it into the ST—all on its ROM cartridge.

The **MacCartridge** allows you to use unmodified Mac software. Since there are over 1000 professional software products available now, **MacCartridge** opens a whole new world of software for the ST.

There are two major problems at present, however. The ST cannot read Mac disks. Software must be ported from the Mac to the ST, via an RS232 interface, for example. An important question is: will Apple license the Mac OS to Data Pacific? There's no word yet.

Apple is understandably concerned that the **MacCartridge**/ST combination will cut into Mac sales. Considering the computing power to price ratio, the Amiga and ST have made the Mac all but obsolete. Now Apple is coming out with the Mac Plus, upgrading older models with kits—including more memory and a new OS.

Apple could take the obsolete 64K ROMs returned by service centers and resell the old plastic and silicon for about $180 per copy! They could port **MacPaint**, **MacWrite** and **MacDraw** to ST format disks and sell those to **MacCartridge**/ST owners. Apple has the potential to get a slice of every ST pie on the market. If the company believes their OS should be the industry standard (as opposed to the PC's MS-DOS), then this is their chance.

A new box.

You may have guessed: after the **MacCartridge**, most everything else seemed anticlimactic. As a matter of fact, the ST and **MacCartridge** got more news coverage in the San Francisco area than did the new laptop IBM PC, which uses 3½-inch drives. These should prove a real boon to ST owners, as well.

There was some concern about how we would get IBM software for STs when the IBM box comes out. Well, now that IBM sells a PC with 3½-inch disks, all PC software vendors will be porting their programs to this format. ST owners will benefit from this directly.

The IBM box (no official name was announced) was shown at the Hanover, Germany fair. Sam Tramiel hopes it will be shipping by the end of the summer. The box will be shown at April's COMDEX, running Lotus 1-2-3. Mr. Tramiel says it should be over 99% IBM compatible. Leonard Tramiel said no final decision has been made on the packaging yet—whether it will have IBM PC expansion style slots or not.

There was some confusion about the IBM box. The Tramiels indicated that it would take a 5¼-inch drive, then the 3½-inch capability came up. Since file formats are compatible, we were led to believe the PC box could load its software from an ST's 3½-inch disk (going through the ST first, which could pose a problem in software compatibility).

It could be that the "packaging problem" involves making a few more engineering decisions. Maybe you could put an ST 3½-inch *or* IBM 5¼-inch drive directly into the PC box, rather than into the ST. At a price of $200 to $300, the box should simplify the addition of future products.

Atari at the Faire.

Atari was represented by San Leandro Computer Club (SLCC) president Bob Barton, and Atari Bay Area Computer Users Society (ABACUS) president Bill Zinn. Atari didn't have a booth, but supported the clubs with equipment (STs, hard disk, monitors and other support).

SLCC sponsored a speakers' conference called The Atari Resurgence. Bob Barton and Tom Bennett (SLCC assistant editor) did an excellent job of organizing the conference. ABACUS held an all-day meeting to demonstrate new ST and XE products.

The title of the SLCC conference implies a past, present and future. The group was moderated by David Small, who began the discussion with Atari's past. All questions by those in attendance, of course, concentrated on the future—what products we can expect for our favorite machines.

Sam and Leonard Tramiel represented Atari Corp., Sam with a marketing viewpoint, while Leonard was more fluent about software and hardware. It was interesting to learn that the Tramiels bought Atari because of its name, recognized all over the world. It was discussed at length, however, that Atari's grown-up machine has a "game machine" image.

The general consensus was that the ST's computing power will speak for itself in time—as it already has in Europe. Sam explained that Atari is an electronics technology company. So long as game machines (8- or 16-bit) turn a profit, Atari will produce them.

Serious applications and business software, though, will help a great deal in changing the image. It was noted that strong ST sales in specialty stores have revitalized 8-bit sales, as well. Many vendors are picking up more software and peripherals for the line, for diehard 8-bit owners who visit the STs.

Bill Wilkinson represented *COMPUTE!* and Optimized Systems Software (whose ST product sales are booming, while 8-bit products are selling fairly well). Mr. Wilkinson dispelled rumors that OSS was developing an ST BASIC; they are not.

Leonard Tramiel assured me the Atari ST BASIC is being debugged "as much as possible" and will probably be re-released soon via user group networks. Unfortunately, it will still have the same annoying multi-window interface—I want to list and edit on the same screen!

According to another recent report, Jack Tramiel claims Atari's coming out with a *new* ST BASIC. If all the bugs are worked out of the current version and it's enhanced, it will be a virtually new BASIC. We'll know more after COMDEX.

Leonard Tramiel assured us that GEM tools for developers will be updated soon. The software will be thoroughly tested at Atari before shipping begins.

The Atari ST hard disk was demonstrated at both the SLCC and ABACUS booths. In pilot production now, it should go into mass production in May. The 20-megabyte hard drive will be less than $800.

James Capparell represented *ANTIC* magazine. From the reader feedback he's gotten recently, there's a great deal of concern for the 8-bit Ataris. *ANTIC* and **ANALOG Computing** are dedicated to 8-bit users and will continue to support them. Mr. Capparell also sees the Atari image improving daily—due, primarily, to the ST. There's no reason to discontinue production of game systems. Sam Tramiel said 2600s are "selling like hotcakes." And, as he had pointed out, he won't turn off a profitable business.

The 7800s should be out in April, with twelve new titles. This system, with its 100 player/missile or sprite capability, also runs older 2600 game cartridges. Atari plans to release a 68000-based game machine in 1987. My guess is that it will be an ST without a keyboard or drive. Developers could write software for it on the ST.

This might prove instrumental in the development of ROM cartridge technology for ST computers. OSS now has state-of-the-art bank-switching super cartridges for 8-bit machines. It would be a boon to productivity if the likes of VIP, Pascal, C, **1st Word** and 68000 assembler programs were put on cartridges.

Yours truly represented **ANALOG Computing** on the panel. I'm merely a regular contributor and couldn't expound on the magazine's perception of the Atari commu-

nity. I presented the end user's point of view, as president of ACE St. Louis.

It was I who brought up concerns about the Atari image and expressed a hope for the continuation of the 8-bit machines. I had taken my ST to work (McDonnell Douglas), for demonstrations on my lunch breaks. The two most common remarks I heard were that "it isn't IBM compatible" and "I could never get the name *Atari* on a purchase request; the boss would accuse me of buying a game machine."

Well, Atari has already addressed the first problem, as will be seen at COMDEX. The latter's an ongoing process. McDonnell engineers know what's "under the hood." We know how the 68000 microprocessor and a potential 4 megabytes of storage can make an IBM look like the second-rate technology it really is. (It's like an IZOD; people buy it for the logo.)

Atari's image can be changed with good advertising, as Sam Tramiel pointed out. In fact, Atari has just signed a contract with Toys 'R' Us to market the complete line. The 520STs will be unbundled, so you can buy a system a little at a time.

Sam indicated that Atari is backing a significant Toys 'R' Us ad campaign in the near future. With a name like Toys 'R' Us, their advertising isn't likely to dispel the game machine image, but they'll be marketing 8- and 16-bit software, too.

There was a question about getting more space in **VIP Professional** spreadsheets. With TOS ROMs in, you have about 200K more RAM. Unfortunately, that won't help much. **VIP Professional** locks up if you try to run it on a ROM system. TOS must be loaded from disk first, not unlike booting a Translator on the 8-bit machines.

This is ridiculous. Virtually all other software for STs runs with TOS in ROM or RAM. Apparently, VIP breaks some well documented rules of the OS. It's unfortunate; there's been a great deal of confusion about upgrades. If you haven't sent in your registration card, you're out of luck.

The ST's future was discussed at length. The 520s are supposed to be shipping with RF composite video capability now. From what I've read, 1040s were to be built that way from the start.

A friend of mine got a 1040ST in early April—without the RF connector, even though the documentation refers to it. I've heard that Atari decided, since this is to be their "serious machine," it doesn't need the connector.

The composite video output capability is important, however, to hook up monitors for demonstrations at user group meetings and in business. Apparently, only the newest 520STs are being produced with RF output at this time.

Atari is now shipping **1st Word** and a slick spiral-bound manual with STs. It's version 1.03, which has double-spacing capability, more printer drivers and additional features. It seems that **ST Writer** won't be pushed by Atari any longer.

Being a long-time **AtariWriter** user, I've been content with **ST Writer**. But, after generating well over 100K of text in the last few days on **1st Word** 1.03, I'm hooked. It's an excellent, easy-to-use word processor. And it utilizes GEM's window interface more elegantly than any other software product I've seen on the ST yet.

There are no control keys to memorize, and you can edit up to four files at the same time, cutting and pasting between them. If you haven't tried your **1st Word**, you don't know what you're missing. Get-

ting a printer driver working is a pain, but, after that, the rest is just plain fun!

During the panel discussion, the Tramiels dropped hints about future products and enhancements we may see for the ST line. Future STs may have a 68020, a full 32-bit machine and a 68881—a floating point math co-processor. These chips will add so much computing power to the ST it'll make the IBM PC AT look like a Tinker toy!

The "blitter" chip for the 1040ST was discussed, as well. This chip will be responsible for moving large chunks of memory and performing simple logic operations, primarily for graphics processing.

Once the chip is complete, the bitblt (*blt* stands for "bit block transfer") routines of the GEM OS will be rewritten to use this hardware. The speed of all software using the current GEM OS bitblt routines will dramatically increase. Software which bypasses the GEM OS, using its own faster bitblt routines, won't show any speed increase with the blitter chip.

If developers wisely follow the GEM OS calling guidelines, their code should run without a hitch on blitter-equipped STs. It was suggested that the blitter be used for future products, with high-speed transfers of huge amounts of data between the ST and an external box (a 32-bit engine).

We were informed that Knowledge Set (formerly Activenture) and Library Corp. are coming out with CD ROM laser disks for the ST. Sam Tramiel indicated that Atari hopes to have their CD version out in the third or fourth quarter of this year, with audio capability.

Since you can't daisy chain DMA (direct memory access) hardware on the ST, you'll need an interface box to allow more than one DMA device on the ST (e.g., a hard drive and a CD ROM). Up to eight devices may be addressed by the ST, thus the "Octobussy" (as Sam Tramiel affectionately calls it) will be coming out.

It's simply a bus splitter, break-out box with eight connectors and "some latches." With it, you'll be able to plug in the hard drive, CD ROM, IBM expansion box and other upcoming products—all at once.

CP/M for the 68000 is selling for the ST in Europe and will be available in the U.S. soon. (A nongraphics OS on a graphics machine of the ST's power doesn't make much sense to me, however.)

Beckemeyer Development Tools was demonstrating ST multitasking, with the **Micro RTX**. Sig Hartmann said that multitasking OS9 is on the ST now, too.

Meanwhile, Leonard Tramiel said Atari won't support any multitasking OS till a better memory management scheme can be developed. In recent months, though, rumor had it that Atari was considering the **RTX** for their Developer's Kit. With the current state of memory management units, a system cannot have hardware-protected memory—a must in multitasking systems. Atari wants a "very robust, crash-free system. . .unlike some other computers."

Speaking of operating systems, we asked if Atari planned to emulate any other systems, such as that of the Apple II. No comment was made; however, Atari did consider emulating an XE on the ST. This is "virtually impossible," though, and the 65XE (which sells for about $79) is a very good "emulator," according to David Small.

True, but many people can't afford the two machines (assuming they can *justify* owning two systems in the first place). I heard a Commodore 64 was emulating an Apple II at the Faire, and that a version for the XE was coming soon. If this happens, a whole new world of educational software will open up for the Atari 8-bits.

According to Sam, the AMY sound chip is "almost alive and well" and will (when it finally works properly) function on many different computers. It will provide awesome speech synthesis and sound effects capabilities.

Atari plans, eventually, to market an affordable laser printer for the ST. The company claims 1 meg is the 10's maximum RAM; future versions may have more.

New titles coming from Atari include **Star Raiders II** (a resurrected, revamped version of **Last Starfighter**) and **Planetarium** (once referred to as the **Home Astronomer**) for the 8-bits.

The almost final version of the ST's **Star Raiders** was demonstrated. Jerry Pournelle, who writes *Byte*'s "Chaos Manor," stopped to play it. "This is great," was all he said—over and over. He came back later on and played for 45 minutes.

I was told that there are a lot of "closet Atarians" at *Byte*. Thanks to universal acceptance of the ST, they're coming out of the closet to give the ST equal coverage.

The ST version of **Planetarium** was at the Faire, too. Bill Zinn, president of ABACUS, commented during demos of new Atari software: "It's good that Atari has their eyes on the stars, but, fortunately, still has one hand on the joystick."

The final version of ST **Joust** was demonstrated at the San Leandro Computer Club booth. This one has better graphics than its coin-op arcade version! All these products should be out within the next month or two.

New for 8-bit machines.

Although few booths at the Faire showed 8-bit products exclusively, it's reassuring to see new 8-bit products coming from Atari. Sam Tramiel revealed that Atari's coming out with a new 3½-inch, 327K drive for the 8-bit computers late this year, with OSS developing a DOS for it.

I understand there'll be utilities to convert from 5¼-inch DOS to the new format, but not the reverse. This is unfortunate: many 3½-inch buyers will already have 5¼-inch drives. The latter is more universal, and everyone exchanges programs.

The 3½-inch drive won't be fully utilized without the capability to port in both directions. I'm sure some programmer will take care of the problem, though.

We need a smart DOS to handle all drives, formats and densities. **Sparta DOS** already does it all for 5¼-inch and 8-inch equipment, both single and double sided—in single, enhanced and double densities. . .even hard disks! I'm sure 3½-inch support will be trivial for them.

A new 80-column card for 8-bit Ataris made its appearance at the Hanover fair. Sam Tramiel said the card's almost complete. It was enhanced recently with more memory, to provide even more flexibility. We'll see it again at the April COMDEX. It's expected to go for $79 in July, although no details on software compatibility have yet been revealed.

The XM301 modem is now supposed to be shipping in quantity. It took longer to get out than Atari expected. Atari is *not* considering making an XM1201 (1200-baud version) any time soon.

Future versions of XE may have more RAM. I understand the next one might double—to a 260XE. Several quarter-megabyte RAM expansion kits are already floating around for the 800XL, gaining in popularity. There's a do-it-yourself modification for the 130XE: a 256K add-on. Add that to the original 128K and you have over ⅓ meg.

There's even a 576XE kludge making the rounds! If Atari would just increase the XE to ½ megabyte, rather than enhancing the new machines' RAM a little every six months, software developers would begin to support it, helping keep the 8-bit machines vital.

New ST products.

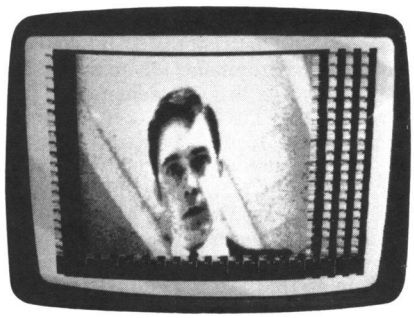
The much talked about interactive graphics adventure **Pawn** was selling very well at the Faire. There were also demonstrations of a new program called the **PrintMaster**, from Unison World Inc. Much more than a **Print Shop** clone with new features, it can mix fonts on one page, supports upper- and lowercase, gives a graphic preview of design layouts, and lets you create monthly, weekly or daily calendars.

All **PrintMaster**'s graphics allow two different icons on a page, and all designs may be saved to and restored from disk. Unfortunately, it's not in **DEGAS** format. **PrintMaster** is running on IBM, Apple II, Commodore 64/128, CP/M and Atari ST computers, so you're not likely to see specific applications supported. You *can* expect to see many utilities for it.

My preliminary tests show it's very familiar (I've used **Print Shop** a lot) and uses the mouse interface completely. While not as powerful as XLent's **Typesetter ST**, it's infinitely easier to use.

We saw **HippoSound** and **HippoVision** at the SLCC booth. The **HippoVision** shown was a black-and-white video digitizer, graphics processor. The software wasn't yet completely debugged; there were some glitches in the graphics displays, and the grey scales could use some work.

I saw a breathtaking color video digitizer running on the Amiga. If **HippoVision** can match it, they'll have a fantastic product. As it is, **HippoVision** improves on the 8-bit **Computer Eyes** features, but falls short of the ST's graphics capabilities. We'll see.



HippoVision.

The **HippoSound** voice digitizer got rave reviews from the SLCC booth. It will digitize any sound and turn your keyboard into a complete synthesizer. The user interface of the software handled the mouse and GEM quite well, I'm told.

A prototype of the Shanner SD2000 dual double-sided 3½-inch ST floppy was demonstrated at the SLCC booth and performed flawlessly at the show. The pair of drives fit in a package of the same size as a single Atari drive. I expect these to sell well to those buying the 520ST on the mass market—without peripherals.

Bob Barton pointed out one minor bug with the drives: they don't know—or tell the ST—when you remove a disk. Using Atari drives, you can remove a disk, put in a new one and press ESCAPE to get a new directory in the window. With SD-2000 drives, you must close the window and double click on the drive icon again. Dave Duberman of Shanner assured me the problem will be worked out before the drives are released.

ABACUS demonstrated **Music Studio**, equipped with the Casio CZ101 and Yamaha percussion machine. The demonstrations of these products were fantastic. **N-Vision** (**MacPaint** in color) was also shown, with its "substantial text capabilities."

Bob Barton informed me that the Holmes and Duckworth **H&D Database** has been revamped. It's been enhanced and debugged, and is "finally developing nicely." I understand DBASE II programmers will be right at home with this program.

Paul Heckel, author of **Zoomracks**, was demonstrating his personal database program extensively. Using the card rack or Rolodex® file concept, you create cards of information. Many of the racks may be open to view at once. It's easy to zoom in to a specific card, or out to view the entire rack (or multiple racks).

The software strips vowels from text when zooming out, to maintain readability while displaying lots of data. Reactions to **Zoomracks** have been that its user interface is unfamiliar; while using the mouse extensively, it doesn't take advantage of GEM's windows. Still, once you learn the commands, it's powerful, fast and relatively easy-to-use.

MichTron (pronounced "mish-tron") was selling and demonstrating software for the ST system. Their newest products include **Cards** and **Personal Money Manager**.

In **Cards**, up to four can play Blackjack against the house dealer. You can play Cribbage against the computer, and Klondike, Solitaire and Poker Squares are available within the program. Any of these may be selected from a pull-down menu. The games are colorful and well constructed. All use the mouse and GEM quite well.

A new desk accessory called **ALT** is coming from MichTron, to let you define up to sixty keystrokes for any ALT keypress, A to Z and 0 to 9.

The **ALT** editor is available almost anywhere you find the desktop. **ALT** templates can be saved to and recalled from disk, while the processor will hook into almost any program. It can be used as a sophisticated cut and paste editor, or as a buffer with your word processing or database programs. You can even create complicated command sequences for your adventure games, as you memorize them.

Cornerman is also coming soon from MichTron. It's a work-alike of Sidekick, a personal productivity tool for the IBM PC. Actually a huge desktop accessory (about 100K), it adds many features to your ST—with only one entry to your desktop accessory window, like ten accessories in one.

Cornerman's includes a 16-digit calculator with decimal, hex, binary and octal capabilities (a must for programmers). It performs logic functions and has hard copy capability. An ASCII chart is also accessible along with an autodialer (using your AT command modem), personal note pad, sophisticated phone book, and other "mini database" capabilities.

Abacus Software showed **PC Board Designer** at the Faire. It's much closer to being translated to English. It has two-sided PC board design capability and three sets of component definitions, plus a user-expandable library of sockets and types.

The program can handle a design of forty to fifty components, I'm told. Apparently, it has yet to be pushed to its limits. Its release is expected by the time of the April COMDEX.

Abacus has several new books coming for the ST line, including *Tricks and Tips*, *Graphics and Sound*, *Logo*, *BASIC Training Guide* and *3-D Graphics*.

ANTIC demonstrated new wares at the ABACUS club meeting. Included were: **Calc Magic**, a spreadsheet for 8-bit Ataris; **Rhythm Composer**, a programmable 8-bit drum machine; and **CAD-3D**.

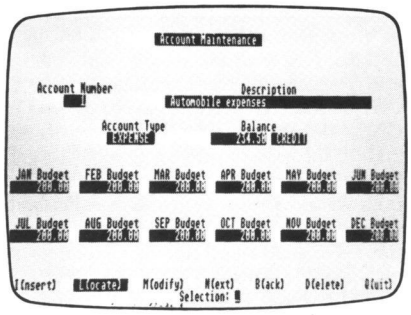
The latter's a three-dimensional solid modeling system that uses the GEM interface to perfection. View an object with up to three light sources, plus ambient light. You can join multiple shapes, add, subtract and perform logical operations on them.

A 1-meg ST with TOS in ROM lets **CAD-3D** give you over 10,000 points and 20,000 faces to define an object. To view from any direction, just adjust slide bars on a window. The mouse controls almost everything. Objects can be seen as wire frames or solids, and finished products can be saved in **DEGAS**, **COLOR Editor**, or **NEO-Chrome** format.

CAD-3D runs on color or monochrome systems (monochrome's recommended. It's simple to draw a cut-away glass and "spin" it around an axis, for a complete 3-D object. From there, all the program's features

are quickly demonstrated. Up to four views may be displayed and updated at once.

With "animation" on, you can record rotations, for playback with a **DEGAS** or **NEO-Chrome** slideshow player. The object can be resized for a zoom effect, and playing an animation from RAMdisk will be spectacular. **CAD-3D** is a visualization tool as powerful as EASY-3D for the Mac—for half the price.



Personal Money Manager.

Unfortunately, the program won't allow you to dimension the object or automatically generate engineering drawings with hidden lines. A future version incorporating these features would help establish STs in the engineering marketplace, where IBMs currently rule.

Another interesting product was the **Avatex 1200 Modem**. It's Hayes AT command compatible, but not compatible enough to run Hayes SCOM software. The best feature about this 300/1200 baud modem was that it was selling for only $99, with an unconditional one-year warranty!

Wrapping up.

The Faire seemed a great success, much due to ST-generated interest. Bob Barton said Atari got great coverage because of SLCC and ABACUS, which they backed.

The **MacCartridge** was certainly the hit of the Faire. Apple's alarm there dissolved into technical curiosity, when they found no grounds for a lawsuit.

Eight-bit Ataris are alive and well, with the promise of new hardware and software products from Atari Corp. Only popular backing will force third-party software vendors to supply products in the 3½-inch format. (I hope the OSS developers are reading this. . .Remember DOS 3.0!)

When the Atari product line hits the shelves at Toys 'R' Us, we'll see a whole new 8-bit resurgence, with new software and hardware readily available.

Expect great things for the 8-bit product line from ICD. Their **P:R: Connection**, an 850 interface replacement, is finally shipping. This tiny box (about one-third the size of the 850) gives you a parallel printer interface and two RS232 interfaces—one for your modem, the other to talk to your ST—for less than $80.

New software for the STs is coming out faster than editors can keep up with reviews. The new CAD (Computer Aided Design) software, like **CAD-3D** and **PC Board Designer**, will help get the ST into the engineering environment, where the power of the 68000 is in great demand.

When full VT100 and VT240 (graphics terminal) emulation software arrives for the ST, the computer will be established in the business world. New, powerful ST design and business software is helping Atari overcome its "game" image. Soon, very soon, you'll hear people saying, "Sure, it runs on an IBM PC, but is it ST compatible?" Everyone agrees: the ST delivers "Power without the Price!"

BASIC Editor II

An updated version

by Clayton Walnum

BASIC Editor II is a utility to help you enter BASIC program listings published in **ANALOG Computing**. To simplify the identification of errors, each program line is evaluated immediately after it's typed, eliminating the need for cumbersome checksum listings. When you've finished entering a program using **BASIC Editor II**, you can be certain it contains no typos.

An option is provided for those who wish to use standard BASIC abbreviations. Also, the program retains all Atari editing features. Finally, for those who prefer to type programs the conventional way, using the built-in editor, a post-processing mode is available. It allows you to check typing after the entire listing has been entered.

Typing in the Editor.

To create your copy of **BASIC Editor II**, follow the instructions below—exactly.

Disk version.

(1) Type in Listing 1, using the old **BASIC Editor**(issues 43, 44 and 45).

(2) Save the program to disk with the command *SAVE "D:EDITORL1.BAS"*.

(3) Clear the computer's memory with the command *NEW*.

(4) Type in Listing 2, using the old **BASIC Editor**.

(5) Run the program and follow the on-screen prompts. A data file will be written to your disk.

(6) Load Listing 1 with the command *LOAD "D:EDITORL1.BAS"*.

(7) Merge the file created by Listing 2 with the command *ENTER "D:ML.DAT"*.

(8) Save the resultant program with the command LIST "D:EDITORII.LST".

Cassette version.

(1) Type in Listing 1, using the old **BASIC Editor**.

(2) Save the program to cassette with the command *CSAVE*. (Do *not* rewind the cassette.)

(3) Clear the computer's memory with the command *NEW*.

(4) Type in Listing 2, using the old **BASIC Editor**.

(5) Run the program and follow the on-screen prompts. A data file will be written to your cassette.

(6) Rewind the cassette.

(7) Load Listing 1 with the command *CLOAD*.

(8) Merge the file created by Listing 2 with the command *ENTER "C:"*.

(9) On a new cassette, save the resultant program with the command *LIST "C:"*.

Using the Editor.

Take a look at one of the BASIC program listings in this issue. Notice that each program line is preceded by a two-letter code. This code is the checksum for that line; it's not a part of the program.

To enter a program listing from the magazine, load **BASIC Editor II** with the *ENTER* command, and run it. You'll be asked if you wish to allow abbreviations (see your BASIC manual). If you do, type *Y* and press RETURN. Otherwise, type *N*.

Note: if you set **BASIC Editor II** to allow abbreviations, the program will run slightly slower.

Your screen will now be divided into two "windows." The upper window will display each line after it's processed, as well as the checksum generated for that line. The lower window is where program lines are typed and edited.

When the program's waiting for input, the cursor will appear at the left margin of the typing window. Type a program line and press RETURN. The line will be evalu-

ated and reprinted in the message window, along with the checksum generated.

If the checksum matches the one in the magazine, then go on to the next program line. Otherwise, enter the command *E* (edit) and press RETURN. The line you just typed will appear in the typing window, where you may edit it. When you think the line has been corrected, press RETURN, and it'll be re-evaluated.

Note: you may call up any line previously typed, with the command *E* followed by the number of the line you wish to edit. For example, *E230* will print Line 230 in the typing window. *Do not attempt to edit any program lines numbered 32600 and higher. These lines fall within the* ***BASIC Editor II*** *program.*

If you're using BASIC abbreviations, the two versions of the command E work slightly differently. The command *E*, without a line number, will call up the line exactly as you typed it. When you append the line number, the line will be printed in its expanded (unabbreviated) form.

Leaving the Editor.

You may leave **BASIC Editor II** at any time, by entering either *B* (BASIC) or *Q* (quit). If you type *B*, the **Editor** will return you to BASIC. Enter *LIST* to review your work, if you wish. Note that Lines 32600 and above are the **Editor** program. Your work will appear before these lines. To return to the **Editor**, type *GOTO 32600.*

Type *Q*, and you'll be asked if you really want to quit. If you type *Y*, the **Editor** program will be erased from memory, and you may then save your work in any manner you like. If you type *N*, the *Q* command will be aborted.

Large listings.

If the program you're entering is particularly long, you may need to take a break. When you want to stop, type *Q* and press RETURN, then save your work to disk or cassette. When you're ready to start again, load the program you were working on, then load **BASIC Editor II** with the *ENTER* command. Type *GOTO 32600*, and you're back in business.

The post-processor.

Many people may not want to use **BASIC Editor II** when entering a program listing, preferring, instead, the Atari's built-in editor. For that reason, **BASIC Editor II** will allow you to check and edit your programs after they've been typed.

To take advantage of this option, type any magazine program in the conventional manner, then save a copy to disk or cassette (just in case). With your typed-in program still in memory, load **BASIC Editor II** with the *ENTER* command, then type *GOTO 32600.*

Respond with *N* to the "abbreviations" prompt. When the **Editor** appears on your screen, enter the command *P* (post-process), and the first program line will appear in the typing window. Press RETURN to enter it into the **Editor**.

The line will be processed, and the checksum, along with the program line, will be printed in the upper window. If the checksum matches the one in the magazine, press RETURN twice, and the next line will be processed.

If you find you must edit a line, enter the command *E*, and the line will be moved back to the typing window for editing.

When the entire listing has been checked, you'll be asked if you wish to quit. Type *Y* and press RETURN. The **Editor** program will be removed from memory, and you may then save the edited program in any manner you wish.

Murphy's Law.

Anyone who's been associated with computing knows this is the industry Murphy had in mind. You may find that, after typing a program with **BASIC Editor II**, it still won't run properly. There are two likely causes for this.

First, it may be that you're not following the program's instructions properly. Always read the article accompanying a program *before* attempting to run it. Failure to do so may present you with upsetting results.

Finally, though you can trust **BASIC Editor II** to catch your typos, it can't tell you if you've skipped some lines entirely. If your program won't run, make sure you've typed all of it. Missing program lines are guaranteed trouble.

One last word. Some people find it an unnecessary and nasty chore to type REM lines. I don't condone the omission of these lines, since they may be referenced within the program (a bad practice, but not unheard of). If you want to take chances, **BASIC Editor II** is willing to comply.

Listing 1.
BASIC listing.

```
EI 32600 IF FL THEN 32616
UK 32602 DIM L$(115),SV$(115),C2$(2),B$(1
   15),M$(119),S$(98),E$(69),A$(1):FL=1:S
   TMTAB=PEEK(136)+PEEK(137)*256
LV 32604 GRAPHICS 0:POKE 710,0:P=0:ABR=0:
   ? "ALLOW ABBREVIATIONS";:INPUT A$:IF A
   $="Y" OR A$="y" THEN ABR=1
HD 32606 B$(1)=" ":B$(115)=" ":B$(2)=B$
HP 32616 OPEN #17,4,0,"E:":L$=" ":GOSUB 3
   2662:START=0
UB 32618 POKE 766,1:POKE 83,39:POSITION 1
   ,3:IF LEN(L$)<39 THEN ? L$:GOTO 32624
JU 32620 IF LEN(L$)<77 THEN ? L$(1,38):?
   L$(39,LEN(L$)):GOTO 32624
SA 32622 ? L$(1,38):? L$(39,76):? L$(77,L
   EN(L$))
QZ 32624 POKE 752,0:POKE 766,0:POKE 559,3
   4:POKE 82,1:POKE 83,38:POSITION 0,10:?
    " ";:INPUT #17;L$:POKE 766,1
HO 32626 IF (L$="P" OR L$="p") AND START=
   0 THEN P=1:L$=""
TZ 32628 IF L$="E" OR L$="e" THEN E=1:POS
   ITION 1,10:? SV$:GOTO 32624
LH 32630 IF L$="Q" OR L$="q" THEN 32690
JG 32632 IF L$="" AND P=1 THEN 32686
VN 32634 IF L$="" THEN 32624
ZY 32636 IF L$="B" OR L$="b" THEN GRAPHIC
   S 0:? "TYPE 'GOTO 32600' TO CONTINUE":
   END
PL 32638 IF L$(1,1)="E" OR L$(1,1)="e" TH
   EN E=1:TRAP 32624:EL=VAL(L$(2)):POSITI
   ON 1,9:LIST EL:GOTO 32624
QE 32640 SV$=L$:TRAP 32624:X=VAL(L$)
OC 32642 START=1:IF P AND  NOT E THEN 326
   52
```

```
OI 32644 GOSUB 32674:IF  NOT ABR OR P THE
   N 32652
RD 32646 POKE 766,0:? CHR$(125):POSITION
   0,3:L=VAL(L$):LIST L:? :? :? "CONT":L$
   =B$
WY 32648 POSITION 0,0:POKE 842,13:STOP
WA 32650 POKE 842,12:A=USR(ADR(S$),ADR(L$
   ),4):L$=L$(1,A)
GC 32652 CHKSUM=USR(ADR(M$),ADR(L$),LEN(L
   $)):CHKSUM=CHKSUM+PEEK(1542)*65536
VZ 32654 CHK=CHKSUM-(INT(CHKSUM/676)*676)
   :HI=INT(CHK/26):LO=CHK-(HI*26):C2$(1)=
   CHR$(HI+65):C2$(2)=CHR$(LO+65)
PP 32656 IF  NOT P OR E THEN E=0:GOSUB 32
   662:IF  NOT P THEN 32660
AU 32658 POKE 83,39:POKE 752,1:FOR X=3 TO
    5:POSITION 1,X:? B$(1,38):POSITION 1,
   X+7:? B$(1,38):NEXT X:POKE 83,38
XN 32660 POKE 766,1:POKE 83,38:POSITION 6
   ,7:? C2$:POKE 752,0:GOTO 32618
UQ 32662 GOSUB 32702:POKE 766,0:POKE 752,
   1:? "R":POKE 82,1:DL=PEEK(560)+256*PEE
   K(561)+4
LX 32664 POKE DL-1,70:POKE DL+2,6:POKE DL
   +3,112:POKE DL+4,112:POKE DL+5,112:POK
   E DL+13,112:POKE DL+14,112
EM 32666 POKE DL+22,112:POKE DL+23,112:PO
   KE DL+24,65:POKE DL+25,PEEK(560):POKE
   DL+26,PEEK(561):POKE 83,39
AG 32668 POSITION 20,0:? "  basic editor
   ii  ":POSITION 0,7:? "                TYP
   ING WINDOW                "
UL 32670 POSITION 0,1:? "                MESS
   AGE WINDOW                ":POSITION 1,7
   :? "CODE:";
FH 32672 POKE 559,34:RETURN
ET 32674 GRAPHICS 0:POKE 559,0:POKE 766,1
   :POKE 82,0:POKE 83,39:POSITION 0,3:? L
   $:? :? :? :? "CONT":POSITION 0,0
QT 32676 POKE 842,13:STOP
BE 32678 POKE 842,12:TRAP 32682:A=USR(ADR
   (E$),VAL(L$)):IF A=4 THEN POP :GOTO 32
   682
FB 32680 RETURN
GY 32682 GOSUB 32662:SOUND 0,75,10,8:FOR
   X=1 TO 20:NEXT X:SOUND 0,0,0,0:POSITIO
   N 1,3:? "SYNTAX ERROR!":POKE 766,1
DG 32684 POKE 83,38:POSITION 1,10:? SV$:G
   OTO 32624
IJ 32686 LINE=PEEK(STMTAB)+PEEK(STMTAB+1)
   *256:IF LINE>32599 THEN 32690
JV 32688 OFS=PEEK(STMTAB+2):STMTAB=STMTAB
   +OFS:POSITION 1,9:LIST LINE:GOTO 32624
GM 32690 POKE 766,0:POSITION 1,10:? "READ
   Y TO QUIT";:INPUT A$:IF A$<>"Y" THEN P
   OSITION 1,10:? B$(1,38):GOTO 32624
LY 32692 GRAPHICS 0:? :? :? :FOR X=32600
   TO 32636 STEP 2:? X:NEXT X:? "CONT":PO
   SITION 0,0:POKE 842,13:STOP
KU 32694 POKE 842,12:GRAPHICS 0:? :? :? :
   FOR X=32638 TO 32674 STEP 2:? X:NEXT X
   :? :? "CONT":POSITION 0,0
RB 32696 POKE 842,13:STOP
IO 32698 POKE 842,12:GRAPHICS 0:? :? :? :
   FOR X=32676 TO 32702 STEP 2:? X:NEXT X
   :? :? "POKE 842,12":POSITION 0,0
OQ 32700 POKE 842,13:STOP
NA 32702 POKE 16,112:POKE 53774,112:RETUR
   N
```

Listing 2.
BASIC listing.

```
MV 10 DIM L$(120),ML$(119),A$(1)
XF 20 GRAPHICS 0:POKE 710,0:? "DISK OR CA
   SSETTE";:INPUT A$:IF A$<>"C" AND A$<>"
   D" THEN 20
AH 30 IF A$="C" THEN 50
NY 40 ? "PLACE FORMATTED DISK IN DRIVE":?
    "THEN PRESS RETURN":INPUT L$:OPEN #1,
   8,0,"D:ML.DAT"
YB 50 ? :? "READY CASSETTE, PRESS RETURN"
   ;:INPUT L$:OPEN #1,8,0,"C:"
PR 60 L$="32608 M$(1)=":L$(13)=CHR$(34)
SX 70 N=119:GOSUB 130:L$(14)=ML$(1,58):L$
   (LEN(L$)+1)=CHR$(34):? #1;L$
NZ 80 L$(1)="32610 M$(59)=":L$(14)=CHR$(3
   4):L$(15)=ML$(59):L$(LEN(L$)+1)=CHR$(3
   4):? #1;L$
VJ 90 L$(1)="32612 S$=":L$(10)=CHR$(34)
BC 100 ML$="":N=98:GOSUB 130:L$(11)=ML$:L
   $(LEN(L$)+1)=CHR$(34):? #1;L$
GI 110 L$(1)="32614 E$=":L$(10)=CHR$(34)
C5 120 ML$="":N=69:GOSUB 130:L$(11)=ML$:L
   $(LEN(L$)+1)=CHR$(34):? #1;L$:END
ES 130 FOR X=1 TO N:READ A:ML$(X)=CHR$(A)
   :NEXT X:RETURN
XU 140 DATA 104,104,133,204,104,133,203,1
   04,104,133,205,169,0,141,3,6,141,2,6,1
   41,4,6,141,5,6
TV 150 DATA 141,6,6,238,3,6,32,68,218,172
   ,2,6,177,203,133,212,32,170,217,32,182
   ,221,32,68,218
IA 160 DATA 173,3,6,133,212,32,170,217,32
   ,219,218,32,210,217,165,212,141,0,6,16
   5,213,141,1,6,24
VF 170 DATA 173,0,6,109,4,6,141,4,6,173,1
   ,6,109,5,6,141,5,6,144,3,238,6,6,238,2
XA 180 DATA 6,172,2,6,196,205,208,176,173
   ,4,6,133,212,173,5,6,133,213,96
AT 190 DATA 104,104,133,204,104,133,203,1
   04,104,141,255,6,169,0,133,213,216,165
   ,88,133,205,165,89,133,206
XS 200 DATA 174,255,6,24,165,205,105,40,1
   33,205,144,2,230,206,202,208,242,160,0
   ,177,205,201,64,144,18
GD 210 DATA 201,96,144,19,201,128,144,18,
   201,192,144,6,201,224,144,7,176,8,24,1
   05,32,144,3,56,233
TI 220 DATA 64,145,203,200,192,114,240,2,
   208,215,177,203,201,32,208,3,136,208,2
   47,200,132,212,96
XI 230 DATA 104,104,141,254,6,104,141,253
   ,6,169,0,133,213,216,165,136,133,205,1
   65,137,133,206,160,0,177
JZ 240 DATA 205,205,253,6,208,8,200,177,2
   05,205,254,6,240,15,160,2,177,205,24,1
   01,205,133,205,144,228
XR 250 DATA 230,206,176,224,160,4,177,205
   ,201,55,240,4,160,0,240,0,132,212,96
```

Listing 3.
Assembly listings.

```
;CHECKSUM.M65
;**********************************
;*      CHECKSUM CALCULATOR       *
;*                                *
;*           SYNTAX               *
;*   X=USR(A,ADR(L$),LEN(L$))     *
;*                                *
;*       A=ADR OF ROUTINE         *
;*       L$=BASIC LINE            *
;**********************************
          .OPT OBJ
          *=  $5000
;
; EQUATES
; -------
;
BRET      =   $D4      ;BASIC return
FR0       =   $D4      ;flting pnt reg0
FR1       =   $E0      ;flting pnt reg1
IFP       =   $D9AA    ;int to FP
FPI       =   $D9D2    ;FP to int
FMUL      =   $DADB    ;FP multiply
FMOVE     =   $DDB6    ;FP move
ZFR0      =   $DA44    ;zero FR0
SADR      =   $CB      ;string adress
SLEN      =   $CD      ;string length
PROD      =   $0600    ;product
INDEX     =   $0602    ;string index
```

BASIC Editor II *continued*

```
FACTOR  =   $0603   ;factor for mult
SUM     =   $0604   ;checksum
;
; INITIALIZE
; ----------
;
        PLA         ;# of bytes
        PLA         ;string adr hi
        STA SADR+1
        PLA         ;string adr lo
        STA SADR
        PLA         ;ignore hi byte
        PLA         ;string length
        STA SLEN
        LDA #0      ;init str pnter
        STA FACTOR  ;init factor
        STA INDEX   ;init index
        STA SUM     ;init storage
        STA SUM+1   ;for 3-byte
        STA SUM+2   ;checksum
;
; MAIN PROGRAM
; ------------
;
M1
        INC FACTOR
        JSR ZFR0    ;zero FR0
        LDY INDEX   ;get str index
        LDA (SADR),Y ;get character
        STA FR0     ;store int
        JSR IFP     ;convert to FP
        JSR FMOVE   ;move # to FR1
        JSR ZFR0    ;zero FR0
        LDA FACTOR  ;get factor
        STA FR0
        JSR IFP     ;convert to FP
        JSR FMUL    ;do mult
        JSR FPI     ;FR0 to int
        LDA FR0     ;and store the
        STA PROD    ;result
        LDA FR0+1
        STA PROD+1

        CLC         ;prepare for add
        LDA PROD    ;get product
        ADC SUM     ;and add to
        STA SUM     ;checksum
        LDA PROD+1
        ADC SUM+1
        STA SUM+1
        BCC M2
        INC SUM+2
M2
        INC INDEX   ;pnt to next char
        LDY INDEX
        CPY SLEN    ;all done?
        BNE M1      ;nope
        LDA SUM     ;yes, so return
        STA BRET    ;checksum to
        LDA SUM+1   ;BASIC
        STA BRET+1
        RTS         ;Back to it!
```

●

```
;STRING.M65
;**********************************
;*  LOAD STRING FROM SCREEN MEM   *
;*                                *
;*           SYNTAX               *
;*      X=USR(A,ADR(L$),N)        *
;*                                *
;*    A=ADR OF ROUTINE            *
;*    L$=STRING TO BE LOADED      *
;*    N=STARTING SCREEN LINE      *
;**********************************
;
        *=  $5000
;
; EQUATES
; -------
;
SAVMSC  =   $58     ;screen mem pntr
SADR    =   $CB     ;string adr
TSCR    =   $CD     ;temp scr pntr
BRET    =   $D4     ;BASIC return
LINE    =   $06FF   ;screen line
;
; INITIALIZE
; ----------
;
        PLA         ;# of arguments
        PLA         ;string adr hi
        STA SADR+1
        PLA         ;string adr lo
        STA SADR
        PLA         ;ignore hi byte
        PLA         ;screen line
        STA LINE
        LDA #0      ;init hi byte
        STA BRET+1  ;of BASIC return.
        CLD         ;just in case
;
; MAIN PROGRAM
; ------------
;
; ADVANCE SCREEN POINTER
;
        LDA SAVMSC  ;get screen adr
        STA TSCR    ;and store it in
        LDA SAVMSC+1 ;temp work space
        STA TSCR+1
        LDX LINE    ;get line number
ADD
        CLC         ;prepare for add
        LDA TSCR    ;advance to next
        ADC #40     ;screen line by
        STA TSCR    ;adding 40 bytes
        BCC ADD1
        INC TSCR+1
ADD1
        DEX
        BNE ADD
;
; GET STRING FROM SCREEN
;
        LDY #0      ;y is index
GETSTR
        LDA (TSCR),Y ;get screen char
        CMP #64     ;less than 64?
        BCC CH632   ;yes
        CMP #96     ;less than 96?
        BCC CH664   ;yes
        CMP #128    ;less than 128?
        BCC INSTR   ;yes
        CMP #192    ;less than 192?
        BCC CH632   ;yes
        CMP #224    ;less than 224?
        BCC CH664   ;yes
        BCS INSTR
;
; CHANGE TO ATASCII
;
CH632
        CLC         ;add 32 to
        ADC #32     ;char value
        BCC INSTR
CH664
        SEC         ;subtract 64
        SBC #64     ;from char value
;
; ADD NEW CHAR TO STRING
;
INSTR
        STA (SADR),Y ;store char
        INY         ;inc index
        CPY #114    ;at end?
        BEQ BKSP    ;yes
        BNE GETSTR  ;get next char
;
; GET RID OF TRAILING SPACES
;
BKSP
        LDA (SADR),Y
        CMP #32     ;is it a space?
        BNE OUT     ;no, all done!
        DEY         ;-1 index
        BNE BKSP    ;go get next
OUT
        INY         ;adjust str len
        STY BRET    ;len to BASIC
        RTS
```

●

```
;C6000.M65
;**********************************
;*      CHECK BASIC SYNTAX        *
;*                                *
;*           SYNTAX               *
;*      X=USR(A,LN)               *
;*                                *
;*    A=ADR OF ROUTINE            *
;*    LN=BASIC LINE #             *
;**********************************
        .OPT OBJ
        *=  $5000
;
; EQUATES
; -------
;
PNTR    =   $CD     ;temp adr pntr
BRET    =   $D4     ;BASIC return
STMTAB  =   $88     ;statement table
LNUM    =   $06FD   ;line # storage
;
; INITIALIZE
; ----------
;
        PLA         ;# of arguments
        PLA         ;line # hi byte
        STA LNUM+1
        PLA         ;line # lo byte
        STA LNUM
        LDA #0      ;init hi byte
        STA BRET+1  ;of BASIC return.
        CLD         ;just in case
;
; MAIN PROGRAM
; ------------
;
        LDA STMTAB  ;get table adr
        STA PNTR    ;and put it
        LDA STMTAB+1 ;where we can
        STA PNTR+1  ;manipulate it.
LP
        LDY #0      ;Y is offset
        LDA (PNTR),Y ;get line # lo
        CMP LNUM
        BNE NXT     ;go inc pointer
        INY
        LDA (PNTR),Y ;get line # hi
        CMP LNUM+1
        BEQ GETTOK
NXT
        LDY #2      ;point to offset
        LDA (PNTR),Y ;get offset
        CLC         ;prepare to add
        ADC PNTR    ;advance pointer
        STA PNTR    ;to next line
        BCC LP
        INC PNTR+1
        BCS LP
GETTOK
        LDY #4      ;offset to token
        LDA (PNTR),Y ;get token
        CMP #$37    ;is it ERROR?
        BEQ OUT     ;yep!
        LDY #0      ;
        BEQ OUT
OUT
        STY BRET    ;len to BASIC
        RTS
```

●

AtariWriter Plus

ATARI CORPORATION
Sunnyvale, CA 94086
48K Disk $39.95

by Clayton Walnum

It's been several years since Atari released the original **AtariWriter**. After all that time, it still stands as one of the best word processors for Atari machines. Now the folks in Sunnyvale have released **AtariWriter Plus** (**AWP**) and they've truly outdone themselves.

AWP comes on two disks. The first contains two versions of the main program—one for the older computers, and the second for XE machines. That's right! If you're the proud owner of a 130XE, **AWP** will let you take advantage of that extra memory. Imagine: 47,000 bytes for your document. That's thirty double-spaced pages!

When using the 130XE version, memory is divided into three banks of 15,872 bytes each. A single keystroke moves you from one bank to the next.

All the block functions, such as *copy* and *move*, work fine from one bank to another (though you can't define a block across a bank boundary). Except for the switch, it's almost like having the memory in one contiguous chunk.

Those familiar with the older **AtariWriter** will find **AWP** a snap to use. The keystrokes necessary to access the various functions have remained virtually unchanged.

One exception is in the text block commands. You no longer delineate blocks by CONTROL-X. With **AWP**, OPTION-B starts a block. Moving the cursor then selects the text you wish included, highlighting each line passed over.

All the block functions one has a right to expect from a quality word processor—*delete, move, duplicate*—are included, plus a couple of goodies not available in the original.

One of these, *alphabetization*, is especially useful. Any list (as long as it doesn't cross a memory bank boundary) can be sorted in ascending order, by marking it as a block and pressing OPTION-A. Very nice.

Also added is the ability to count the number of words within a text block.

One of the greatest complaints people have about word processing on an Atari (unless you happen to own an ST) is the lack of 80 columns. **AWP**, though it doesn't support 80 columns directly, has come up with a fair compromise.

You can set your screen to any number of columns, from 5 to 249. If you set it to over 40, the display becomes a "window" on the page. As you type off the right side, the display moves along with you.

Probably one of the most important features of **AWP**, is the inclusion of a printer driver "construction set." Now you can use special printer functions, like underlining and expanded text, with any printer you happen to own. You can even access up to nine character fonts with little fuss.

All text formatting controls are accessed from a "Global Format" menu, a definite improvement over the old **AtariWriter**. A couple keystrokes is all it takes to set your margins, spacing, indentation and other controls. No need to remember which control character does what. You can, of course, change any format within a document by embedding the control codes in your text.

For those of us who find spelling correctly an impossible chore, Atari has graciously included a program called *Proofreader*.

This is essentially a revision of the old **Atspeller**, marketed by the now-defunct APX. *Proofreader* provides you with all the conveniences of a spelling checker, including the ability to search, or to add words to the dictionary. *Proofreader* is loaded from the main menu; no need to reboot.

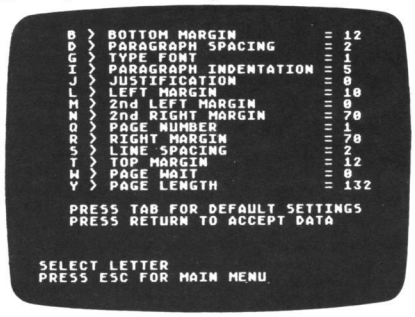
As if all the above wasn't enough, Atari added yet one more bonus to the package: a mail merge system. This is much like a small database, without all the special features, such as sorts and totalling.

You can create your own record formats of up to fifteen fields (or use the default format, a handy address book). You're allowed up to 255 records, which is enough for private use, but businesses may find this restricting.

Creating form letters is painfully simple. Wherever you want one of the mail merge fields to appear in your document, press OPTION-M, followed by the field number. When you print the document, **AWP** will ask for the mail merge filename, then print out a copy of the letter for each record in the file, placing the relevant information for each record in the locations you specified. It's a bit slow, but it sure beats doing the task by hand.

AWP isn't perfect (*what?*), I'm afraid.

When you select "Verify Spelling" from the main menu, you're prompted to reinsert the program disk. That's all fine and dandy, except—since the main program has two versions, one on each side of a double-sided disk—it's easy to insert the wrong side. If you should, you can kiss your text goodbye. No warnings.



AtariWriter Plus.

Also, *Proofreader* seems to crash once in a while, for no apparent reason. You'd be wise to save your document before checking your spelling.

One other anomaly that crops up is that, sometimes, when **AWP** tries to reorganize memory between the three blocks on an XE computer, it gets a little mixed up. You may find the first line in the second and third blocks a little scrambled. This doesn't happen often, but can be annoying when it does.

All things considered, **Atari Writer Plus** is just about everything you could want in a word processor. It's a shame that a couple of bugs had to creep in and muddy things up, but the problems are easy to live with, considering how powerful the program is. A good addition to your applications library.

ST-LOG

THE ATARI ST OPERATOR'S MAGAZINE

AUGUST 1986 ISSUE 5

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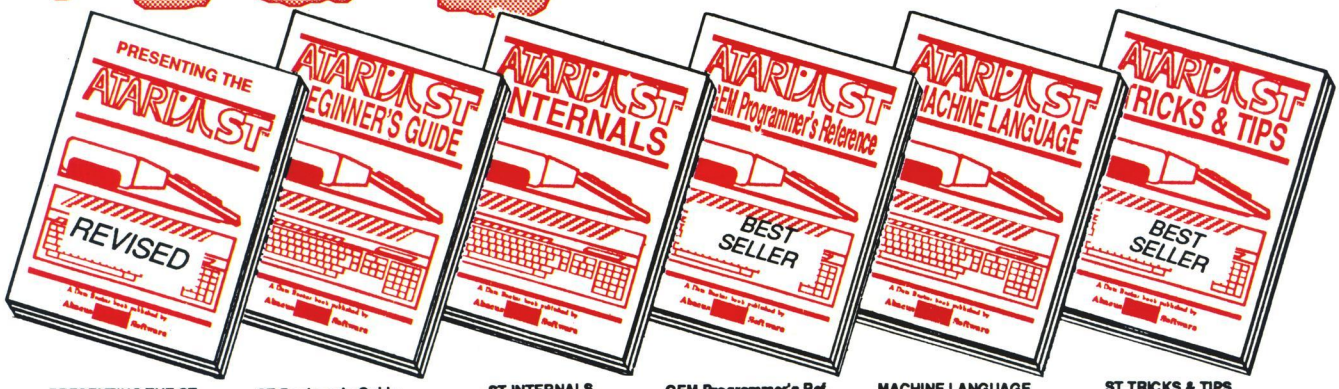

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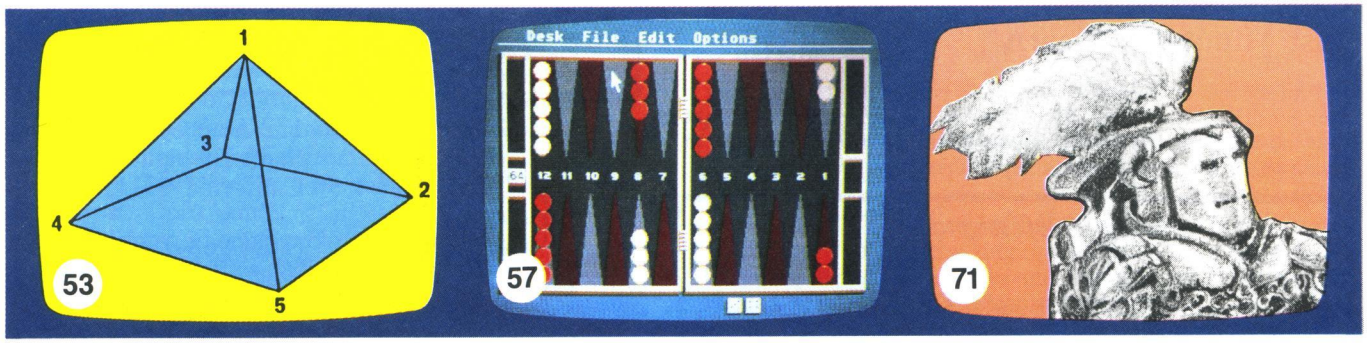

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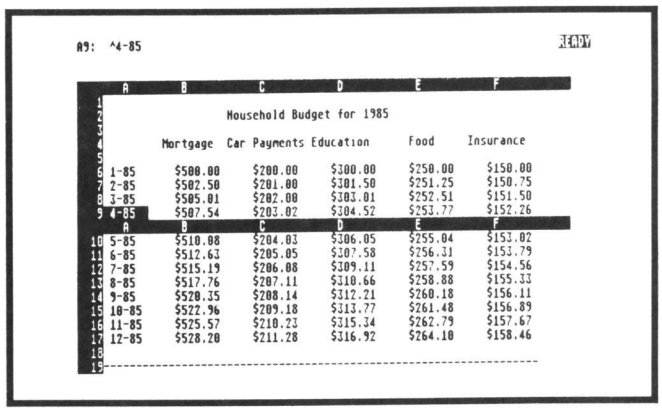

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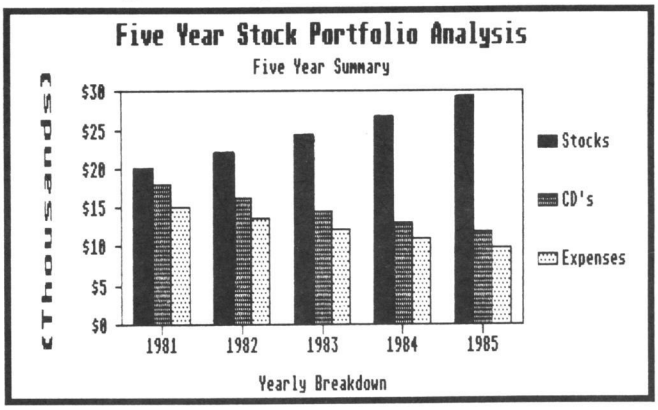

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SYSTEM REQUIREMENTS: Atari 520K; One disk drive; Monochrome or color monitor; Works with printers supported by GEM.

Solid States ST

A bonus for ST disk subscribers

by James Luczak

This article is published as a bonus for our ST disk subscribers. The listings for it, and complete documentation, are found on the ST disk version of this issue, and the article here is simply a brief explanation to go with those programs.

Solid States is a 3-D object plotting program that appeared in issue 16 of **ANALOG Computing**. It was soon followed by **Solid States Revisited** in issue 19, and **Son of Solid States** in 22.

Each of the latter articles added enhancements and image files to the original. Now, you can use **Solid States** on the 520ST.

Solid States for the 520ST (for brevity, **SS-ST**) has the same features as the original. You can load, store, display and edit image files. And there's a plus—this version can automatically rotate an image along the X-, Y- or Z-axis.

The keyboard entry mode has been modified, to make it easier to use the keypad on the ST to enter or edit files. Entering object coordinates has been made quick and easy, by using the mouse to input coordinate data.

SS-ST will run in medium- and high-resolution modes. The image files (files containing object parameters) use a slightly different format from the 8-bit version. If you port image files from the 8-bit version to the **SS-ST**, they won't work. Don't panic!

By modifying a couple program lines, you can load and run ported image files. When you save the ported files, they'll be saved with the ST image file format.

Solid States recapped.

Solid States allows you to display three-dimensional objects on-screen, in a wire frame configuration. You are able to view the object from any angle, retaining true perspective.

There are two steps in drawing a 3-D object. First, you must define the location of each "point" of the object in X-, Y-, Z-coordinates. Figure 1 shows a pyramid. Each number corresponds to a point of the pyramid.

Second, you must define the "endpoints" of each line to be drawn. In other words, you must tell the computer how to draw the object. For example, to draw the pyramid, you must instruct the computer to draw a line from point 1 to point 2, then from point 1 to point 3, etc.

To find the X-, Y-, Z-coordinates of each point of the pyramid, start with a graph like the one shown in Figure 2. Next, draw the top view and number each point where two or more lines intersect. A top view of the pyramid is shown in Figure 3, with five points labeled.

Now, draw a side view of the object, as shown in Figure 4. Note that the vertical axis is labeled as the Z-axis. This view will give the object's height. Again, number each point where two or more lines intersect. Notice that, in Figure 4, points 3 and 4, and points 2 and 5 are at the same location. This is because they have the same X- and Z-coordinates.

Write down each point's coordinates. To find the X-coordinate of point 1, look at Figure 3 or 4. In either case, the coordinate for point 1 is *0*. For the Y-coordinate, look at Figure 3. The Y-coordinate for point 1 is *0*.

Finally, to find the Z-coordinate, look at Figure 4. The Z-coordinate for point 1 is 5. Now that you have the coordinates for point 1, continue until all the points have been defined. Figure 5 shows the coordinates for the five points of the pyramid.

Figure 6 shows the sequence in which to draw the pyramid's lines. These are the endpoints for each of the eight lines that make up the pyramid.

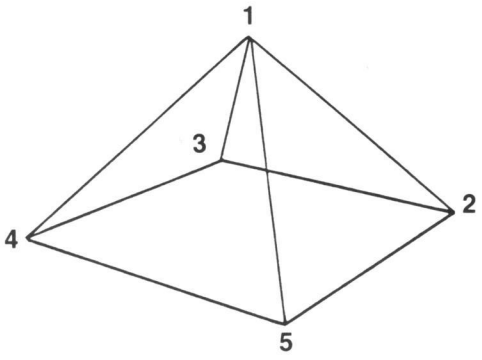

Figure 1.

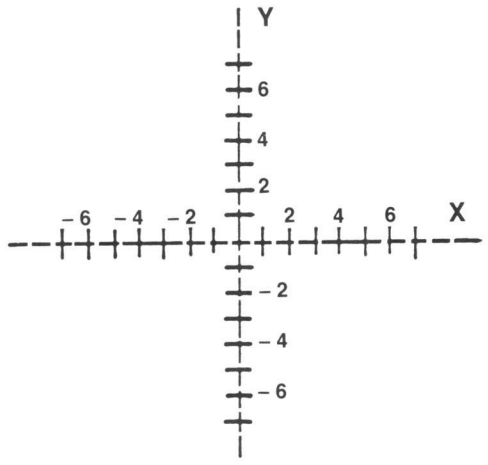

Figure 2.

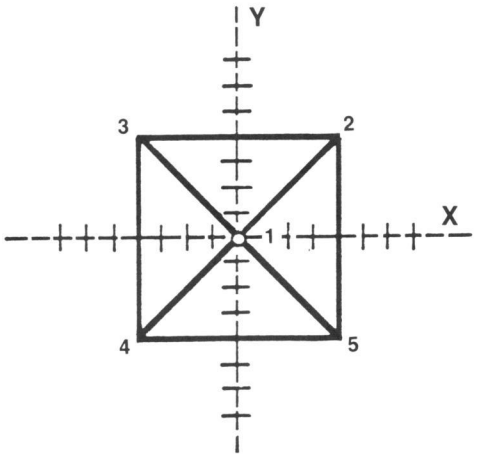

Figure 3.

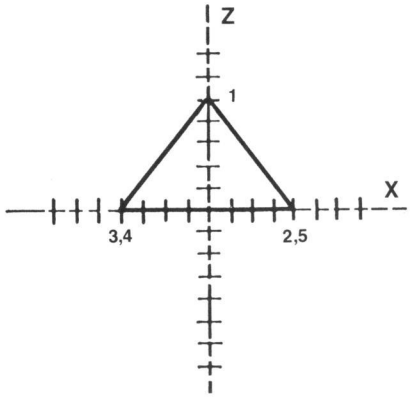

Figure 4.

POINT #	X	Y	Z
1	0	0	5
2	4	4	0
3	-4	4	0
4	-4	-4	0
5	4	-4	0

Figure 5.

LINE #	FROM POINT	TO POINT
1	1	2
2	1	3
3	1	4
4	1	5
5	2	3
6	3	4
7	4	5
8	5	2

Figure 6.

Solid States for the 520ST has some great potential. With the 68000's speed, the ST's fast line-drawing capability and some assembly language programming, it should be possible to have fluid real-time rotation—showing just how powerful the ST really is.

James Luczak bought his first Atari in 1980 and has, since 1979, written programs in BASIC, C, LOGO, FORTH and Action!, plus 6502 assembly. He enjoys writing dedicated database programs.

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by Arthur Leyenberger

PrintMaster is a graphics program that allows you to use your Atari ST computer and printer to design personalized greeting cards, signs, stationery, calendars and banners.

It has a series of multiple menus to guide you through the creation and printing processes and is very easy to use. If a mistake is made, you can easily back up through the series of selections, change an item, then scoot right back down to where you left off—and continue with the program.

If you're familiar with **The Print Shop**, an 8-bit graphics program from Broderbund, then you have a good idea of how **PrintMaster** works and what it can do. However, **PrintMaster** has a number of features that surpass those of **The Print Shop**. Before I tell you why it's better, let me briefly describe the program.

PrintMaster was first developed for the IBM PC and compatibles; its ST implementation is basically the same. Once the program is run, you select what you want, to create from a list in the main menu.

In addition to the items mentioned above, you can also create your own picture with the graphic editor, and initialize the program to use the particular printer you own.

Since the program's menu driven, selecting an item like "Sign" leads to another menu. Next, you must choose the type of border you want. The choices are listed, as well as shown graphically, and one choice allows you to design your own border (border designs include thick and thin lines, cars, footprints, ants, and more).

Next, you select a graphic, either from the more than 100 provided with the program, or from an optional Art Gallery Disk (another 100, sold separately). Again, a list of graphic names is displayed, and the graphic is actually shown as the cursor's moved over the name. Once the graphic has been chosen, you select size, position and the font you want to use.

Eight different fonts are available, and each can be used in one of three sizes. In addition, solid, outline or "3-D" styles can be picked.

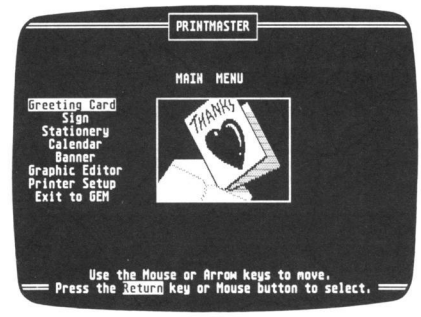
Enter the desired message, and the entire sign is displayed on-screen for your perusal. If all is to your liking, you give the signal—the print jumps to life. This example showed how a sign may be created, but all the possibilities are just as easy to work up.

If you want to design your own graphic, or if you'd like to modify an existing one, the Graphic Editor is used. With this editor, you can draw and erase lines, or invert and flip whole pictures. All available commands are presented on-screen, next to the drawing area.

Compared to **The Print Shop**, **PrintMaster** for the ST has a number of advantages. First, it runs on the ST; **The Print Shop** doesn't, at least not yet.

More important: with **PrintMaster**, you can see the entire design on the screen, before it's printed. Also, unlike **The Print Shop**, once you've created your own unique sign, banner, or whatever, you can save that design to a disk file.

Finally, **Printmaster** has better quality graphics output on the printer (at least, it does on my Epson FX-80). And **PrintMaster** lets you create and print calendars, which **The Print Shop** does not.



PrintMaster.

There's a book available from Unison World, to help you get the most out of the program. Called *The Creative PrintMaster*, this 200-page work gives tips and ideas on how to select and use the various typestyles in your designs. It helps you in laying out your work, selecting borders, using color, picking the proper paper, and creating ads and newsletters.

The majority of the book is generic information, so if you're a user of **The Print Shop**, **The Newsroom**, or another, similar graphic design program, this information will be of help to you.

Interestingly, Broderbund is attempting to sue Unison World, saying the program is a knock-off of **The Print Shop**. Well, it's somewhat similar, but has more features and is better implemented.

All in all, **Printmaster** is an excellent program that will give you hours of rewarding fun.

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-Check (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 the article, you may send for back issue 41 ($4.00).

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Hippo Backgammon

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by Clayton Walnum

Back when I was a tot, there were two activities that filled the greater portion of my days. The first of these, an innate and mysterious ability discovered shortly after birth, was surely the most controversial. Simply known among us rugsters as "discovering the limits," it was, to my delight, a skill that could evoke some of the most amazing sounds from the throats of my parents. Unfortunately, this pastime had serious side effects, not the least of which were watering eyes, a running nose and a well pinked fanny.

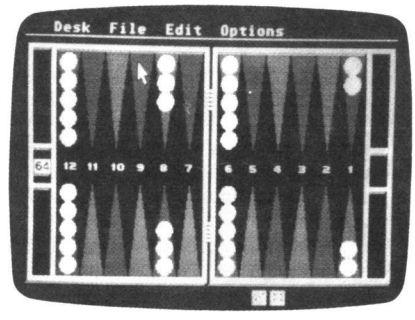
But once the eyes and nose had dried, and the glare from my glowing posterior had ebbed (that portion of my anatomy was so often in its luminous state I feared it radioactive), I resorted to my second favorite activity: playing games.

The best games were, of course, those easily learned, yet able to be played at whatever strategic level best suited the player. Checkers was one such game. And on the back of every checkerboard was the other game, the one only a few kids knew how to play: backgammon.

Now, from the viewpoint of a parent, backgammon is a wholly different experience. Just finding the game usually means placing each child beneath bright lights and interrogating them ruthlessly. Once the box has been located, the pieces belonging in it must be gotten together—and pried apart (we don't use superglue in our house; lollipops do the trick quite nicely, thank you). Sometimes you have to sit back and wonder if playing the game is worth the effort.

Ah, but there *is* hope for the child-infested household. If you have a 520ST, you can get a copy of **Hippo Backgammon**. Let the young people do what they will with the old-fashioned plastic and cardboard version. You'll never lose the pieces to this one.

The first thing you'll notice when you load this game is the stunning graphics.



Hippo Backgammon.

They've done a marvelous job of presenting a "lifelike" playing board. Just watching the game set itself up is interesting. Each piece floats up from its resting place, turns about and places itself at its starting position, all with a 3-D effect.

The game play is as simple as one could expect from a computer game. Pieces are picked up and moved about the board with the mouse as freely as with your hand. The dice are rolled automatically by the computer, and when your turn is finished, clicking on the dice with the mouse passes them to your opponent.

Your opponent is one of two "robots" supplied. You may choose to play either robot A or robot B. If you're feeling particularly lazy, you can sit back, pit the robots against each other and watch them battle it out. Unfortunately, there's no option allowing you to play against another human. Strange, since this would be an easy thing to implement.

The robots may be set up as expert, medium, or novice (the default is expert) from files supplied on the disk, or you may customize each robot's abilities by editing the "cortex" or "neurons" for the robot you wish to change.

The cortex supplies the robot's overall strategy, and the neurons contain data determining the importance of each point on the board (a backgammon board is made up of 24 points, triangular spaces upon which the pieces move). Once you've modified the robot to your liking—no easy feat, since the strategies are quite complex—you may save your creation to disk for later use.

The top of the screen sports a series of drop-down menus to allow access to the game's options. Utilizing these menus, you may save a game in progress, load a previously saved game, load or save robots, edit robots, choose your opponent, change the screen colors, change sides, clear the score, view the manual, and quit to the desktop. There's also an option to let you set up the board in any configuration you wish.

The program's not perfect. One annoying oversight: you can pass the dice to your

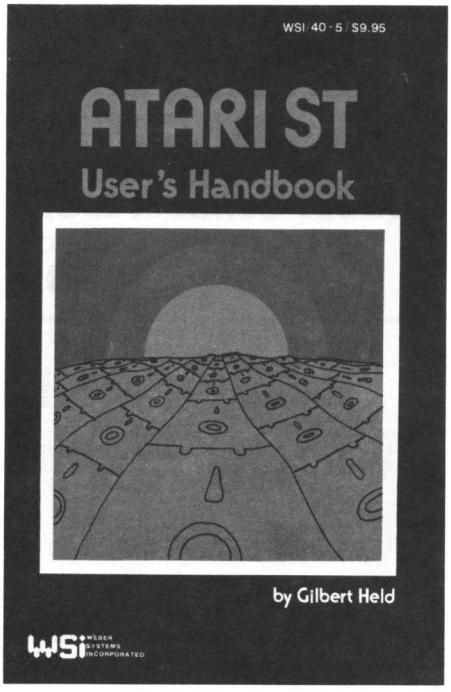
opponent, whether or not you've completed your move. This stems from the fact that, according to the rules of backgammon, a piece on the bar must be placed back in the game before other pieces may be moved.

Depending on your roll, this can leave you unable to move. Rather than check for this specific circumstance, **Hippo Backgammon** lets you pass the dice at any time, legal or not.

Hippo Backgammon is a playable and interesting version of this popular game. A word to the wise: be sure you get the latest version. Earlier releases had a lot of bugs, not the least of which was an inability to set up the board manually.

Insist on testing the game before you lay out your cash. Select the "game board" option from the edit menu, then try to set up the board. If it works, you have the latest version. This may seem like a lot of bother, but it'll be worth it. After all, there's only one alternative: find a bottle of sulphuric acid and hope *that* can eat its way through the lollipop gunk.

ST NEWS!



USER'S HANDBOOK

Weber Systems Incorporated has just published the ***Atari ST User's Handbook***, by Gilbert Held.

The book covers a lot of ground, with chapters on: installation of the ST computer, information on disks and disk drives, using the operating system, Logo programming, keyboard and mouse usage and communications.

To ease the first-time user into understanding the ST, there are examples used throughout the book, along with diagrams, screen dumps for many situations you'll encounter and a few photos.

Chapters other than those mentioned above cover the use of the VT52 emulator provided by Atari and give you a fairly complete rundown on the fundamentals of the ST. The book even supplies some "history" on Atari's development of the new line.

The ***Atari ST User's Handbook*** is 159 pages. Give the bookstore ISBN 0-9388-62-40-5 to order your copy.

The ***Handbook*** is selling for $9.95. For more information, contact Weber Systems, Incorporated, 8437 Mayfield Road, Chesterland, OH 44026.

CIRCLE #183 ON READER SERVICE CARD

LET YOUR FINGERS DO THE TALKING

First Byte, Inc. has announced the development of its unlimited, software-only speech synthesis technology for the Atari ST series.

Requiring no hardware, this new version, **Smoothtalker**, accepts plain English text from either the keyboard or a text file. Pronunciation can be switched between an adult male and a female voice, in clear, smooth sound. Potential applications consist of education, accounting, scientific, tutorial and data entry proofreading, among others.

For additional information, contact First Byte, Inc., 2845 Temple Avenue, Long Beach, CA 90806.

CIRCLE #182 ON READER SERVICE CARD

PROFESSIONAL DATA MANAGEMENT

Talisman is a full relational database system designed to utilize the ST's power, huge RAM and crisp graphics. Touted as easy to use, its data input routines are described as being simple and hassle-free.

The **Talisman** is also virtually free of constraints, such as field lengths, number of records, or number of files. Its special design pushes these limitations beyond the point where most users would encounter them. This database is integrated with GEM and is available in three language versions.

For more information, contact Talent Computer Systems, Curran Building, 101 St. James Road, Glasgow G40NS, Scotland, U.K. — (041) 552-2128.

CIRCLE #181 ON READER SERVICE CARD

GEM DATABASE

Regent Base is a full-function relational GEM database written specifically for the ST. Regent Software describes the program as being ideal for home or small business, with modules available for checkbook balancing, general ledger, accounts receivable and more.

Regent Base was written in machine language, making it very fast and efficient. Another plus for it is an ability to merge data with **Regent Word II**, Regent's word processor, allowing mail-merge functions.

A sorting program permits up to three fields to be processed, recognizing information in **Regent Base** tables. The database also recognizes memory upgrades, making sorting and query functions even faster. Reports generation is available, using custom formats. These may include multiple type styles, subscripting, superscripting, underlining, bold and elongated type. Over fifteen printers are compatible.

Price is $99.95, from Regent Software, 7131 Owensmouth, Suite 45A, Canoga Park, CA 91303 — (818) 883-0951.

CIRCLE #184 ON READER SERVICE CARD

LET'S WRITE

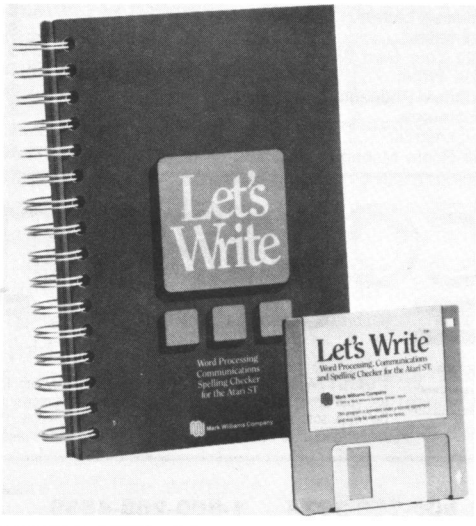
The Mark Williams Company has begun shipping a new professional text processor that goes by the name of **Let's Write**.

This program features a spelling checker and a communications utility. The latter allows your ST to be employed as a remote terminal to larger systems, with the ability to transfer text and binary files over the phone lines.

Additional features of the program include a full-screen editor with its own formatting language and the capability to display up to eleven windows. Users can also design their own keyboard macros for frequently used phrases.

Let's Write is available for $79.95. Contact Mark Williams Company, 1430 W. Wrightwood Ave., Chicago, IL 60614 — (312) 472-6659.

CIRCLE #180 ON READER SERVICE CARD



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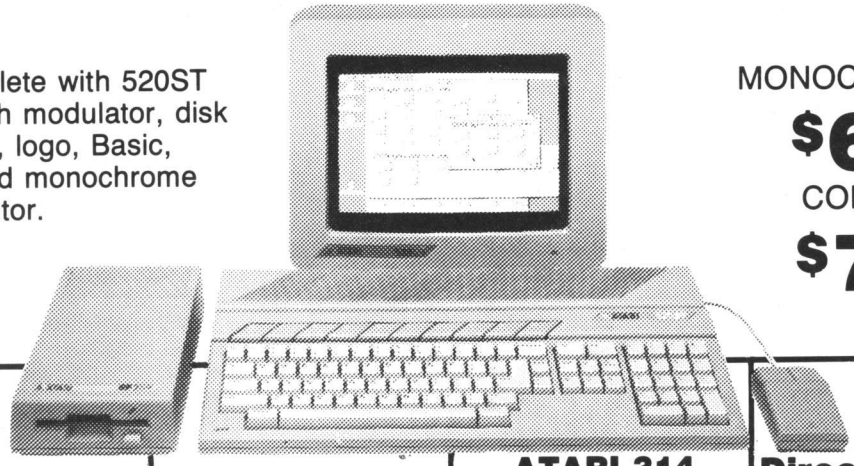

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CIRCLE #129 ON READER SERVICE CARD

AN INTRODUCTION TO Logo FOR THE ST

by James Luczak

As all of you are probably aware by now, the Atari ST comes equipped with two programming languages, ST BASIC and Digital Research's Logo for the ST. While both have been around for quite a while, BASIC is by far the more popular of the two. Since the ST comes with both BASIC and Logo, eventually people who've never programmed with Logo are going to give it a try.

What kind of language is it? Well, Digital Research's Logo can be used to draw with "turtle graphics" and to process words and lists. The first, drawing, is the language's primary function.

What is turtle graphics? The phrase refers to a method that will draw a line in a specified direction (in degrees), for a specified number of units.

The coordinate system used in Logo is a little different from the coordinate system of BASIC. Instead of coordinates *0 0* being at the upper left-hand corner of the screen, coordinates *0 0* in Logo put you in the very center of the screen. Coordinates below the screen's center and to the left of center are represented by negative numbers. Coordinates above center and to the right are represented by positive numbers.

How do you program in Logo? As in BASIC, you can use the "immediate" or "program" mode. In the immediate mode, instructions are carried out as soon as you press the RETURN key. For example, if you type *FORWARD 20 RIGHT 90 FORWARD 20*, the turtle will move forward 20 units, make a 90-degree turn, then move forward another 20 units, as soon as you press RETURN.

In the program mode, unlike BASIC, Logo does not use line numbers. Instead you must define what's called a "procedure." Here's an example of a procedure that will clear the screen and draw a square.

```
TO SQUARE

CLEARSCREEN
FORWARD 20 RIGHT 90
FORWARD 20 RIGHT 90
FORWARD 20 RIGHT 90
FORWARD 20

END
```

Now, if you type the word *SQUARE*, the screen will be cleared and a square will be drawn. Of course, you could use the procedure SQUARE within other procedures.

When learning a new programming language, I've found the easiest way is to determine how to perform commonly used simple functions, such as *A=A+1*, *PRINT "HELLO"*, etc. It's also a good idea to type in known, working programs using the new language. Having even a few program listings in the new language is a great help, because they demonstrate how it performs various functions.

Table 1 (BASIC vs Logo) shows a number of simple functions in BASIC and illustrates how the same functions can be performed in Logo.

Table 2 (Working with Logo) shows how to perform various housekeeping tasks with Logo. By "housekeeping," I mean things like clearing old programs from memory, getting your program to list to the printer, and so forth.

Table 3 (Helpful hints for programming Logo) points out a number of items the Sourcebook for Atari Logo doesn't make quite clear.

Listing 1 is a numbers demo program. To run the demo, set the screen to low resolution. After you've entered the program, type *NUMBERS*. The program will display a series of ten numbers, displayed five times in a variety of positions, colors and line widths.

Listing 2 gives you a designs demonstration. Again, set

the screen to low resolution. After you've entered the program, type *DESIGN*. The program will display the same design in eleven different positions in different colors, then randomly switch colors.

Before running the demostration programs, set the graphics display window to full screen. To do this, move the mouse so the arrow is on the shaded area where *GRAPHICS DISPLAY* is written, then click the mouse. Next, move the mouse to the full box icon and click it. (The full box icon can be found in the upper right-hand corner of the screen.)

Like any programming language, Logo has lets you do most things in any of several different ways. The methods I've described may not be the best or most efficient ways of programming in Logo, but I hope that they'll make starting off in Logo a little easier for you.

Table 1. — BASIC vs Logo.

BASIC

```
A = A + 1
B = B - 1
X = INT (Y)
X = INT (Y * Z)
X = ABS (Y)
X = ABS (Y / Z)
```

LOGO

```
MAKE "A :A + 1
MAKE "B :B - 1
MAKE "X INT :Y
MAKE "X INT (:Y * :Z)
MAKE "X ABS :Y
MAKE "X ABS (:Y / :Z)
```

BASIC

```
PRINT "HELLO"
PRINT "ONE";"TWO"
```

LOGO

```
PRINT [HELLO]
TYPE [ONE] PRINT [TWO]
```

NOTE: In Logo, the "PRINT" command inserts a carriage return at the end of the list being printed. The "TYPE" command prints the list without inserting a carriage return.

BASIC

```
FOR X = 1 TO 10
PRINT "HELLO"
NEXT X
```

LOGO

```
REPEAT 10 [PRINT [HELLO]]
```

BASIC

```
IF X = 1 THEN Y = 7
```

LOGO

```
IF :X = 1 [MAKE "Y 7]
```

BASIC

```
10 IF X = 10 THEN GOTO 30
20 PRINT "X <> 10" : GOTO 40
30 PRINT "X = 10"
40 PRINT "ALL DONE"
```

LOGO

```
IF :X = 10 [GO "L1]
PRINT [X <> 10] GO "L2
LABEL "L1 PRINT [X = 10]
LABEL "L2  PR [ALL DONE]
```

BASIC

```
DIM A(3)
A(1) = 10
A(2) = 20
A(3) = 30
FOR X = 1 TO 3
PRINT A(X)
NEXT X
```

LOGO

```
MAKE "A [] MAKE "CNT 1
MAKE "A LPUT 10 :A
MAKE "A LPUT 20 :A
MAKE "A LPUT 30 :A
```

NOTE: The "LPUT" command puts the incicated value at the end of the list. The *L* in *LPUT* stands for "Last." The "FPUT" command puts the indicated value at the beginning of the list. The *F* in *FPUT* stands for "first."

Table 2. — Working with Logo.

TO: Display a list of all procedures in memory.
TYPE: *PROCLIST*

TO: Display a list of all procedures and their definitions.
TYPE: *POALL*

TO: Display a single procedure and its definition.
TYPE: *PO "procedure_name*

TO: Edit a single procedure.
TYPE: *ED "procedure_name*

TO: Edit all procedures in memory.
TYPE: *EDALL*

TO: Erase a single procedure from memory.
TYPE: *ER "procedure_name*

TO: Erase all procedures from memory.
TYPE: *ERALL*

TO: Print text to a printer.
TYPE: *COPYON*

TO: Stop print to printer.
TYPE: *COPYOFF*

TO: Display a list of all Logo files on a disk.
TYPE: *DIR*

TO: Clear the graphics screen.
TYPE: *CS*

TO: Clear the text screen.
TYPE: *CT*

The "CS" command erases the screen and places the turtle at position *0 0*, heading *0* with pen down. The "HOME" command places the turtle at position *0 0*, heading *0* without erasing the screen.

Table 3. — Helpful hints for programming Logo.

Variables in Logo can be either *numeric* or *alphabetical*. For example:

```
MAKE "A 10
MAKE "A [HELLO]
```

A file loaded into memory is "appended" to memory. If, for example, you've defined procedures named *ONE* and *TWO*, and then load a file containing procedures named *THREE* and *FOUR*, you'll have procedures *ONE*, *TWO*, *THREE* and *FOUR* in memory. If you want to clear memory before loading another file, use the "ERALL" command.

To employ variables to set parameters within brackets in a command, use the following methods.

```
COMMAND___SETPOS [-100 50]
```

To use variables for the values of *-100* and *50*, use the following form:

```
MAKE "X -100 MAKE "Y 50
SETPOS SE :X :Y
```

```
COMMAND___SETPAL 3 [500 600 700]
```

To use variables for the values of *500*, *600* and *700*, use the following form:

```
MAKE "A 500 MAKE "B 600 MAKE "C 700
SETPAL 3 (SE :A :B :C)
```

In the command *SETPAL 3 [500 600 700]*, the numbers within the brackets *(500, 600* and *700)* are referred to as the "RGB list." The first number represents the color red. The second represents green, and the third, blue. Any value between *0* and *1000* can be used for each color. However, only the "most significant digit" of the number is used to set the intensity of color. Figure 1 is a color intensity chart for the RGB list.

(Figures and listings on next page)

Jim Luczak has, since 1979, written programs in BASIC, C, Logo, FORTH and Action!, plus 6502 assembly. He enjoys writing dedicated database programs.

Figure 1.
Color intensity chart for RGB list.

0 = LOW INTENSITY	8 = HIGH INTENSITY
Value	**Intensity**
000 - 099	0
100 - 199	0
200 - 299	0
300 - 399	1
400 - 499	2
500 - 599	3
600 - 699	4
700 - 799	5
800 - 899	6
900 - 999	7
1000	8

As an example, in the command "SETPAL 3 [500 600 700]," the first number *(500)* indicates that the color red is at an intensity of *3*. Any value between *500* and *599* could be used *(545, 539,* or *567)*, and the intensity of red would remain *3*. Remember that the M.S.D. determines the intensity. To increase the red's intensity to, let's say, *7*, we would have to change the first number of the RGB list from *500* to a value between *900* and *999*.

The *3* which appears before the brackets is the "color index," which designates the color register whose red, green and blue constituents are being set by the command.

In the command "SETLINE [1 2 3]," the three numbers within the brackets *(1, 2* and *3)* represent, respectively, line style, line width and line color. Line style can be any number between *1* and *7*. Figure 2 shows the line style chart.

Figure 2. — Line style chart.

STYLE NUMBER	DESCRIPTION
1	Solid line
2	Long dash line
3	Dot line
4	Dot short dash line
5	Short dash line
6	Dash half-dash dot line
7	User defined line

Line width can be any value between *1* and *39*, if the line style is style 1. The higher the line width value, the wider the line will be. To use line styles 2 through 7, the line width must not exceed *2*. If the line width value exceeds *2*, the line style value will default to *1* (solid).

To activate the "FILL" function, include the following code in your procedure:

```
MAKE "GFILL "TRUE
```

Like this:

```
TO DRAWCIRCLE
CIRCLE [0 0 20]
MAKE "GFILL "TRUE
FILL
END
```

The above procedure will draw a circle at coordinates *0 0* with a radius of *20* and fill the circle. By making GFILL false, the procedure will draw the circle, but will not fill it, even though the "FILL" command is in the procedure.

Attention: **In these listings, the exclamation points at the end of program lines shouldn't be typed in. They are there to indicate that the statement wraps around to the next line.**

Listing 1.
Logo listing.

```
TO ZERO :SIZE
R PU BACK :SIZE PD
RT 45 FD :RO
RT 45 FD :SIZE
RT 45 FD :RO
RT 45 FD :SIZE * 3
RT 45 FD :RO
RT 45 FD :SIZE
RT 45 FD :RO
RT 45 FD :SIZE * 3
PU FD :SIZE PD
END

TO ONE :SIZE
R PU BACK :SIZE RT 90
FD :SIZE LT 45 PD
FD :RO
RT 135 FD :SIZE * 5
RT 90 FD :SIZE
BACK :SIZE * 2 PU
RT 90 FD :SIZE * 5
LT 90 FD :SIZE * 3
RT 90 PD
END

TO TWO :SIZE
R PU BACK :SIZE PD
REPEAT 2 [RT 45 FD :RO RT 45 FD :SIZE!
]
RT 45 FD :RO * 3
LT 135 FD :SIZE * 3
PU LT 90 FD :SIZE * 5
LT 90 FD :SIZE * 3
RT 90 PD
END

TO THREE :SIZE
R PD
RT 90 FD :SIZE * 3
RT 135 FD :RO * 2
LT 135 FD :SIZE
REPEAT 2 [RT 45 FD :RO RT 45 FD :SIZE!
]
RT 45 FD :ROOT
PU RT 45 FD :SIZE * 4 PD
END

TO FOUR :SIZE
PD RT 180 FD :SIZE * 3
LT 90 FD :SIZE * 3
BACK :SIZE
LT 90 FD :SIZE * 2
BACK :SIZE * 4
PU FD :SIZE * 5 LT 90
FD :SIZE * 2 RT 90 PD
END

TO FIVE :SIZE
R PD
RT 90 FD :SIZE * 3
BACK :SIZE * 3
RT 90 FD :SIZE * 2
LT 90 FD :SIZE * 2
REPEAT 2 [RT 45 FD :RO RT 45 FD :SIZE!
]
RT 45 FD :RO
PU RT 45 FD :SIZE * 4 PD
END

TO SIX :SIZE
R PU
RT 90 FD :SIZE * 3
RT 90 FD :SIZE
RT 135 PD FD :RO
```

```
LT 45 FD :SIZE
LT 45 FD :RO
LT 45 FD :SIZE * 3
REPEAT 3 [LT 45 FD :RO LT 45 FD :SIZE!
]
LT 45 FD :RO
PU RT 135 FD :SIZE * 3 PD
END

TO SEVEN :SIZE
R PD
RT 90 FD :SIZE * 3
RT 135 FD :RO * 2
LT 45 FD :SIZE * 3 PU
RT 180 FD :SIZE * 5
LT 90 FD :SIZE RT 90 PD
END

TO EIGHT :SIZE
R PU RT 90 FD :SIZE PD
FD :SIZE
RT 45 FD :RO
RT 90 FD :RO
RT 45 FD :SIZE
REPEAT 4 [LT 45 FD :RO LT 45 FD :SIZE!
]
RT 45 FD :RO
RT 90 FD :RO
PU LT 135 FD :SIZE RT 90 PD
END

TO NINE :SIZE
R PU
RT 90 FD :SIZE * 3
RT 90 FD :SIZE RT 135 PD
FD :RO
REPEAT 3 [LT 45 FD :SIZE LT 45 FD :RO!
]
LT 45 FD :SIZE
RT 180 FD :SIZE * 3
RT 45 FD :RO
RT 45 FD :SIZE
RT 45 FD :RO
PU RT 45 FD :SIZE * 4 PD
END

TO NUMB :LIST :SIZE
IF :LIST = [] [STOP]
RUN SE FIRST :LIST :SIZE
PU RT 90 FD :SIZE * 4 LT 90 PD
MAKE "COL RANDOM 15 IF :COL = 0 [MAKE!
 "COL 1]
SETPC :COL
NUMB BF :LIST :SIZE
END

TO DONUMBERS
MAKE "SIZE RANDOM 10
IF :SIZE < 5 [MAKE "SIZE 5]
MAKE "T1 1
MAKE "T2 :SIZE - 1
MAKE "T3 1
SETLINE (SE :T1 :T2 :T3)
HEADEG
NUMB SHUFFLE [ONE TWO THREE FOUR FIVE!
 SIX SEVEN EIGHT NINE] :SIZE
END

TO HEADEG
PU HOME
MAKE "HED RANDOM 360 SETH :HED
IF :HED >= 270 [MAKE "X1 RANDOM -150 !
MAKE "Y1 RANDOM -100 GO "L1]
IF :HED >= 180 [MAKE "X1 RANDOM 150 M!
AKE "Y1 RANDOM -100 GO "L1]
IF :HED >= 90 [MAKE "X1 RANDOM 150 MA!
KE "Y1 RANDOM 100 GO "L1]
MAKE "X1 RANDOM -150 MAKE "Y1 RANDOM !
100
LABEL "L1 PU SETPOS (SE :X1 :Y1) PD
END

TO R
MAKE "RO :SIZE * 1.41421
END

TO PALETTE
SETPAL (3 + RANDOM 13) (SE RANDOM 100!
0 RANDOM 1000 RANDOM 1000)
END

TO NUMBERS
CS HT
REPEAT 5 [DONUMBERS]
LABEL "L3 PALETTE GO "L3
END

MAKE "GFILL "FALSE
MAKE "COL 13
MAKE "ST3 4
MAKE "ST2 7
MAKE "Y 29
MAKE "ST1 1
MAKE "X 7
MAKE "HED 213
MAKE "ROOT 8.485257
MAKE "B -23
MAKE "A -100
MAKE "SIZE 5
MAKE "SZ 32
MAKE "RO 7.071048
MAKE "Y1 -65
MAKE "X1 12
MAKE "T3 1
MAKE "T2 4
MAKE "T1 1
```

●

Listing 2.
Logo listing.

```
TO BASE
FD :S
IF REMAINDER :K :F = 0 [RT :A2 GO "L1!
]
RT :A
LABEL "L1 MAKE "K :K + 1
END

TO SETDESIGN
MAKE "SP [-250 90 -100 90 50 90 200 9!
0 -250 -150 -100 -150 50 -150 200 -15!
0 -175 -25 -25 -25 125 -25]
MAKE "SF [-200 110 -50 110 100 110 25!
0 110 -200 -130 -50 -130 100 -130 250!
 -130 -125 -5 25 -5 175 -5]
MAKE "X ITEM :CNT :SP MAKE "Y ITEM (:!
CNT + 1) :SP
MAKE "X1 ITEM :CNT :SF MAKE "Y1 ITEM !
(:CNT + 1) :SF MAKE "CNT :CNT + 2
PU SETPOS (SE :X :Y) PD
REPEAT 40 [BASE]
PU SETPOS (SE :X1 :Y1) PD FILL
MAKE "SL RANDOM 15 MAKE "SL1 RANDOM 1!
5
LABEL "K2 IF :SL = :BG1 [MAKE "SL RAN!
DOM 15 GO "K2]
LABEL "K3 IF :SL1 = :BG1 [MAKE "SL1 R!
ANDOM 15 GO "K3]
SETLINE (SE :SX :SX :SL) SETFILL (SE !
:SX :SX :SL1)
END

TO PALETTE
```

```
SETPAL (3 + RANDOM 13) (SE RANDOM 100!
0 RANDOM 1000 RANDOM 1000)
END

TO DESIGN
MAKE "S 25 MAKE "A 45 MAKE "A2 -45 MA!
KE "F 5 MAKE "K 0 MAKE "P 2
MAKE "CNT 1 MAKE "GFILL "TRUE MAKE "S!
X 1 MAKE "BG1 RANDOM 15
SETFILL [1 1 3]
SETBG :BG1 SETPC 1 SETZOOM 0.5 HT CS
REPEAT 11 [SETDESIGN]
LABEL "K1 PALETTE GO "K1
END

MAKE "A2 -45
MAKE "GFILL "TRUE
MAKE "CNT 23
MAKE "YP2 42
MAKE "YP1 42
MAKE "XP2 108
MAKE "Y -25
MAKE "XP1 -31
MAKE "X 125
MAKE "S 25
MAKE "P 2
MAKE "SL1 2
MAKE "K 440
MAKE "F 5
MAKE "A 45
MAKE "BG1 3
MAKE "SX 1
MAKE "YP 10
MAKE "XP [-250 150 -100 150]
MAKE "SP [-250 90 -100 90 50 90 200 9!
0 -250 -150 -100 -150 50 -150 200 -15!
0 -175 -25 -25 -25 125 -25]
MAKE "SL 7
MAKE "SF [-200 110 -50 110 100 110 25!
0 110 -200 -130 -50 -130 100 -130 250!
 -130 -125 -5 25 -5 175 -5]
MAKE "PC 3
MAKE "Y1 -5
MAKE "X1 175
```

●

C-MANSHIP

by Clayton Walnum

Good news. . .Megamax C is now available. Though I haven't had much time with it yet, it seems to be everything promised—and then some.

The compiler's about seven times faster than the DRI system. For instance, using the DRI compiler, a 28K source file took about fourteen minutes to compile and link. The same file compiled and linked in slightly over two minutes with Megamax.

The program comes with a hefty loose-leaf manual, including all operating instructions, as well as good descriptions of the GEM and BIOS routines. The package contains not only the compiler and linker, but an editor, a resource construction program, a disassembler, a "code improver," and a shell program to neatly tie the whole thing together, allowing easy access to all of Megamax's features.

If you've been holding off on getting your C development system because the DRI offering was too expensive and you didn't want to compromise on quality, here's your chance. For $195, you can make both yourself and your ST very happy. Watch for a complete review of this product in a future issue of **ST-Log**.

You can contact Megamax, Inc. at Box 851521, Richardson, TX 75085, or phone them at (214) 987-4931.

Mailbag.

The postman dropped an interesting comment on my desk this month. Earl Davis writes:

> At present, I have an 800XL system, but am anticipating (anxiously) getting a 520ST (or 1040ST). . . On our 8-bits, no full-fledged C seems to exist (or so I was told!), and, as a result, I took up Action! (from OSS) to get accustomed to a "C-type" language. Do you think I made the right decision?

First of all, learning a new language is never a *wrong* decision. Most programming techniques you're exposed to will apply to many other languages. With each new language, you gain not only new insight to old ideas, but skills which will make subsequent studies that much easier.

Action! is really a combination of C and Pascal. Learning to program in Action! will certainly help you, once you get that ST, in your experiments with C. Just like C, Action! uses functions as program building blocks. The lessons you'll learn from structuring your code and passing arguments between functions can be applied directly to C programming.

One of the major differences between Action! and C is that the former tends to be more readable, incorporating English words where C uses more cryptic symbols. Action!'s enhanced readability is due to its combination with Pascal. Okay, enough stalling. Back to business.

What's the point?

This month, we'll take a look at pointers. They're a decisive factor in separating the real programmers from the dabblers. Actually, though handling pointers can be confusing at times, the basic concept is quite simple. In fact, we've been using them all along, whether you're aware of it or not, whenever we referred to an array name.

What exactly is a pointer? Simply put, it's a variable containing the address of a data item we wish to access. For example, look at this line of code:

```
pointer = &var;
```

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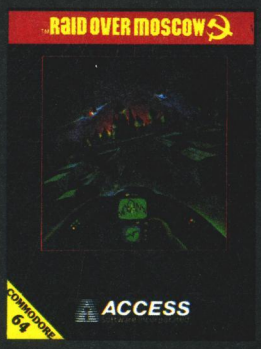

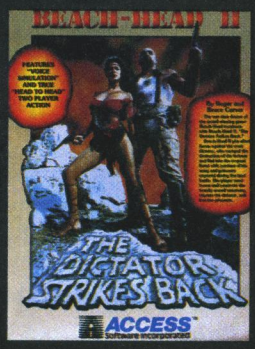

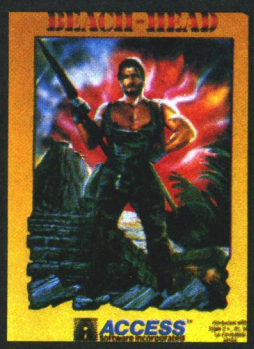

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After this line has been executed, pointer contains the address of var, or, to say it another way, *points* to that section of memory where the value of var is stored.

So, what's all the hoo-ha? Why not use the "&" operator and be done with all this nonsense? Because there's a subtle difference between pointer and &var. The first is a variable; the second is a constant.

Still not impressed? Okay, let me ask you a question: what makes variables so handy? Give up? We can perform mathematical procedures on variables; not so with constants.

Another advantage to pointers is that, when declared properly, they're much "smarter" than constants or run-of-the-mill variables. We'll see why in a minute.

A point of declaration.

To get full service from a pointer, the compiler needs some information, namely the type of data the pointer points to. We pass this information with the pointer's declaration.

```
int *p1;
char *p2;
float *p3;
```

The first example tells the compiler we want a pointer to an integer value. The second sets up a pointer to character data. The third points our way to floating point information.

Each of these data types (as well as others) is stored in a special way in memory. A pointer to integer won't function as we expect if we try to use it on character data. The * before the name identifies the variable as a pointer and requests "special handling" from the compiler. Don't confuse it with the multiplication operator.

Once we've declared our pointer, we have to assign it a value. We want it to point *to* something, don't we? You assign an address to a pointer in exactly the same way as you would to any other variable. Take a look at this segment of code:

```
int var, array[10];
int *p1, *p2, *p3;

p1 = &var;
p2 = array;
p3 = &array[5];
```

First, we've declared an integer variable and an integer array. Following that are the declarations for three pointers to integer. After declaration, these pointers are still useless to us. We have to assign them values—that is, addresses to point to.

In the first case, p1 is assigned the address of var (or &var). Don't forget the ampersand; without it, you'd be assigning the value of var, not its address.

In the second assignment, p2 gets the address of the first element of the array array[]. What? No ampersand? Don't tell me you've forgotten already! An array name *is* an address.

Ah, but what about the third assignment in our example? There's that address operator. No mistake here. Once you add the brackets to the array name, you're referring to the contents of an element of the array, not its address.

Just remember: the only time you don't need the address operator is when you're doing your assignment with an array name. The following two lines do exactly the same thing:

```
p1 = array;
p1 = &array[0];
```

Putting them to work.

Okay, now we've got our pointers declared and assigned addresses. Now what?

There are several operations we can perform with pointers, including: assignment, getting the address, getting a value, and incrementing or decrementing.

The first, assignment, we've already learned about. The second, getting the address, is nothing new, either. To get the address of a pointer—the place in memory where the pointer itself is stored—place the address operator in front of the pointer name:

```
adrp1 = &p1;
```

A more useful operation is getting the value the pointer is pointing to:

```
var = 5;
p1 = &var;
z = *p1;
```

In the above example, z becomes equal to var. How? Our pointer, p1, is assigned the address of the variable var. The third line is read "z gets the value of the contents of the address pointed to by p1." The asterisk is referred to as an "indirection operator," since it allows us to access data indirectly.

Of course, this is a pretty silly example. It would've been more efficient to directly assign the value of var to z (z = *var*;). But there are times when we can't get at variables in the conventional way. Remember, C passes arguments between functions by value, not address.

Take, for instance, our bubble sort program a couple of months ago. What if, instead of using an array, we had three integer variables we wanted to sort, then pass back to the calling function? The following lines show a function call and the first two lines of the function. Will it work?

```
sort(x, y, z);

sort(a, b, c)
int a, b, c;
```

Think about it for a minute. The three arguments passed to the sort function are placed in the three automatic variables a, b and c. No problem there, so we go ahead and sort the three values (code not shown), putting y into x, and z into y, and x into z—or whatever's necessary to complete the sort. Hurray! We did it.

Wrong.

We forgot one tiny detail. We now have to pass all three values back to the calling function. Any suggestions? The return() statement will allow only one argument. Looks like we're stuck.

What did we do wrong? Why is C being so obstinate? Shall we forget the whole thing and go back to BASIC? Why am I asking you all these questions, instead of just providing the answers?

The answer is (drumroll, please): pointers.

Let's change our function call to this:

```
sort(&x, &y, &z);
```

We're still passing our arguments to automatic variables, but now those variables will contain the addresses of the original three. And, to make things as efficient and elegant as possible, we're going to make those automatic variables pointers. The first two lines of our function will look like this:

```
sort(p1, p2, p3)
int *p1, *p2, *p3;
```

Now we have access to the variables from the calling function. We can switch them around any way we want, using code similar to this:

```
save = *p1;
*p1 = *p2;
*p2 = *p3;
*p3 = save;
```

In English, the above reads: "save gets the contents of the address pointed to by p1; the contents of the address pointed to by p1 get the contents of the address pointed to by p2; and so on. What we're actually doing is this:

```
save = x;
x = y;
y = z;
z = save;
```

Once we've got the variables the way we want them, we exit the function. We don't have to return any values now; we've done all our work on the variables themselves.

Incrementing and decrementing.

I stated earlier that pointers were much smarter than conventional variables. One reason is that they're mathematical whizzes. When we perform addition or subtraction on a pointer, the compiler does a lot of the work for us, taking into account the data type it's pointing to and the way that data is stored in memory.

For instance, if we add 1 to an integer pointer, we don't end up with an address 1 byte higher in memory; we actually move forward 2 bytes. The compiler knows that integers are 2-byte animals, and, if we're going to end up with a usable address, it had better be pointing to the beginning of the next integer.

Quiz time.

A character array has a beginning address of *73455*. A pointer to character, p1, has been initialized to the starting address of the array. What address will we get if we increment the pointer?

Answer: *73456*. Character data requires 1 byte of storage for each element in the array. Adding 1 to the pointer yields the address of the next element in the array. In this case, the next element is 1 byte higher in memory.

The proof.

Now's a good time to dig into Listing 1. Type it in, compile and run it. The output should look something like this:

```
+0  p1 = 71926    &p1 = 72910    *p1 = 65

+0  p1 = 71926    &p1 = 72910    *p1 = 65
+1  p1 = 71927    &p1 = 72910    *p1 = 66
+2  p1 = 71928    &p1 = 72910    *p1 = 67

+0  p2 = 71930    &p2 = 72914    *p2 = 10
+1  p2 = 71932    &p2 = 72914    *p2 = 11
+2  p2 = 71934    &p2 = 72914    *p2 = 12

Press space bar
```

The table this program prints sums up everything we've discussed about pointers. Take a look at the first line of the table. Using what you've just learned, what's the address of the letter *A* (65) in the character array array1[]? If you answered 71926, then you probably have a good basic understanding of how pointers work.

For those of you who are still confused, don't fret. It'll sink in as you get accustomed to using them. Let's go through the program and see what's going on.

Lines 2 and 3 declare the arrays and pointers, as well as initializing the arrays. Line 7 puts the address of the first element of array1[] into the character pointer p1.

Line 8 prints out the four values in our table: the amount added to the pointer, the contents of the pointer, the address of the pointer, and the contents of the address the pointer's pointing to. The first line of the table will be printed again when we get into the loop at Line 9. The reason for this is to show you that setting the pointer with the array name is equivalent to setting it with the address operator preceding an array element. In this case, we're comparing array1 with &array1[0].

Lines 9 through 12 move through array1[], using the address operator. Each pass through the loop prints one line of our table.

Lines 14 through 17 accomplish the same thing, only now we're cycling through an array of integers, incrementing the pointer with the incrementation operator instead of with the address operator.

A glimpse of macros.

Notice that, in Listing 1, we've used printf() three times, in almost exactly the same way. In fact, the only difference between them is the name of the pointer we're working with. If the programmer's voice within you is screaming that it's stupid to code the same thing three times, then listen to it. It's right. C provides us with a handy technique to avoid this type of redundant code. The technique involves the use of macros.

As with pointers, you've already been exposed to macros—though you were probably unaware of it. Every time you use the #define statement, you're setting up a macro. We've done this dozens of times over the last few months, but only in the simplest fashion. Macros can be quite complex and are powerful programming aids.

Listing 2 is a modification of Listing 1. Here, each occurrence of the printf() call has been replaced with a macro call. The macro itself is defined in Line 2. Any legal variable name can be used as a macro name.

See the parentheses? This macro contains an argument that will be passed when the macro's expanded (the substitution of the replacement string). In our example, the argument will be the pointer name we want printed in the table.

Of course, just placing the argument in the macro name isn't enough. We've got to tell the macro where we want the argument used in the expansion. In our example, ev-

ery Z in the replacement string will be replaced by the argument supplied when the macro is called.

Lines 9, 13 and 17 show the macro calls. In Lines 9 and 13, p1 will be substituted into the replacement string, and the code generated by the compiler preprocessor will look identical to Line 8 in Listing 1. In Line 18, p2 will be substituted.

Changes for Megamax.

There's little doubt that Megamax C will be a popular development system. For that reason, I'm going to try to keep this column compatible with both the DRI and Megamax compilers—or, at least, note the differences when they pop up.

At this time, I don't know if that'll be practical in the long run, or not. Once we get more involved with GEM, the differences between the two compilers may force us to make a choice. I can't promise anything for the future. We'll just have to see what happens.

Some differences I noted this month involved the function getchar() and the use of macro arguments within strings.

Megamax C has its own interpretation of the way getchar() should work. You'll find, rather than grabbing one character and continuing on, it'll wait for a carriage return. Ironic, when you consider that the DRI version of getchar() doesn't recognize carriage returns at all.

Also, Megamax C doesn't allow macro arguments within strings. Listing 2, when compiled from Megamax, will print the Zs in the printf() control string literally, rather than substituting the argument passed to it. However, the values in the table will be correct.

Till next month, happy compiling.

Listing 1.
C listing.

```
#include <stdio.h>

char *p1, array1[] = "ABC";
int *p2, array2[] = {10, 11, 12};

main()
{
   int x, ch;

   p1 = array1;
   printf("+0  p1 = %ld    &p1 = %ld    *p1 = %d\n\n", p1, &p1, *p1);
   for (x = 0; x < 3; ++x) {
      p1 = &array1[x];
      printf("+%d  p1 = %ld    &p1 = %ld    *p1 = %d\n", x, p1, &p1, *p1);
      }
   printf("\n");
   for (x = 0, p2 = array2; x < 3; ++x) {
      printf("+%d  p2 = %ld    &p2 = %ld    *p2 = %d\n", x, p2, &p2, *p2);
      ++p2;
      }
   printf("\nPress space bar");
   ch = getchar();
}
```

Listing 2.
C listing.

```
#include <stdio.h>
#define PRINT(Z) printf("+%d  Z = %ld    &Z = %ld    *Z = %d\n", x, Z, &Z, *Z)

char *p1, array1[] = "ABC";
int *p2, array2[] = {10, 11, 12};

main()
{
   int x = 0, ch;

   p1 = array1;
   PRINT(p1);
   printf("\n");
   for (x = 0; x < 3; ++x) {
      p1 = &array1[x];
      PRINT(p1);
      }
   printf("\n");
   for (x = 0, p2 = array2; x < 3; ++x) {
      PRINT(p2);
      ++p2;
      }
   printf("\nPress space bar");
   ch = getchar();
}
```

ST news and information

by Ian Chadwick

It's not easy trying to think up something witty with which to begin a new column. So I'll save the wit for a later issue.

Let's talk about languages, instead.

ST developers and users are high on C these days, citing portability between machines, modular structure, etc., as reasons for enthroning it as language of choice. I'm not so sure it fits. We heard the same gushing praise for Pascal when it arrived, and even for FORTH. (Argh! Try as I might, I could never get my head bent enough to learn to program backwards in FORTH style. . .)

I'm in favor of BASIC, myself. Hands up, everyone who agrees. See? A lot of us out there don't want a career as a programmer, but want to tinker, hack and write little programs to amuse ourselves and our children, or to put up on CompuServe as monuments to our abilities. Good ol' BASIC suits that need, or would if there were a decent version on the ST.

C is a superior developer's language, and I agree about all of its benefits—except ease of learning. It takes dedication and effort, which equates with time. Time is something a lot of us have little of today.

BASIC is *easy* to learn. It lets you fumble around, write sloppy code, experiment and see the results right away. It's immediate. And lots of fun. I've never heard anyone describe C as fun. And *fun* was one

// Ian's Quest *continued*

of the reasons I bought a computer, back in the Pleozoic.

ST BASIC is awful, simply put. It's slow, clumsy, does awkward things with windows and doesn't like TOS in ROM. Wonderful. One sure way of moving everyone to C is to give them a terrible BASIC. Atari managed to do that. The ever-churning rumor mill has it that they have a *new* BASIC due out very soon now, which fixes everything. Sure. After Halley's Comet, I gave up on wonders.

BASIC is the people's language. It may not be the best, but I don't know any computer owner who doesn't know *some* BASIC, or who hasn't tinkered with programming in it. BASIC programmers often graduate to assembly language, if they move upward at all.

To me, assembler is superior to *any* high-level language. Hey, you're speaking the *machine's* language, not through some interface. You and your computer can have a real conversation in assembler, once you learn to translate into hex in your head.

My first experience with my brand new ST was to load TOS (from disk, of course), load BASIC (ditto; no one had considered the advantages of putting it in ROM, or at least on a cartridge, like the 8-bit line), to find I had 5K free.

The mind boggles. I had started in about 1979 with 16K, at which point, people were shouting about all the memory they had to work in (machines had gone from 4K to 16K in the preceding year). I crawled up to 48K, 64K, 128K—and now, on my half-meg machine, I was reduced to 5K! The benefits of an advancing technology . . . It tends to color one's approach to BASIC, to say the least.

At the Atlanta COMDEX, I was given a copy of Softworks BASIC, a compiled BASIC with a *lot* of commands, plus complete access to AES, VDI, BIOS and the rest of the GEM functions (more than some versions of C offer). It should be great; it has oodles of features and compiles your code, removing the *numero uno* complaint about BASIC—slowness. But there are strings attached, as always.

Softworks BASIC doesn't have an interpreter. Being able to write your code and test it as you work is BASIC's main advantage for the non-professional. If C had an interpreter, it would probably take over a lot of BASIC users. The process for this BASIC is much like that for C; you write the code using a word processor (they provide **1st Word** on the disk, but it's not my favorite choice), then compile it.

You don't see the results of your efforts until the very end, so if you find bugs, it's back to the text file again. But, before you run the program, enter their runtime system. What? Yes, that's right. . .you don't create stand-alone code, only an intermediate code. It can't be run by anyone else, unless they also have the runtime program. This suggests either that they expect everyone will buy a copy, or that you can distribute the runtime system freely. Nothing in the manual suggests otherwise; it lacks even the basic copyright information (those lines about: "distribute this program, and we break your legs"). Big mistake. All BASICs need an interpreter. Carve that one in stone, please.

Second mistake: compilers should produce stand-alone code. Hand me the chisel again, for law number two. This intermediate stuff harks back to the good old days of the Apple II+ and TRS-80 Model 1 (and the brontosaur). We've come a tad further than mandatory runtime programs (especially if those aren't for free distribution).

Mistake number three (this is like Monty Hall, isn't it?): the manual. Manuals are a subject dear to my heart, having written so many in my time. To call this one terse is to lean toward understatement. Curt is a better adjective. It's a modest reference document, if you're already familiar with BASIC; otherwise, it's rather like Linear B. Several important (and powerful) commands are given a few threadbare lines of description, rather than the lengthy explanations they deserve. Functional examples are so rare as to be an endangered species.

Many of the commands are not found in the Atari 8-bit universe (they come from the IBM or TRS worlds, I gather), so a lot of ST owners won't be familiar with them. You can probably figure out half of the basic command list from your background BASIC use, but the rest are baffling.

The GEM information is spartan, and the error message description cryptic. This keeps book publishers happy; they gleefully churn out books to decode the abysmal manuals that accompany most software.

Bottom line: looks very good, but needs serious work. This could be the dynamite BASIC we've all been waiting for, once these three elements are patched up. (It's a major overhaul, but think of the fame, the riches, the glory!) Until then, it has a limited audience, unfortunately.

Lest we forget, there are two other languages vying for space on CompuServe's ATARI16 SIG: OSS's Personal Pascal and TDI's Modula-2.

I've played minimally with Pascal on other machines and know of its popularity, but I haven't worked with the OSS version. All I can say is that it has a good reputation (as does the company), and the text editor that accompanies it is superb. I know programmers who bought it for its non-GEM text editor, to write assembly code!

I bought Modula-2 and tinkered a bit, although I haven't seen the latest release (mine's version 1, and I've been lazy about returning my disks for an upgrade). Word has it that it's pretty good. The interesting thing is that Pascal and Modula-2 were both written by Niklaus Wirth, Modula-2 being the later—and some say more advanced—version of Pascal.

The greatest difficulty is finding entry-level teaching books on it. It's relatively new and unpopular, although it offers some very potent programming features for the HLL (that's high-level language, folks) crowd, who want to go beyond BASIC. Who knows, I might even get around to serious tinkering when I finally get version 2.

Finally, a serious question. Do you really need to learn to program? It's a lot like cars: you can learn to drive, go shopping, pick the kids up, race around the streets and even parallel park downtown—without ever once learning to change a spark plug.

Programming is auto mechanics for the computer. You don't need to program to use a computer. If your main use is word processing (like 94% of us, according to one survey I read) or games, then why bother?

I don't need to learn C to enjoy playing **Time Bandit** on Ethel. (Jerry Pournelle names *his* computers, so I call my 130XE Fred, and my ST is Ethel. I toyed with Bert and Ernie, Roy and Dale, and even Ford Prefect and Arthur Dent.)

Anyway, aside from the writing aspects, I use my computer to play games. When I finally get tired of other people's games, I'll sink my teeth into one of those HLL's and write my own. ■

Ian Chadwick is the author of Mapping the Atari *(Compute! Books, 1983, 1985) and has been employed as a writer, editor, journalist, cook, salesman, house painter and itinerant fruit picker, among other things. He lives in Toronto with his wife, six cats and one beleaguered dog, whom he's trying to teach to play chess.*

ST INDEX TO ADVERTISERS

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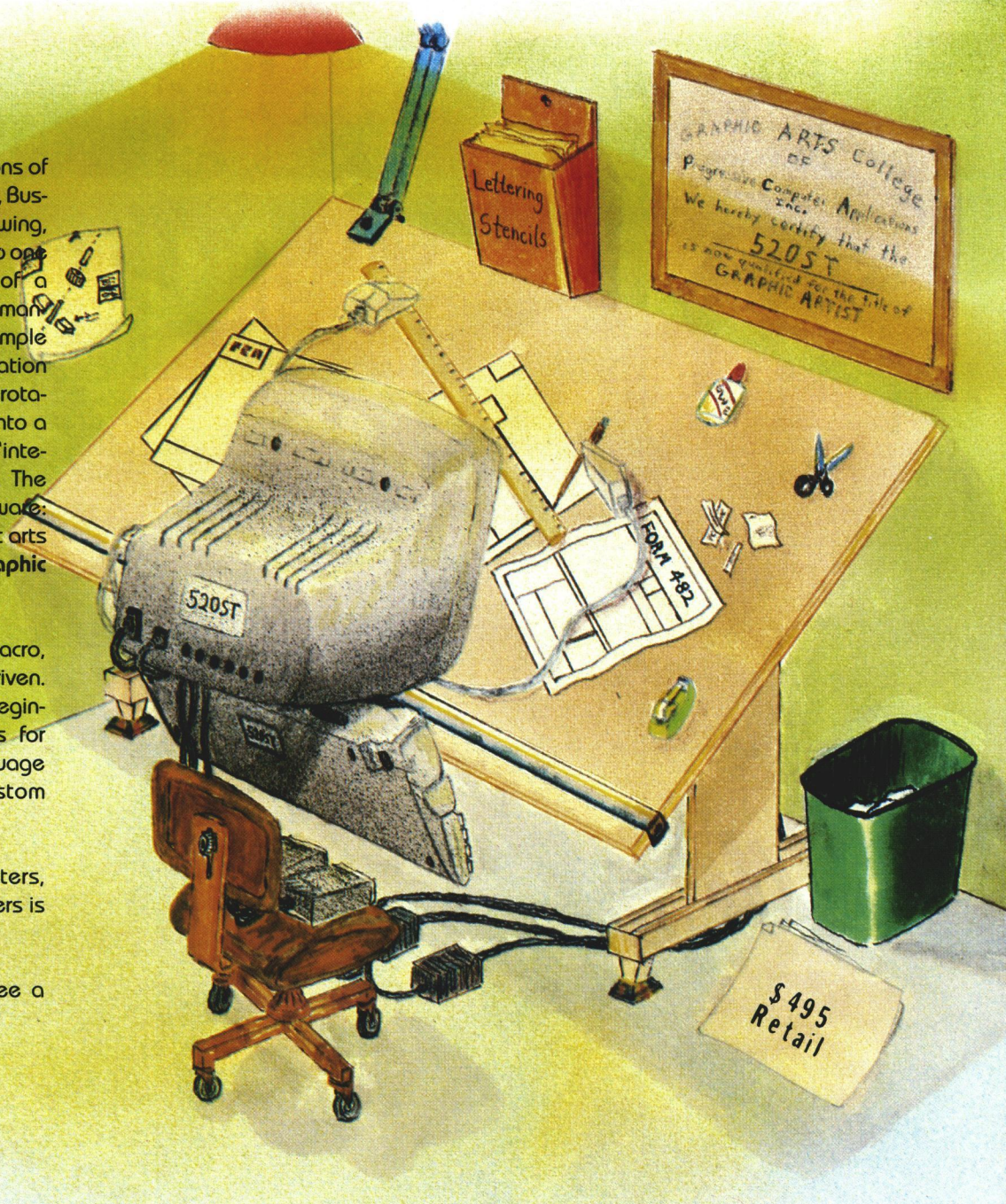

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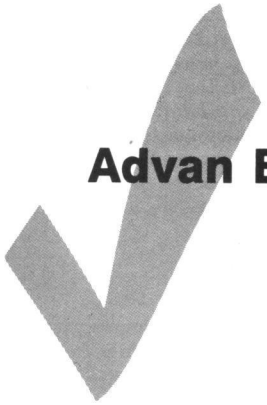

Advan BASIC Compiler

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by Bob Curtin

In recent years, BASIC has developed into a rich and detailed (if rather scruffy) language. And, despite the obituaries, I think it will be with us for quite a while.

For one thing, great products like the **Advan BASIC Compiler** (we'll call it **ABC**) keep hitting the market. The **ABC** makes all of Atari BASIC's commands available to you. That's only the beginning, though.

ABC has so much for the BASIC programmer, my first impression was that it definitely wasn't for the beginner. I've changed: **ABC** is so easy to use that it's appropriate for beginners *and* advanced programmers. If you've used BASIC before, you'll have no problems with **ABC**. If you haven't, learning the **ABC** way will be no more difficult than the Atari BASIC way.

Compiler and assembler are integrated; compilation takes place with a single command. You can simply compile and run the program, or you may compile and save the object code, to be run later.

In any case, using the package is effortless. It more resembles using an interpreter than using a compiler.

Over and above the Atari BASIC commands (or their equivalents) is a vast array of new goodies, which make life easier for the programmer in any application. For example, **ABC** adds some control structures usually found only in the structured languages like Pascal or C.

ABC uses IF DO ELSE (ENDIF), an extremely useful variation on the IF. . .THEN . . .ELSE instruction. Also available are WHILE (WEND), REPEAT UNTIL and the beautifully efficient CASE command. These, coupled with the ability to define your own functions and use named subroutines (similar to the procedure in Pascal), finally allow the BASIC programmer to write elegant, structured, comfortable readable programs.

ABC can store numbers in either integer or real form. The advantage in using integers over real numbers is that real numbers require 6 bytes of memory for storage. Integers require only 2. Additionally (pun intended), calculations with integers run about three times faster than those using real numbers.

ABC permits string arrays and provides a full range of built-in string manipulation functions, including LEFT, RIGHT, MID, LEN, ASC, STR$, CHR$ and INSTR.

Handling data in **Advan BASIC** is made easier with some additional commands. POKEW (POKE Word) will store a 16-bit word in a specified memory location, in the usual low-byte-first format. PEEKW is available, so the programmer can peer into the 2 bytes and get the value stored there.

LOADST (LOAD STack) and POPST (POP STack) allow the programmer to load values onto the stack (page 1 in memory), or pull values off. These two commands make passing values to subroutines (especially machine language subroutines) and back again quick and painless.

There are many more built-in functions available in **ABC**, including a full range of trig functions (most of which had to be derived in Atari BASIC). There are a couple worth noting. FIX(X,Y), for instance, will round the real value (X) to the number of decimal places specified by the integer (Y). GETKEY returns the ASCII value for a key that's been pressed (*0* if no key has been pressed).

PRINT and LPRINT are augmented in **ABC** by the two commands *PRINT USING* and *LPRINT USING*. These format output to the printer or screen, allowing right justification, decimal place specification (with trailing zeroes), alignment of decimal places, and a lot more.

The system command *WIDTH* allows you to specify the printing width (default is *75*), and **ABC** includes a handy little TAB function that lets you specify the column you want to print in.

There's a full range of normal graphics commands, as well as a batch of new player/missile commands. PSIZE allows you to set the size of the player. HPOS sets the horizontal position of a player. PDISPLAY defines and sets vertical position, while DFILL is used to clear a player.

In addition, there are functions and commands which allow automatic movement of players and missiles. These set speed, synchronize movement and detect collisions.

Sound is handled just as thoroughly, with commands for volume, level, distortion, attack and decay. A programmer can write sound routines, then call them and have them run automatically, while the program's doing other things.

There are even a couple of display list interrupt commands that let you change values on the fly—such as the color of individual mode lines.

ABC has the nicest interface between assembly and BASIC that I've ever seen. Using the command *CODE*, somewhat altered 6502 assembly language source code can be written into the BASIC source code, then assembled during compilation.

ABC comes with two copy-protected disks (one's for backup) and a 119-page tutorial/reference manual. The disks contain the compiler/assembler/editor and a number of useful utilities, including a program to convert previously written Atari BASIC programs over to a form acceptable to **ABC**.

I heartily recommend the package on the strength of **Advan BASIC** alone, but there's more. For a measly $29.95 each, you can get a disk full of utilities and a disk with a screen design program.

The utility disk (among other things) contains a program enabling people who don't own **Advan BASIC** to use your compiled programs. This formats a disk and places a special "execute module" on it.

The same disk has a renumbering utility, a comprehensive variable/line number lister, a library of named subroutines. The latter, appended to a program, allows the use of commands to print matrix data; input or read data to a matrix; add, subtract or multiply matrices; set the elements of one matrix equal to another; calculate the determinant, inverse or transposition of a matrix; or set particular matrix values.

There are utilities which, once appended to a program, allow you to easily perform DOS operations from within the program—via the commands *KILL, LOCK, UNLOCK, DIR* and RENAME. Finally, there's a subroutine to let you change any number from one base to another, say from base 10 (decimal) to base 8 (octal). This command can be used in your programs to change values on the fly.

The screen design disk contains a program vaguely reminiscent of **MicroPainter**, but with a few twists. The **ABC** program lets you design a graphics display with any standard graphics mode, or you can use a "custom mode," in which you mix several different graphics modes in one display. You can even specify horizontal and/or vertical fine scrolling.

Once you've designed a screen, you can save it to disk and, with the subroutines included on the graphics disk (which must be appended to your program), you can load the display from the program—with horizontal and vertical fine scrolling.

I have to tell you, after many hours spent before the ST with Tom Hudson's **DEGAS**, using this program felt awkward and incredibly slow. I guarantee that anyone with a touch tablet or mouse-driven art or drawing program will feel the same way. However, the Advan program is solid and comprehensive enough to give remarkably good results, with patience and a little practice. (How soon we forget what it was like a couple years ago!)

To sum up: for programmers planning to stick with BASIC for a while, but who'd like a lot more speed, power and flexibility, this is definitely a package worth looking into. At less than fifty bucks, the **Advan BASIC Compiler** is a deal and a half. Buying the other two disks at less than thirty dollars each is something akin to petty larceny. ■

Bob Curtin bought an Atari 800 in 1982, to write, program and telecommunicate.

RAM DOS XL

A resident DOS for your 800XL

by Angelo Giambra

DOS XL is an excellent disk operating system. It's versatile, easy to use and has many nice features. But what fun is it, if we can't complain about something?

There are those annoying COM files that have to be loaded any time you want to copy files, or format a disk, or duplicate disks, or. . .well, you get the idea. Too bad we couldn't just have all those utilities resident in RAM—where we could have instant access to them whenever we needed them.

RAM Operating System for Atari XLs, an article in **ANALOG Computing**'s issue 29, pointed out a very interesting fact about XL computers. There's a 16K block of RAM in every XL, more or less just sitting there doing nothing. It shares memory addresses with the OS; in a sense, it lies "beneath" the OS. Trouble is, to get at it you have to *disable* the OS. . .and when you do that—crash!

Of course, the above's not exactly true. If you do it *just right*, you can turn the 16K block of RAM on long enough to stuff a bunch of files in there, where you can retrieve them later. In a sense, your XL has a mini-RAMdisk built right in.

The nice part about all of this is: anything stored in the leftover area of RAM doesn't take room away from anything else running on the system. It's normally invisible to the system, anyway.

Setting it up.

Type in Listing 1 (which we'll call the **RAM DOS XL** program), using **M/L Editor** and name the resultant file AUTORUN.SYS. This file will allow you to place certain COM files in the mini-RAMdisk area. You can then use COPY, INIT, DUPDSK, or other utilities—without having to load them from disk each time. Here's what to do.

Place the AUTORUN.SYS file on a DOS XL disk. Whenever you boot from this disk, the file will load and execute.

The **RAM DOS XL** program looks for any files with the extension *MEM*. As they are found, each "MEM" file is loaded, then moved up into the RAMdisk area.

Before explaining how you can get at the files in the mini-RAMdisk area, I should tell you of certain limitations.

First, only 14K of extra RAM is really available for the mini-RAMdisk. The 2K block from $D000 to $D7FF is unusable, because the XL employs it for I/O control. The AUTORUN.SYS program automatically skips over this area as it loads the files.

Second, you obviously can't fit all the COM files into 14K of memory. So you have to be a little choosy about which files you want to put in memory. I've found that COPY.COM, INIT.COM, DUPDSK.COM and DUPDBL.COM all fit quite comfortably. Those are the ones used most often, at any rate.

Let's assume you want these four COM files loaded into the mini-RAMdisk. Rename each one of the files with the *MEM* extension (*COPY.COM* becomes *COPY.MEM*, etc.). Now, turn off your system and reboot from the disk again.

You'll notice loading now takes a little longer, since each MEM file is being loaded into the mini-RAMdisk.

If you try to put too many COM files into memory, **RAM DOS XL** will display the name of the first file that doesn't fit and will stop loading files at that point. It loads files in the order in which it finds them in the directory. So, if you see a filename displayed, it means that file and all the following MEM files were *not* loaded into the mini-RAMdisk.

Okay, so how do we get at the utilities? Easy. From the DOS XL command line, key in *RUN 2300*, followed by the command you would normally have entered.

An example: to copy file A from drive 1 to drive 2, renaming it *B*, key in: *RUN 2300 COPY D1:A D2:B.* Or, to run the DUPDSK program, key in: *RUN 2300 DUPDSK.*

As before, if you were using BASIC and had a program loaded, that program will be wiped out when using these utilities, so save any BASIC program first.

In order for all this to work, a small portion of the AUTORUN.SYS file remains resident in memory, beginning at hex $2300. It protects itself by raising the LOWMEM pointer. It will remain resident even across SYSTEM RESETs.

An explanation.

So how does it all work? As the AUTORUN.SYS program (aka **RAM DOS XL**) encounters each file with the extension *MEM*, it loads the file intact into an area of RAM. It then switches out the OS, making the 16K block of RAM visible.

Starting at hex address $C000, **RAM DOS XL** moves the first MEM file up beneath the OS. At $FE00, a directory of each loaded file is kept. The directory contains the first eight characters of each file loaded, followed by the 2-byte address where the file was loaded.

Now suppose you key in the following: *RUN 2300 COPY D1:*.* D2:*. The program residing at hex 2300 switches out the OS and examines the directory at $FE00, looking for the file named COPY. If that's found, the program looks at the next 2 bytes to find where the file resides.

It then uses the same method DOS does whenever you load a binary file into memory. It examines the header bytes, to determine the starting and ending memory addresses, and moves the code into that address range. If the file's a compound file, additional header bytes are examined, and the process continues. End of file is indicated by four trailing zeroes.

Next, the program copies any parameters for the file's program into DOS XL's command line buffer at hex $1655. Finally, the OS ROM is switched back in, and the program jumps to the starting address of the utility.

If you liked using DOS XL before, you're going to love working with it now. And you'll have the additional satisfaction of knowing that you're getting your money's worth out of that extra 16K block of RAM!

Angelo Giambra is a senior analyst/programmer for Marine Midland Bank in Buffalo, N.Y. He holds a B.A. in English Literature and has been in the data processing field for eight years. He has been an avid Atari hobbyist since he bought his computer three years ago. An incessant tinkerer, he enjoys writing machine language utilities and extensions to the OS and DOS.

Listing 1.
BASIC listing.

```
1000 DATA 255,255,0,64,1,64,68,58,143,
64,138,65,105,1,46,77,876
1010 DATA 69,77,173,1,211,133,140,169,
0,133,136,169,192,133,137,169,9912
1020 DATA 0,133,134,133,156,169,0,133,
130,169,49,141,0,3,169,1,2762
1030 DATA 141,1,3,169,82,141,2,3,169,6
4,141,3,3,169,2,141,1591
1040 DATA 6,3,169,15,141,4,3,169,64,14
1,5,3,169,128,141,8,2030
1050 DATA 3,169,0,141,9,3,173,143,64,1
41,10,3,173,144,64,141,3986
1060 DATA 11,3,32,89,228,164,130,185,1
5,64,208,3,76,49,36,41,2012
1070 DATA 64,240,32,24,165,130,105,13,
168,162,1,185,15,64,221,145,6339
1080 DATA 64,208,16,200,232,224,4,208,
242,32,55,65,165,156,240,3,8464
1090 DATA 76,49,36,24,165,130,105,16,4
8,4,133,130,208,199,238,143,8779
1100 DATA 64,208,3,238,144,64,230,134,
165,134,201,8,144,3,76,49,5297
1110 DATA 36,76,168,64,24,165,130,105,
5,168,162,0,32,11,36,185,2495
1120 DATA 15,64,201,32,240,12,157,2,64
,157,0,254,200,232,224,8,8911
1130 DATA 208,237,160,8,165,136,153,0,
254,165,137,200,153,0,254,32,9190
1140 DATA 23,36,160,0,185,145,64,157,2
,64,200,232,192,4,208,244,432
1150 DATA 169,155,157,2,64,162,16,169,
12,157,66,3,32,86,228,162,4936
1160 DATA 16,169,3,157,66,3,169,0,139,
65,134,66,157,68,3,169,3591
1170 DATA 64,157,69,3,169,4,157,74,3,3
2,86,228,169,7,157,66,4062
1180 DATA 3,169,139,157,68,3,169,66,15
7,69,3,169,16,157,72,3,2333
1190 DATA 169,39,157,73,3,32,86,228,16
9,0,141,47,2,165,20,197,4257
1200 DATA 20,240,252,189,72,3,133,138,
189,73,3,133,139,169,139,133,8071
1210 DATA 132,169,66,133,133,32,11,36,
160,0,177,132,145,136,230,132,7954
1220 DATA 208,2,230,133,32,45,66,165,1
56,208,96,198,138,165,138,201,1172
1230 DATA 255,208,2,198,139,5,139,208,
225,162,4,169,0,145,136,32,6360
1240 DATA 45,66,202,208,246,32,23,36,1
69,34,141,47,2,24,173,77,2891
1250 DATA 65,105,10,141,77,65,141,90,6
5,141,96,65,141,77,66,144,4637
1260 DATA 12,238,78,65,238,91,65,238,9
7,65,238,78,66,96,230,136,9242
1270 DATA 208,24,230,137,165,137,201,2
54,208,4,230,156,208,12,201,208,3379
1280 DATA 208,8,230,137,165,137,201,21
6,208,248,96,169,42,141,0,254,1544
1290 DATA 32,23,36,169,34,141,47,2,162
,0,169,11,141,66,3,169,2468
1300 DATA 2,141,68,3,169,64,141,69,3,1
60,0,185,2,64,201,155,4832
1310 DATA 240,3,200,208,246,152,141,72
,3,169,0,141,73,3,32,86,2949
1320 DATA 228,169,0,133,20,165,20,201,
135,66,138,66,200,144,250,96,9343
1330 DATA 0,35,251,35,173,1,211,141,21
6,22,133,140,169,0,133,141,7524
1340 DATA 133,128,133,129,141,47,2,165
,10,141,8,36,165,11,141,9,1543
1350 DATA 36,165,20,197,20,240,252,32,
11,36,162,0,160,9,185,85,4706
1360 DATA 22,201,32,240,35,201,155,240
,31,221,0,254,208,4,200,232,2235
1370 DATA 208,236,230,141,165,141,201,
5,208,3,76,237,35,24,165,128,7318
1380 DATA 105,10,133,128,166,128,208,2
12,165,128,24,105,8,168,185,0,6686
1390 DATA 254,133,141,200,185,0,254,13
3,142,160,0,162,0,177,141,149,8699
1400 DATA 143,200,208,3,32,220,35,232,
224,2,208,241,165,143,201,255,4618
1410 DATA 208,10,165,144,201,255,208,4
,162,0,240,225,165,129,208,12,793
1420 DATA 165,143,141,8,36,165,144,141
,9,36,230,129,165,143,208,7,7530
```

```
1430 DATA 165,144,208,3,76,237,35,162,
0,177,141,149,154,200,208,3,8941
1440 DATA 32,220,35,232,224,2,208,241,
152,72,177,141,160,0,145,143,9731
1450 DATA 104,168,200,208,3,32,220,35,
230,143,208,2,230,144,165,144,946
1460 DATA 197,155,144,228,165,143,197,
154,144,222,240,220,162,0,240,141,4363
1470 DATA 230,142,165,142,201,208,208,
8,230,142,165,142,201,216,208,248,6554
1480 DATA 96,32,23,36,169,34,141,47,2,
162,0,160,9,185,85,22,2157
1490 DATA 252,35,69,36,157,85,22,201,1
55,240,4,200,232,208,242,32,1529
1500 DATA 255,255,96,120,169,0,141,14,
212,169,254,141,1,211,96,165,108
1510 DATA 140,141,1,211,88,169,64,141,
14,212,96,32,255,255,169,49,9699
1520 DATA 141,231,2,169,36,141,232,2,9
6,165,12,141,36,36,165,13,3464
1530 DATA 141,37,36,169,35,133,12,169,
36,133,13,76,38,36,224,2,2037
1540 DATA 225,2,149,64,0,0,0,0,0,0,0,0
,0,0,0,0,2472
```

●

Listing 2.
Assembly listing.

```
          .OPT NO LIST
; ***************************
; *                         *
; *     RAM RESIDENT        *
; *     DOSXL LOADER        *
; *          by             *
; *     A. Giambra          *
; *                         *
; *  WRITTEN IN MAC/65      *
; ***************************
;
          *=  $4000
;
; OS EQUATES
;
DDEVIC    =   $0300    ;DEVICE
DUNIT     =   $0301    ;DRIVE UNIT
DCOMND    =   $0302    ;I/O COMMAND
DSTATS    =   $0303    ;STATUS
DBUFLO    =   $0304    ;BUFFER ADDRESS
DTIMLO    =   $0306    ;TIMEOUT
DBYTLO    =   $0308    ;DIRECTION
DAUX1     =   $030A    ;SECTOR
SIOV      =   $E459    ;OS SIO ROUTINE
CIOV      =   $E456    ;OS I/O ROUTINE
OS        =   $C000    ;START OF OS RAM
NMIEN     =   $D40E    ;NMI REGISTER
PORTB     =   $D301    ;RAM ON/OFF
ICCOM     =   $0342    ;COMMAND
ICBAL     =   $0344    ;BUFFER ADDRESS
ICBLL     =   $0348    ;BUFFER LENGTH
ICAX1     =   $034A    ;AUXIALIARY INFO
DOSFLAG   =   $16D8    ;COLDSTART FLAG
DOSVEC    =   $0A      ;DOS VECTOR
DOSINI    =   $0C      ;DOS INITIALIZE
SDMCTL    =   $022F    ;DMA CONTROL
RTCLOK    =   $14      ;CLOCK
DOSBUFF   =   $1655    ;DOSXL BUFFER
LOMEM     =   $02E7    ;LEMEM POINTER
PUTC      =   $0B
READ      =   $52      ;I/O COMMANDS
OPEN      =   $03
CLOSE     =   $0C
GETCHAR   =   $07
DRIVENO   =   $31      ;DRIVE #1
INPUT     =   $40      ;I/O DIRECTION
;
; WORK AREAS
;
OSDIRECTORY = $FE00
OSINDEX   =   $80      ;WORK INDEXES
INDEX     =   $82
INDEX1    =   $84
NUM       =   $86
OSRAM     =   $88
COUNT     =   $8A      ;COUNTER
SAVE      =   $8C      ;SAVE PORTB VALUE
LOADINDEX =   $8D
LOADADDR  =   $8F      ;LOAD ADDRESS
LOADEND   =   $9A      ;END LOAD ADDRESS
FLAG      =   $9C
SPACE     =   $20
CR        =   $9B
PREFIX    .BYTE "D:"
FILENAME
          $=  $+13
DIRECTORY
          $=  $+128
SECTOR    .WORD $0169 ;DIRECTORY
SUFFIX    .BYTE ".MEM"
START
          LDA PORTB    ;SAVE VALUE OF
          STA SAVE     ;PORTB
          LDA # <OS
          STA OSRAM    ;INIT INDEXES
          LDA # >OS
          STA OSRAM+1
          LDA #0       ;INITIALIZE NUM
          STA NUM
          STA FLAG     ;ZERO FLAG
READDIR
          LDA #0       ;INITIALIZE INDEX
          STA INDEX
          LDA #DRIVENO ;LOAD DRIVE NO.
          STA DDEVIC
          LDA #1
          STA DUNIT    ;DRIVE 1
          LDA #READ
          STA DCOMND   ;READ SECTOR
          LDA #INPUT   ;SET
          STA DSTATS   ;DIRECTION
          LDA #2       ;SET
          STA DTIMLO   ;TIMEOUT
          LDA # <DIRECTORY
          STA DBUFLO   ;POINT TO BUFFER
          LDA # >DIRECTORY
          STA DBUFLO+1
          LDA #128     ;TRANSFER 128
          ;            BYTES
          STA DBYTLO
          LDA #0
          STA DBYTLO+1
          LDA SECTOR   ;POINT TO SECTOR
          STA DAUX1
          LDA SECTOR+1
          STA DAUX1+1
          JSR SIOV     ;DO THE I/O
CHECKSTATUS
          LDY INDEX    ;POINT TO ENTRY
          LDA DIRECTORY,Y
          BNE OK       ;LAST ENTRY?
          JMP INITIALIZE ;YES
OK
          AND #$40     ;FILE IN USE?
          BEQ FINDNEXT ;NO
          CLC
          LDA INDEX
          ADC #13      ;POINT TO EXTEN.
          TAY
FINDMEM
          LDX #1
COMPARE
          LDA DIRECTORY,Y ;DOES IT
          CMP SUFFIX,X ;EQUAL "MEM"
          BNE FINDNEXT ;NO
          INY
          INX
          CPX #4       ;DONE?
          BNE COMPARE
          JSR LOADER   ;LOAD THE FILE
          LDA FLAG     ;DID WE OVERFLOW?
          BEQ FINDNEXT
          JMP INITIALIZE ;YES,GET OUT
FINDNEXT
          CLC
          LDA INDEX    ;ADD TEN TO INDEX
          ADC #$10
          BMI NEXTSECTOR
          STA INDEX    ;STILL IN THIS
          BNE CHECKSTATUS ;SECTOR
NEXTSECTOR
          INC SECTOR   ;INC SECTOR
          BNE CHECKIT
          INC SECTOR+1
CHECKIT
          INC NUM      ;INC SECTOR COUNT
          LDA NUM
          CMP #8       ;DONE WITH 8 SECTORS?
          BCC BACK     ;NOT YET
          JMP INITIALIZE
BACK
          JMP READDIR ;DO NEXT SECTOR
LOADER
          CLC
          LDA INDEX    ;POINT Y REGISTER
          ADC #5       ;TO FILENAME
          TAY
          LDX #0
          JSR ROMOFF   ;TURN OFF ROM
MOVENAME
          LDA DIRECTORY,Y
          CMP #SPACE   ;DONE WITH NAME?
          BEQ DONE
          STA FILENAME,X ;NO, STORE IT
STORE
          STA OSDIRECTORY,X ;SAVE NAME
          INY
          INX
          CPX #8       ;DONE?
          BNE MOVENAME
DONE
          LDY #8       ;PUT RAM ADDR IN
          LDA OSRAM    ;OUR DIRECTORY
D1
          STA OSDIRECTORY,Y
          LDA OSRAM+1
          INY
D2
          STA OSDIRECTORY,Y
          JSR ROMON    ;TURN ON ROM
          LDY #0
SUFF
          LDA SUFFIX,Y ;PUT EXTENSION
          STA FILENAME,X ;IN BUFFER
          INY
          INX
          CPY #4
          BNE SUFF
          LDA #CR      ;PUT IN AN EOL
          STA FILENAME,X
          LDX #$10     ;CHANNEL 1
          LDA #CLOSE   ;CLOSE THE CHAN
          STA ICCOM,X
          JSR CIOV     ;DO I/O
          LDX #$10     ;CHANNEL 1
          LDA #OPEN
          STA ICCOM,X ;OPEN COMMAND
          LDA # <PREFIX ;POINT TO
          STA ICBAL,X ;FILE NAME
          LDA # >PREFIX
```

```
          STA ICBAL+1,X
          LDA #$04    ;DIRECTION IS
;                  INPUT
          STA ICAX1,X
          JSR CIOV    ;OPEN THE FILE
          LDA #GETCHAR ;GET CHARACTERS
          STA ICCOM,X
          LDA # <BUFFER ;POINT TO BUF
          STA ICBAL,X
          LDA # >BUFFER
          STA ICBAL+1,X
          LDA # <10000 ;LOAD LOTS OF
          STA ICBLL,X ;CHARACTERS
          LDA # >10000 ;(MORE THAN
          STA ICBLL+1,X ;EXPECTED)
          JSR CIOV    ;DO THE I/O
          LDA #0
          STA SDMCTL  ;TURN OFF DMA
          LDA RTCLOK
WAIT
          CMP RTCLOK  ;WAIT 1 JIFFY
          BEQ WAIT
          LDA ICBLL,X ;FIND OUT HOW
          STA COUNT   ;MANY CHARACTERS
          LDA ICBLL+1,X ;WERE LOADED
          STA COUNT+1 ;SAVE THIS VALUE
          LDA # <BUFFER
          STA INDEX1  ;POINT INDEX1
          LDA # >BUFFER ;TO BUFFER
          STA INDEX1+1
          JSR ROMOFF  ;TURN OFF ROM
          LDY #0
DOMORE
          LDA (INDEX1),Y ;LOAD CHAR
          STA (OSRAM),Y ;STORE IN RAM
          INC INDEX1  ;BUMP UP INDEX1
          BNE AHEAD
          INC INDEX1+1
AHEAD
          JSR INCREMENT ;BUMP OSRAM
;                  INDEX
          LDA FLAG    ;DID WE OVERFLOW?
          BNE OVERFLOW
          DEC COUNT   ;DEC COUNTER
          LDA COUNT   ;DID WE DO ALL
          CMP #$FF    ;BYTES IN FILE?
          BNE TEST
          DEC COUNT+1
TEST
          ORA COUNT+1
          BNE DOMORE  ;STILL MORE TO GO
OUT
          LDX #4      ;NOW PAD END OF
PAD
          LDA #0      ;FILE WITH 4 0'S
          STA (OSRAM),Y
          JSR INCREMENT
          DEX
          BNE PAD
          JSR ROMON   ;TURN ROM ON
          LDA #34     ;TURN ON DMA
          STA SDMCTL
          CLC
          LDA STORE+1 ;BUMP UP THE
          ADC #10     ;DIREC. POINTERS
          STA STORE+1 ;BY TEN
          STA D1+1
          STA D2+1
          STA D3+1
          BCC NOCARRY
          INC STORE+2
          INC D1+2
          INC D2+2
          INC D3+2
NOCARRY
          RTS         ;AND RETURN
INCREMENT
          INC OSRAM   ;BUMP OSRAM INDEX
          BNE XIT
          INC OSRAM+1 ;BUMP HIGH BYTE
          LDA OSRAM+1
          CMP #$FE    ;DID WE OVERFLOW?
          BNE TESTIOAREA
          INC FLAG    ;YES,SET THE FLAG
          BNE XIT
TESTIOAREA
          CMP #$D0    ;IF I/O AREA, SKIP IT
          BNE XIT
BUMPIT
          INC OSRAM+1 ;BUMPI TILL
          LDA OSRAM+1 ;WE'RE OUT OF
          CMP #$D9    ;I/O AREA
          BNE BUMPIT
XIT
          RTS
OVERFLOW
          LDA #'$     ;CHANGE NAME IN
D3
          STA OSDIRECTORY ;DIRECTORY
          JSR ROMON   ;TURN ON ROM
          LDA #34
          STA SDMCTL  ;RESTORE DMA
          LDX #0      ;CHAN 0 (EDITOR)
          LDA #PUTC   ;PUT CHARACTERS
          STA ICCOM
          LDA # <FILENAME ;POINT TO
          STA ICBAL   ;FILENAME
          LDA # >FILENAME
          STA ICBAL+1
          LDY #0
GETLENGTH
          LDA FILENAME,Y ;FIND LENGTH
          CMP #CR     ;OF FILENAME
          BEQ GOTIT
          INY
          BNE GETLENGTH
GOTIT
          TYA
          STA ICBLL   ;STORE LENGTH
          LDA #0
          STA ICBLL+1
          JSR CIOV    ;WRITE FILENAME
          LDA #0      ;
          STA RTCLOK  ;ZERO THE CLOCK

PAUSE
          LDA RTCLOK  ;PAUSE FOR 200
          CMP #200    ;JIFFIES
          BCC PAUSE
          RTS
BUFFER
          *=  $2300
BEGIN
          LDA PORTB   ;SAVE VALUE IN
          STA DOSFLAG ;PORTB AND SET
          STA SAVE    ;COLDSTART FLAG
          LDA #0      ;INITIALIZE WORK
                      ;INDEXES
          STA LOADINDEX
          STA OSINDEX
          STA OSINDEX+1
          STA SDMCTL  ;SHUT OFF DMA
          LDA DOSVEC  ;SET EXECUTE
          STA GO+1    ;ADDRESS
          LDA DOSVEC+1
          STA GO+2
          LDA RTCLOK
IDLE
          CMP RTCLOK  ;WAIT ONE JIFFY
          BEQ IDLE
          JSR ROMOFF  ;SHUT OFF ROM
          LDX #0
INIT
          LDY #9
COMPRE
          LDA DOSBUFF,Y ;LOAD COMMAND
          CMP #$20    ;END?
          BEQ FOUNDIT
          CMP #CR     ;END?
          BEQ FOUNDIT
          CMP OSDIRECTORY,X ;IN DIREC.?
          BNE NEXTTEST ;NO
          INY
          INX
          BNE COMPRE
NEXTTEST
          INC LOADINDEX ;INC COUNTER
          LDA LOADINDEX
          CMP #5      ;END OF DIREC.?
          BNE ADDIT
          JMP EXECUTE ;YES, GET OUT
ADDIT
          CLC
          LDA OSINDEX ;ADD 10 TO
          ADC #10     ;OSINDEX
          STA OSINDEX
          LDX OSINDEX
          BNE INIT
FOUNDIT
          LDA OSINDEX
          CLC
          ADC #8      ;POINT Y TO RAM
          TAY         ;ADDRESS BYTE
          LDA OSDIRECTORY,Y
          STA LOADINDEX ;GET START ADDR
          INY
          LDA OSDIRECTORY,Y
          STA LOADINDEX+1
          LDY #0
          LDX #0
LOAD
          LDA (LOADINDEX),Y ;GET LOAD
          STA LOADADDR,X ;ADDRESS
          INY
          BNE OKAY
          JSR UPIT
OKAY
          INX
          CPX #2      ;GET 2 BYTES?
          BNE LOAD
          LDA LOADADDR
          CMP #$FF    ;IS IT THE FILE
          BNE STRT    ;HEADER BYTES?
          LDA LOADADDR+1
          CMP #$FF
          BNE STRT
          LDX #0      ;YES, TRY AGAIN
          BEQ LOAD
STRT
          LDA OSINDEX+1 ;FLAG SET?
          BNE CONTINUE
          LDA LOADADDR ;NO,SO SET
          STA GO+1    ;THE EXECUTE ADDR
          LDA LOADADDR+1
          STA GO+2
          INC OSINDEX+1
CONTINUE
          LDA LOADADDR ;CHECK FOR ZEROS
          BNE GOODADDR ;WHICH MEAN
          LDA LOADADDR+1 ;END OF FILE
          BNE GOODADDR
          JMP EXECUTE ;EOF,GO EXECUTE
GOODADDR
          LDX #0
GOOD2
          LDA (LOADINDEX),Y ;GET END
          STA LOADEND,X ;LOAD ADDRESS
          INY
          BNE GOOD3
          JSR UPIT
GOOD3
          INX
          CPX #2      ;GET 2 BYTES?
          BNE GOOD2
LOADER1
          TYA         ;SAVE Y ON STACK
          PHA
          LDA (LOADINDEX),Y ;MOVE THE
          LDY #0      ;FILE TO LOAD
;              ADDRESS
          STA (LOADADDR),Y
          PLA
          TAY         ;RESTORE Y
          INY
          BNE L1
          JSR UPIT
L1
          INC LOADADDR ;BUMP INDEX
```

```
            BNE CHECK
            INC LOADADDR+1
CHECK
            LDA LOADADDR+1
            CMP LOADEND+1 ;HAVE WE DONE
            BCC LOADER1 ;ALL THE BYTES?
            LDA LOADADDR
            CMP LOADEND
            BCC LOADER1 ;NO
            BEQ LOADER1 ;NO
            LDX #0      ;YES, GO BACK IN CASE
            BEQ LOAD    ;MULTI STAGE FILE
UPIT
            INC LOADINDEX+1 ;INC HI BYTE
            LDA LOADINDEX+1
            CMP #$D0    ;I/O AREA?
            BNE EXIT1
BUMP
            INC LOADINDEX+1 ;BUMP UP PAST
            LDA LOADINDEX+1 ;I/O AREA
            CMP #$D8
            BNE BUMP
EXIT1
            RTS
EXECUTE
            JSR ROMON   ;TURN ROM ON
            LDA #34     ;TURN ON DMA
            STA SDMCTL
            LDX #0
            LDY #9
TRANSFER
            LDA DOSBUFF,Y ;ADJUST DOSXL'S
            STA DOSBUFF,X ;COMMAND BUFFER
            CMP #CR
            BEQ GO
            INY
            INX
            BNE TRANSFER
GO
            JSR $FFFF   ;EXECUTE PROGRAM
            RTS         ;AND RETURN
ROMOFF
            SEI         ;TURN OFF OS ROM
            LDA #0      ;& ENABLE 16K RAM
            STA NMIEN
            LDA #$FE
            STA PORTB   ;RAM ENABLED!
            RTS
ROMON
            LDA SAVE    ;RESTORE PORTB TO
            STA PORTB   ;PREVIOUS  VALUE
            CLI         ;ENABLE IRQ'S
            LDA #$40    ;ENABLE NMI
            STA NMIEN
            RTS
RESET
            JSR $FFFF   ;REINIT DOS
SETMEM
            LDA # <INITIALIZE
            STA LOMEM   ;SET LOW MEM
            LDA # >INITIALIZE
            STA LOMEM+1
            RTS
INITIALIZE
            LDA DOSINI  ;POINT JSR TO
            STA RESET+1 ;DOS INIT
            LDA DOSINI+1
            STA RESET+2
            LDA # <RESET ;POINT DOSINI
            STA DOSINI  ;TO OURSELF
            LDA # >RESET
            STA DOSINI+1
            JMP SETMEM
            *=  $02E0
            .WORD START
```


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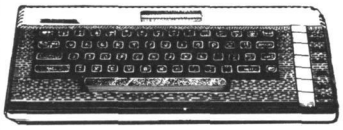

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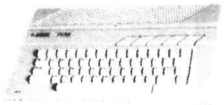

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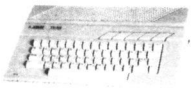

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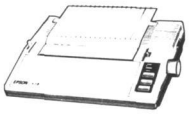

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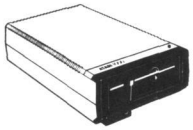

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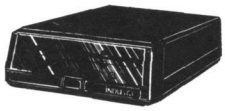

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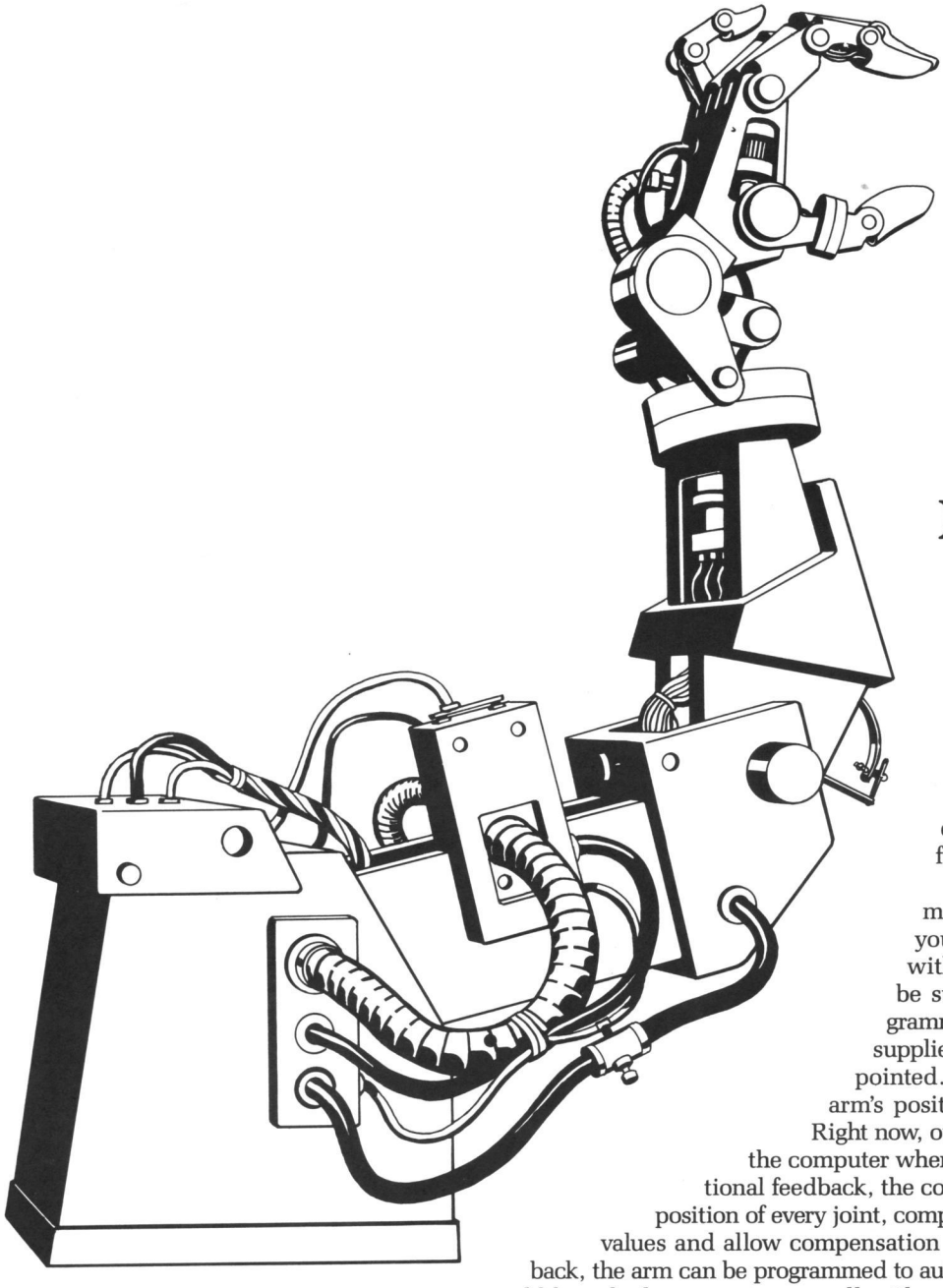


Arm your Atari

Part 2

by Ted Wilmot

Welcome back for another installment of **Arm your Atari**. I hope your construction efforts have been successful up to now, because the real fun's about to begin.

As I mentioned at the close of last month's section, no matter how skilled you become, when you control the arm with timing loops, you can never really be sure of its position. If you tried programming the arm to move the game pieces supplied with it, you were greatly dissappointed. There was no way of predicting the arm's position.

Right now, our arm is essentially lost —it can't tell the computer where it is in space. However, with directional feedback, the computer can continuously monitor the position of every joint, compare this data to some preprogrammed values and allow compensation for any errors. Moreover, with feedback, the arm can be programmed to automatically perform any task the operator would have had to execute manually. Also, with feedback, the arm will be able to repeat tasks with great precision—just like an industrial robot.

To add feedback to the arm, potentiometers (Atari paddle controllers) must be attached to every joint. This way, the computer can simply read (in BASIC) the values of the paddles. It can then output data corresponding to the direction the arm should be moved, with respect to some preset values. In all, four potentiometers will be required: two for the shoulder joints, one for the elbow and one for the wrist.

If you've been keeping track, two joystick ports will be required for the feedback data (one port for every two potentiometers), in addition to the port required for the output data. Let's see. . .that's three!

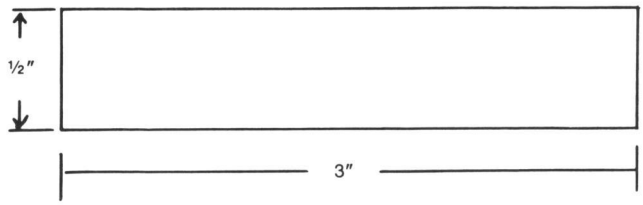
I'll bet you XL owners are really happy at this point, but don't despair; I'm revising the hardware/software to allow you to get away with two ports, with a slight decrease in speed. If there's enough interest, I'll test the design and send it in.

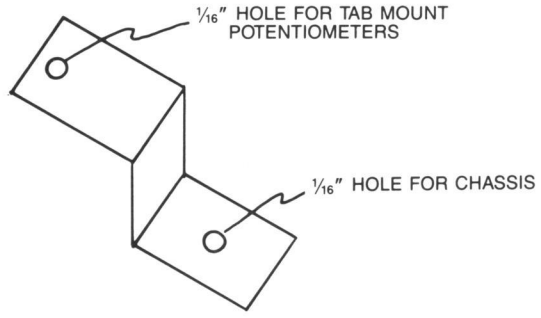
Onward.

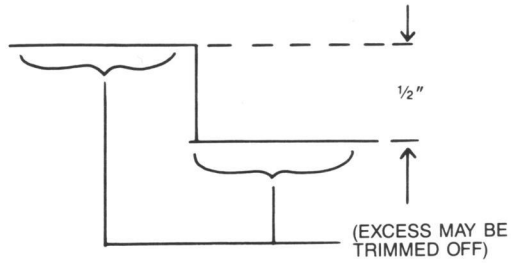
Enough preliminary stuff; let's plunge in! To begin with, you'll need four (4) 1-meg ohm linear taper potentiometers with ¼" shafts (preferably plastic). Atari paddles are really 1-meg potentiometers in disguise, but I wouldn't recommend using them. The shafts are too large, and the potentiometer housings are difficult to work with.

Arm your Atari *continued*

Cut the shafts of two potentiometers, so that ½" projects from the housing. Then cut four pieces of sheet metal into ½" by 3" strips. Drill them according to Figure 1, depending on the type of potentiometer you're using.







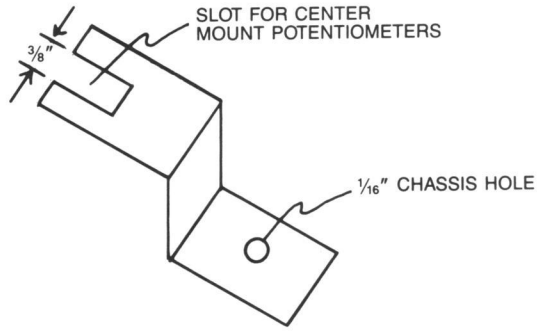


Figure 1.

Next, attach two potentiometers and strips, bending the strips as per Figure 2. Then set the elbow/wrist joints in their mid-positions. Set the potentiometers in their mid-positions, as well. Referring to Figure 3, install the wrist and elbow potentiometers. Wasn't that easy?

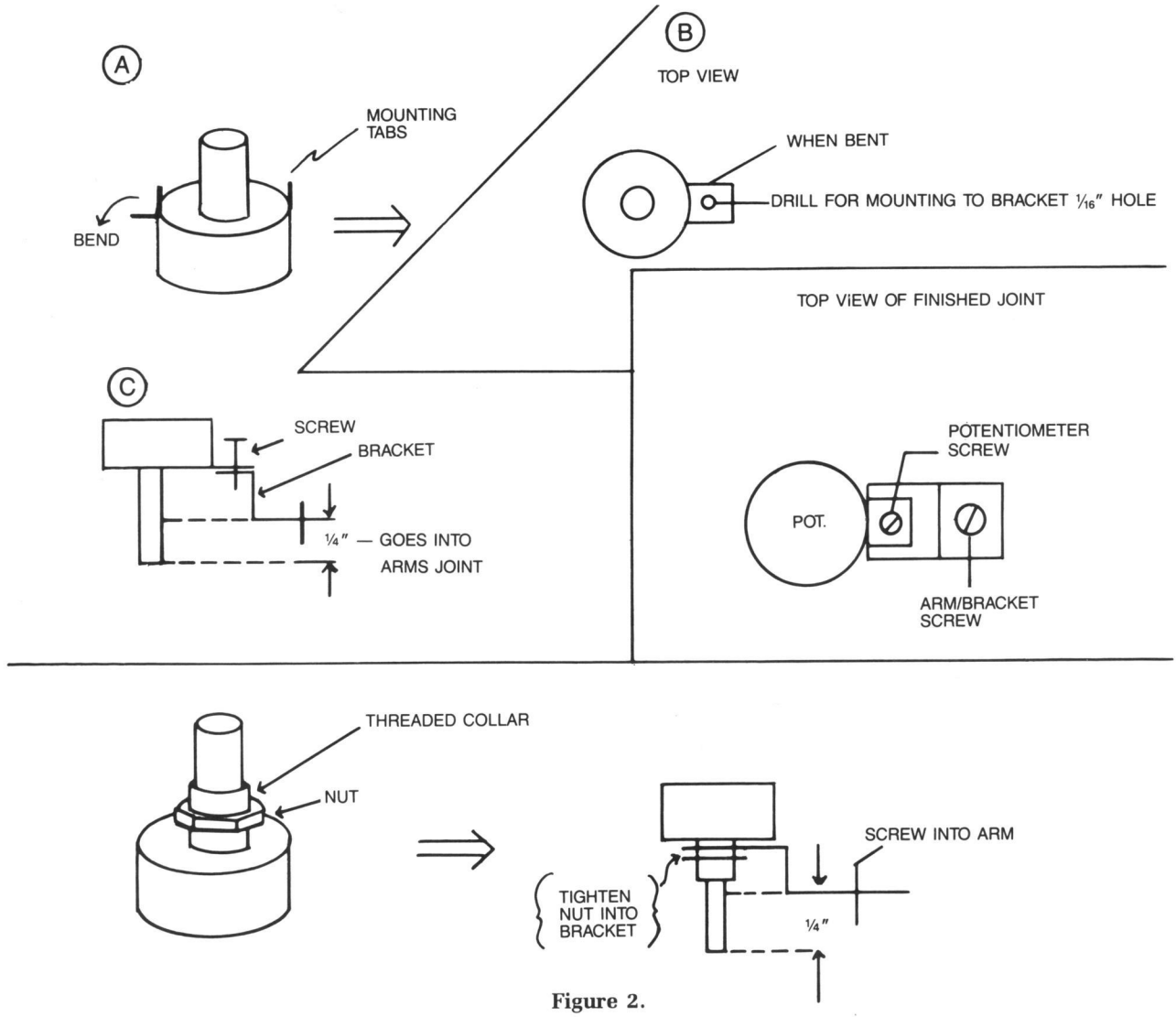
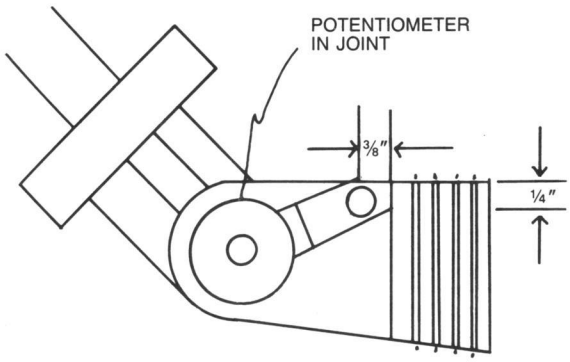
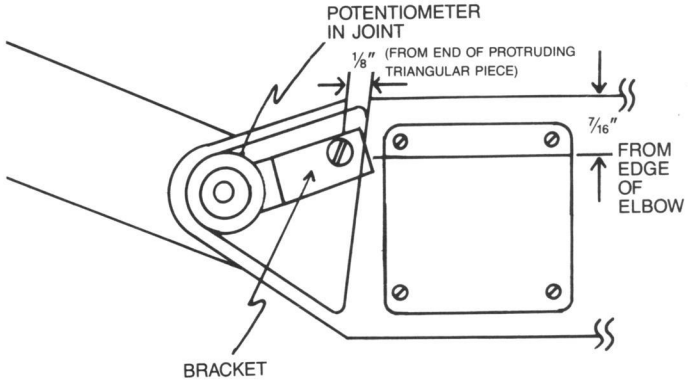


Figure 2.

WRIST POTENTIOMETER:



ELBOW POTENTIOMETER:



Note: These dimensions are important! Internal parts may be damaged if not followed.

Figure 3.

Beware—life gets harder. Drill two 3/32" holes in the shafts of the remaining two potentiometers, to a 1/4" depth. Now obtain a 3" piece of 7/8"-round stock threaded with 6NC32 threads. A cut off screw works well, or you can thread a piece of the energy level indicator support left over from last time.

Cut the threaded stock into 1" and 2" pieces. Screw the 1" piece into one of the potentiometers. Now, remove the housing on the end of the arm, the one that says "Radio Shack ARMATRON," and drill a 1/4" hole in the housing, as in Figure 4.

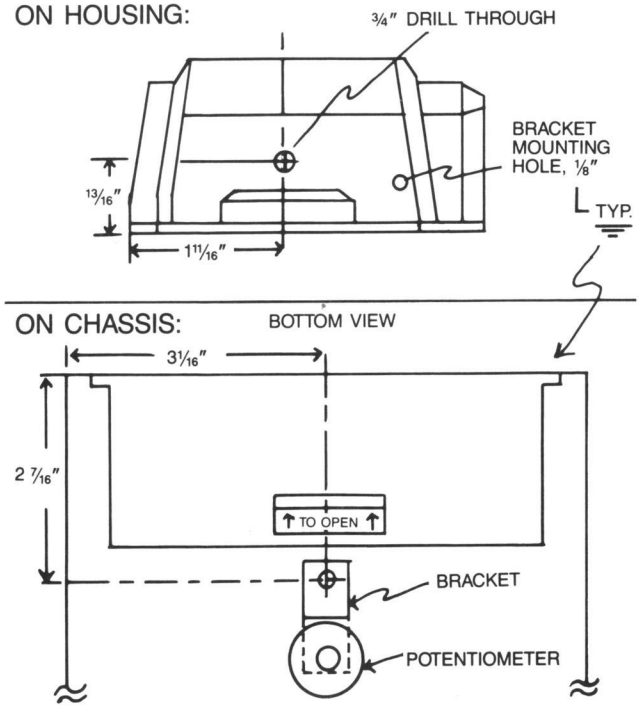


Figure 4.
Shoulder Potentiometer Instructions — Side View.

Now, remove the screw that would lie directly behind the hole and reinstall the housing. Firmly screw the end of the shaft into the hole. Next, attach one of the sheet metal strips to the potentiometer, and drill a hole through the strip and the housing as in Figure 4. Use a small machine screw to hold the bracket to the housing.

Now for the bottom potentiometer. As I mentioned last time, a potentiometer has to be mounted under the arm's chassis to detect the shoulder's position. As you probably know by now, the shoulder, like the wrist, is capable of rotary motion.

Unfortunately, the potentiometer has a limited turning angle. Therefore, we must construct a free-spinning potentiometer capable of rotary motion. To do this, we must disassemble the remaining potentiometer. With it taken apart, you'll notice a dimple in the housing directly below the contacts. This is the enemy; destroy it, being careful not to damage the rest of the potentiometer's housing.

With the dimple removed, the wipers (electrical contacts on the shaft's end) must be altered. Bend the wipers at the ends, so they won't get caught on the contacts—regardless of the direction of rotation.

Now, remove the screw directly below the arm's main shaft; screw in the remaining 2" threaded piece. Attach the remaining metal bracket to the potentiometer and screw it onto the shaft. Drill a hole through the bracket and the chassis as seen in Figure 4 and attach the bracket to the chassis using a sheet metal screw.

Now for the wrist. . .Unlike the other arm joints, the wrist joint is nearly impossible to mount a potentiometer on. The joint is fed by three gears: one to raise and lower, one to rotate, and one to open or close the "jaw." All are contained in the wrist housing, making it too cramped to mount a potentiometer inside.

How can we achieve feedback from the wrist to the computer? Well, I'm sure you electrically oriented types have just thought up at least a dozen ways—optical, magnetic and similar approaches, all of which can be implemented outside the wrist housing.

While optical and magnetic routes are perfectly acceptable, they would generally be too expensive and technically involved for our application. I've decided to use micro switches for the job. In this way, the switches can be mounted outside the wrist housing, and may be actuated by the turning jaw—thus eliminating any wires to the jaw itself!

Moreover, the switches, like the potentiometers, can be read directly by the computer in BASIC with a PTRIG command. If you have a 400/800 machine with four joystick ports, you could (theoretically) read eight switches. While that amount of resolution would be nice, the wiring would be obtrusive.

I elected to go with two switches on my prototype arm, one each for vertical and horizontal jaw orientation. This doesn't sound like many switches, and there isn't any angular resolution to speak of, but it's more than adequate for our purposes.

Before the switches can be mounted on the wrist housing, the latter must be altered. To do this, the wrist must be dissassembled. Remove the wrist-mounted potentiometer and the two round black "bearings."

Then remove the two screws holding the wrist housing together. Separate them, releasing the jaw and associated gears. Now, file down the round collar at the end of the wrist housing as shown in Figure 5. Next, drill the housing pieces as in Figure 6 and install the switches/mounting brackets.

Note: make sure all switch levers face the same direction of rotation with respect to the jaw's axis of rotation.

With the switches in place, reassemble the wrist housing and reinstall the wrist potentiometer.

Now for some wiring. . .In my arm, the potentiometers and switches were wired as you see in Table 1. It would be worth your while to check the response of each joint individually, with a simple PTRIG/PADDLE(x) routine, before soldering any wires together.

If you're unfamiliar with the wiring convention used in Atari paddles, Figure 7 shows how to connect two potentiometers to a single joystick port.

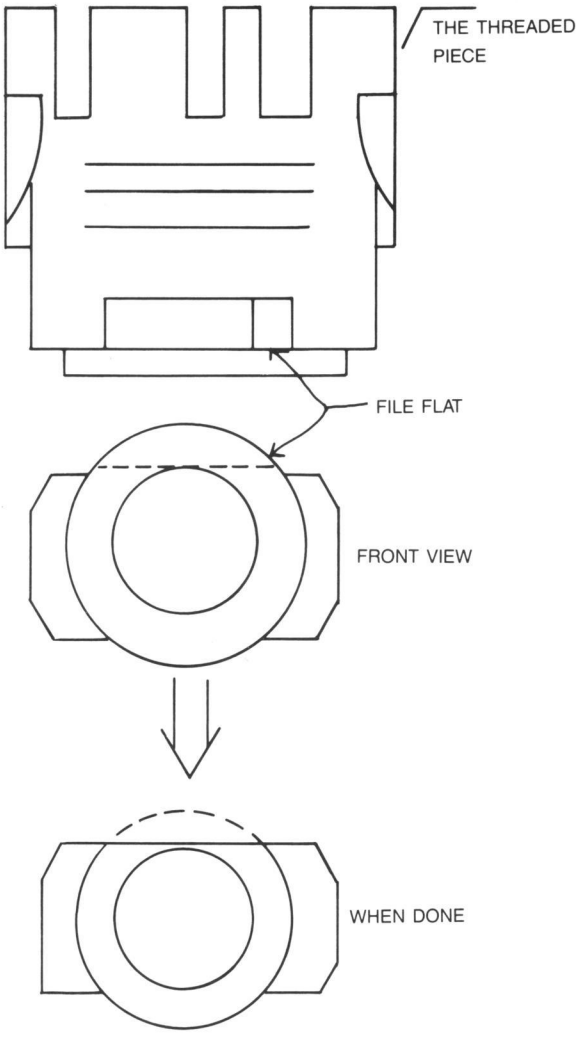


Figure 5.
Collar File Guide.

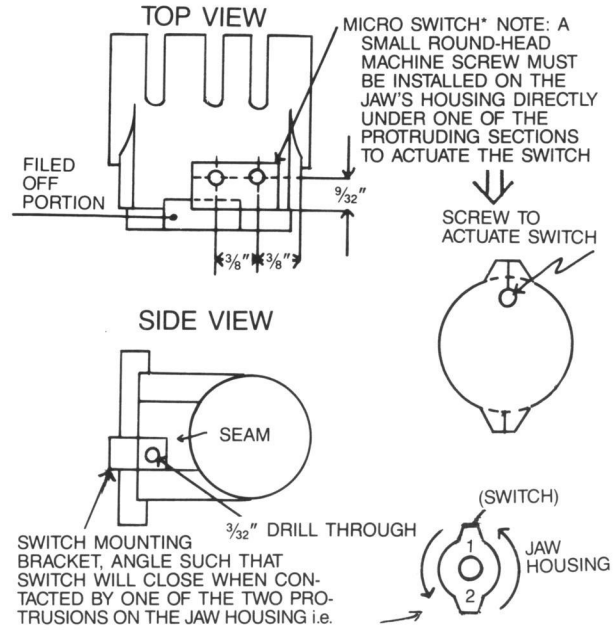


Figure 6.
Collar Drill Guide.

Note: to avoid software conflicts, use joystick port 3 to read the PTRIG (wrist) values—i.e., PTRIG (4-5).

If you've been wondering why no feedback has been added to the jaw itself, the answer is simple. The jaw is internally protected from damage due to too much opening and closing. Therefore, it's best to use simple timing loops to control it.

Trying it out.

Now to test our creation. . . Listing 1 shows a BASIC program that allows you to read in the values of the various joints in a data statement, and have the arm execute the movements you wish—based on your data.

To use the program manually (with the joysticks), move the arm to the object you want to pick up. Align the wrist so one of the two switches is closed (the orientation may be important at times). Type *GOSUB 5000* to read the joint values—and write them down. Manually move the arm to the target destination and, again, type *GOSUB 5000.*

Repeat the above procedure for all the objects you want to move, then put the data into Line 170's data statement. *Note:* change the variable *L* (Line 10) to reflect the number of iterations required (i.e., the number of data values divided by *2*).

Good luck with your new toy. I hope all of you enjoy your creations as much as I do mine!

Ted Wilmot is a senior at SUNY Binghamton, majoring in Electrical Engineering Technology. He has an A.A.S. in E.E.T. and has been interested in computer/electronics since 1972. He's designed and built numerous electronic/ software projects, most frequently with BASIC, APL and assembler.

The two-letter checksum code preceding the line numbers here is *not* a part of the BASIC program. For further information, see the *BASIC Editor II*, page 43.

Listing 1.
BASIC listing.

```
ZI 5 P=PEEK(54018):POKE 54018,P-4:POKE 54
   016,127:POKE 54018,P
AV 6 REM SET UP PORT 1 FOR OUTPUT
AJ 10 FOR L=1 TO 4:REM # OF ITERATIONS OF
    # OF DATA VALUES/2
WO 11 FOR Z=1 TO 450:POKE 54016,76:POKE 5
   4016,12:NEXT Z
SN 12 FOR Z=1 TO 550:POKE 54016,74:POKE 5
   4016,10:NEXT Z:POKE 54016,64:POKE 5401
   6,0
```

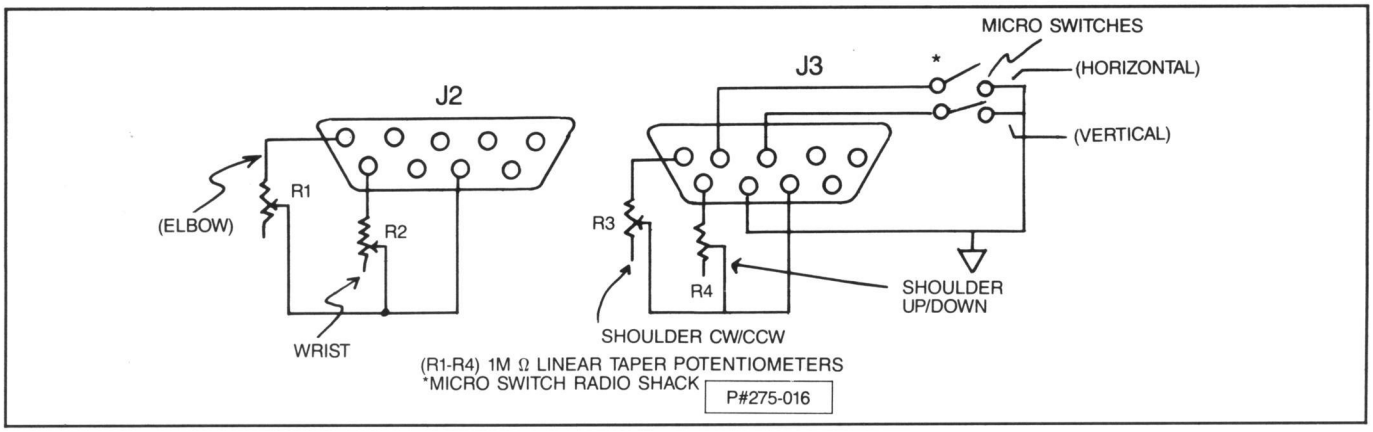


Figure 7.
Paddle/Switch Wiring Diagram.

```
HJ 13 FOR I=1 TO 9
MQ 14 READ PA,PB,PC,PE,WL,PPA,PPB,PPC,PPE
TN 15 GOSUB 40
SW 16 FOR Z=1 TO 450:POKE 54016,65:POKE 5
   4016,1:NEXT Z
OR 17 FOR Z=1 TO 300:POKE 54016,74:POKE 5
   4016,10:NEXT Z:POKE 54016,64:POKE 5401
   6,0
OV 35 PA=PPA:PB=PPB:PC=PPC:PE=PPE
TR 36 GOSUB 40
JF 37 NEXT I
KI 38 NEXT L
ZJ 39 END
DK 40 C=PADDLE(2):REM MAIN MOVEMENT ROUTI
   NE
DE 50 E=PADDLE(4)
DC 60 A=PADDLE(5)
CH 70 B=PADDLE(3)
SY 80 IF A<PA THEN D=8:N=5:X=PA:GOSUB 100
   0
VS 90 IF A>PA THEN D=9:N=5:X=PA:GOSUB 200
   0
ET 100 IF B<PB THEN D=3:N=3:X=PB:GOSUB 10
   00
GE 110 IF B>PB THEN D=2:N=3:X=PB:GOSUB 20
   00
ID 120 IF C<PC THEN D=6:N=2:X=PC:GOSUB 10
   00
LC 130 IF C>PC THEN D=7:N=2:X=PC:GOSUB 20
   00
NJ 131 IF WL=1 THEN GOSUB 3000
NZ 132 IF WL=0 THEN GOSUB 4000
UM 140 IF E<PE THEN D=11:N=4:X=PE:GOSUB 1
   000
VX 150 IF E>PE THEN D=10:N=4:X=PE:GOSUB 2
   000
ZJ 160 RETURN
JX 170 DATA 112,145,1,80,1,228,106,49,131
QU 900 REM
ES 910 REM MAIN OUTPUT ROUTINES
QY 920 REM
HM 1000 A=PADDLE(N)
AN 1020 IF A<X THEN GOTO 1050
FY 1030 POKE 54016,64:POKE 54016,0
AL 1040 RETURN
OY 1050 POKE 54016,D+64:POKE 54016,D
NG 1060 GOTO 1000
HN 2000 A=PADDLE(N)
CF 2020 IF A>X THEN GOTO 2050
FZ 2030 POKE 54016,64:POKE 54016,0
AM 2040 RETURN
OZ 2050 POKE 54016,D+64:POKE 54016,D
NS 2060 GOTO 2000
UE 3000 P=PTRIG(4)
QJ 3010 IF P=1 THEN GOTO 3040
FX 3020 POKE 54016,64:POKE 54016,0
AK 3030 RETURN
PO 3040 POKE 54016,69:POKE 54016,5
OB 3050 GOTO 3000
UT 4000 P=PTRIG(5)
RH 4010 IF P=1 THEN GOTO 4040
FY 4020 POKE 54016,64:POKE 54016,0
AL 4030 RETURN
PP 4040 POKE 54016,69:POKE 54016,5
ON 4050 GOTO 4000
KU 4997 REM
AR 4998 REM ROUTINE TO OBSERVE JOINT VALU
   ES
LC 4999 REM
RY 5000 C=PADDLE(2)
SK 5010 B=PADDLE(3)
TL 5020 A=PADDLE(5)
TX 5030 E=PADDLE(4)
BV 5040 PRINT A,B,C,E
OZ 5050 GOTO 5000
```

●

ARM OUTPUT DATA	REACTION	PADDLE VALUE REACTION
2	ELBOW L	DECREASE
3	ELBOW R	INCREASE
4	HAND CCW	*
5	HAND CW	*
6	HAND UP	INC
7	HAND DOWN	DEC
8	SHOULDER CW	INC
9	SHOULDER CCW	DEC
10	SHOULDER UP	DEC
11	SHOULDER DOWN	INC
12	JAW OPEN	—
1	JAW CLOSE	—

**Note:* These are PTRIG functions. If your arm is built like mine, or more importantly, for the software, PTRIG (4) goes low when the jaw is vertical. PTRIG (5) goes low when jaw is horizontal.

Table 1.

PANAK STRIKES!

Reviews of the latest software

by Steve Panak

Because of the computer, our Earth is a far more efficient world in which to live.

Here I sit, on a Wednesday (the actual date is immaterial). As I go through the mail, my eyes fall upon my daily issue of *USA Today*. Now, this isn't all that extraordinary; it's happened many times before.

What's amazing is that on Monday (having let my subscription lapse again, even after desperate pleas from my parents, my therapist and the publication), I renewed. I just called their 800 line, and gave them my VISA number and expiration date.

They gave me a number (26, the newspaper's cost, in dollars). It's Wednesday, and the paper's here. And I think I called them *late* Monday afternoon.

Not really amazing. . .There's just a person sitting there with a phone.

And a pad.

And a pencil.

And—I almost forgot—a computer. . . tied into another computer. With a few keystrokes, the delivery instruction is made. My bank card is debited.

I'm not surprised in the least. It doesn't amaze me half as much as the fact that each of the great games that follow is crammed into a scant 48K.

ULTIMA IV: QUEST OF THE AVATAR
by Lord British
ORIGIN SYSTEMS
340 Harvey Road
Manchester, NH 03103
48K Disk $59.95

Over three years ago, I saw **Ultima** on display on an Apple in my neighborhood Computerland; it was my first exposure to adventuring on a personal computer. It was love at first sight (byte).

A year later, I got my Atari 800. Soon I also had **Ultima** and was finally able to explore its vast universe.

Now, Lord British has brought us **Ultima IV**, the newest, largest, most complex and best **Ultima** of all. Let's boot up.

After the display of opening credits, you're treated to a picture show and text explaining your transportation away from our world, through a time portal into the realm of Brittania.

There you stumble upon a festival, where an aged fortune-teller casts her cards and determines your destiny. It's at this point that you take control of the game. . . and it takes control of you.

To say **IV** is a radical departure from **I** and **II** (I haven't played **III**) would be a lie. Yet it does have some of the most original components I've seen yet.

For example, the method of choosing attributes for your character in this D&D® derivative is extraordinary. The fortune teller, as she lays down cards representing honesty and compassion, asks you the following question. *When entrusted to deliver an uncounted purse of gold, thou dost meet a poor beggar. Dost thou: (a) deliver the gold knowing the trust in thee was well placed; or (b) show compassion, giving the beggar a coin, knowing that it won't be missed?*

And that's one of the easy ones. Further on, there are quite a number of random questions asked, so you can repeat the opening quite a few times without being completely bored.

At this point, the plot follows the tried and true course of previous versions. It's standard fare: you travel throughout a huge world, interacting with colorful and diverse creatures and characters.

You can converse with each, although initial interactions allow you only to inquire into its name, job and health. From there, some creatures may offer additional information. Others will join your little band, if they feel it would be to their benefit. In **IV** you can control an entire group of characters.

Each action you perform is activated by a key sequence. The arrow keys move you around, while most of the alphabetic keys perform an action.

For example, *A* attacks in a chosen direction, using an *R*-readied weapon. You can *M*ix reagents, then *C*ast spells. All **IV**'s options have a similar mnemonic memory scheme.

As did its predecessors, **Ultima IV** awards you experience and wealth for successful interactions. Whether such encounters be battles or clever negotiations depends on your disposition.

The upper right corner of your display tabulates hit points, gold and food. A status box keeps track of inventory. When you ready a weapon, a weapons list is shown. When you mix reagents, an herb list is presented. The program is very user-friendly.

The graphics are terrific, and the fusion of text adventure and arcade action graphics is nearly seamless. Overhead views prevail above ground, while below is a first-person perspective. Battles are particularly exciting—you fight with weapons and magic in real time. When you control more than one character at a time, the going gets a little rough, until you get the hang of it.

The documentation alone is worth the price of admission. In addition to a colorful cloth map depicting the realm of **Ultima IV**, the package contains three booklets.

The first explains the magic articles and spells available. The next relates Brittania's history. This is the instruction manual, which explains the various weapons, armor and possibilities offered. The third is a small reference sheet. A metal ankh completes the outfit. But all is not perfect in Brittania.

Disk swapping is a problem. A second disk drive would remedy this (and its purchase *might* be justified by this game). Otherwise, just grit your teeth and enjoy the brief break. Every time you enter or exit a city or town, the disks will have to be swapped.

However, in the opening sequence, clever programming has eliminated the disk wait, by loading data for the next image while you're busy comprehending the current screen.

I must also add that the program once crashed when we questioned a shopkeeper. This cost us a couple of hours of work. With **Ultima IV** requiring 200+ hours to complete, any loss is serious. The lesson is to save your position often.

I'd like to tell you a lot more about this one—it really has that much to offer—but I've already used up more than my allotted time.

Despite a price tag that's skyrocketed into the ionosphere, **Ultima IV** offers adventure value that's out of this world.

SARGON III
by Dan and Kathe Spracklen
HAYDEN SOFTWARE
600 Suffolk Street
Lowell, MA 01854
48K Disk $49.95

This is really turning into a month of sequels. And, while chess isn't a game to be bettered, Hayden *has* produced an improved version of one of the first chess simulations for home computers.

Chess logic seems a natural for computerization. But the very attribute which attracted players, complexity, deterred successful programs until very recently. Now, dozens of computerized chess games flood the market. I examined some in issues 35 and 36.

Sargon III is the natural evolution of **Sargon II** (see issue 35). It improves upon the original, correcting mistakes, and adding features which make it a necessity in the chess enthusiast's library.

Sargon III has a virtually unending list of options and features. Besides the usual chess features (such as move suggestion, and take back), there are nine levels. Each may be played in hard or easy mode—effectively, eighteen levels of play.

You can print out board positions and moves, and save your game for later torment. You may have **Sargon** act as a referee between two inferior human players.

Other features include analysis of **Sargon**'s reasoning process, side changing, full control over screen colors and a method to set up a board from scratch. With an opening library of 68000 positions, **Sargon III** boasts a quicker response time than most other games. If you forsake speed and have **Sargon** think for every move, the library can be temporarily closed.

For chess fanatics, **III** has two more tricks in its disk sleeves. One of the three floppies contains a library of great chess games; 107 may be played back and analysed.

A number of chess problems are also included, so that you may sharpen your skills—before you're defeated yet again by the maddeningly logical **Sargon**.

My biggest complaint with **II** was that letter-number coordinates had to be keyed to make moves. This was an acceptable system, except that the on-screen board lacked letter and number references. It was difficult to decipher the move you wished to enter. **III** has remedied the problem, adding the characters on three sides of the board and altering the input method.

You can move using either the joystick or the keyboard. Using the joystick allows you to lean back and enjoy the game. But don't relax too much; **Sargon** has more than a few surprises for all but the most proficient players of this ancient game.

When you move, a flashing square highlights the piece you've chosen. A second flashing square goes to the location you wish to move the piece to. This allows you to better visualize what the arrangement will be after your move.

The manual is complete—for the Commodore 64 owner. Atari users must cross reference to a separate card for all the information. Often, finding the information you need is a minor (but, nonetheless, time consuming) irritation.

About half of the 80-page manual is devoted to explaining the features and functions of the game, as well as how to play chess (although the thought of someone not knowing how to play is bizarre to me—especially among computer users). The final sections describe the game and problem libraries.

So, although **Sargon III** is an excellent program, its price makes it a best buy only for the chess enthusiast who desires a complete library.

Like most computer chess games now available, the thing will beat a high percentage of even the best chess players. Casual players would probably be better advised to get a cheaper version of this classic, timeless game.

BALLYHOO
by Jeff O'Neill
INFOCOM
125 CambridgePark Drive
Cambridge, MA 02140
48K Disk $39.95

You wander slowly among the milling throng of the curious. . . and the curiosities. The fat lady, the man/woman and other "freaks" excite morbid fascination in the crowd. The daredevils—tightrope walkers and trapeze artists—move about, too, with children pointing out their favorites. . .

Except one small child, who's missing, kidnapped in what soon turns out to be a circus festering with crime. There's gambling, kidnapping and, yes, murder.

That's how it seems to outsiders. To those behind the scenes (a group you'll join shortly), there's a different story—one less happy than that the clowns portray.

In Infocom's newest work of interactive fiction, you're drawn into a crime committed in an otherwise joyous place. Like **Deadline** and **Witness** before it, this game is a mystery.

Infocom's interactive fiction falls into categories: mystery, science fiction, or fantasy, to name a few. They're not for everyone. Still, even though I'd prefer a good sci-fi thriller, this predisposition doesn't keep me from enjoying a well written whodunit.

While not exactly a sequel, **Ballyhoo** continues Infocom's now-legendary tradition of producing the highest quality software. It's a standard level game, so its puzzles will perplex you for twenty-plus hours.

More important, its characters and prose will stay with you for months. You won't be able to forget the various circus mutants, even if you try. To make things worse, **Ballyhoo** adds original (twisted) Infocom humor to the experience.

I really don't want to ruin the gags by giving them away. Like all great humor, its basis is surprise, but. . . After a particularly clumsy attempt at a dangerous maneuver, you're told: *You have died. Well, not quite*

died. The doctors do what they can, but, as the debts rise and the prognosis dips, you take the only avenue left and sell yourself to the circus. As the Human Armadillo, you enjoy top billing as a popular midway attraction.

And, once you discover the secrets here, permanently joining the circus will be the farthest thing from your mind.

It's a sleazy circus, where unwanted, late-staying curiosity seekers are lovingly referred to as "lotlice." Your very discovery will excite the cretins to anger (at least), usually peppered with an unhealthy dose of violence.

What elevates this game above most other text-based adventures is the sheer range of responses. All logical choices at any point precipitate unique and entertaining replies. Its smart, abrasive, taunting attitute can push your ire past the brink of rationality; its prose will never bore you.

The huge vocabulary minimizes the number of "clone" responses, such as *I don't recognize the word "alien."* Red herrings abound. Usually the "solution" you try first will fail; your final choice will succeed. Sometimes I got the feeling that pauses for disk loads had been adjusted in length and timed for dramatic effect.

The program performs nearly perfectly, following Infocom tradition. Extensive prerelease testing has exterminated most bugs, although I found one minor problem.

When saving a game, if you fail to insert the story disk properly, the program halts and displays an error message, rather than prompting the now irritated user to insert the disk correctly.

As usual, the Infocom package is more than a simple game disk. The manual is a circus souvenir program. In addition to describing fully how the game's played (without giving away any of the secrets within), it supplies background data on some of the big top's fabulous characters.

Rounding out the package is a balloon, an admission ticket and a card detailing Dr. Nostrum's Extract (a circus snake oil). As always, Invisiclues are only an order blank (and $7.95) away.

There are imitators and innovators. With each new work, Infocom again falls into the latter category. Built on the firm **Zork** foundation, **Ballyhoo** fills yet another wing of the incredible Infocom library. For those who enjoy their visits to its hallowed halls, this is a wing they should explore.

WHISTLER'S BROTHER
by Louis Ewens
BRODERBUND
17 Paul Drive
San Rafael, CA 94903
48K Disk $29.95

While not a sequel at all, **Whistler's Brother** continues the recent (long) trend of really poor arcade games.

What follows is a transcript of the last known rational conversation between two testers, who, until recently, had shown no signs of aberrant behavior, in spite of their profession. In order to protect the guilty . . .well, you know the rest.

"So, what's next on tap?" Ace queried.

"Something called **Whistler's Brother**, from Broderbund," came Deuce's response. "And—get ready!—it's an arcade game."

"Oh no. Don't you have anything else left?"

"No. I saved it for you. It's *your* turn at the stick."

"Okay. So what's this one about?"

"It seems you're a frustrated first-year student in some large university, with the unfortunate luck to have a brother who's quite a bit clumsier than yourself."

"Give me the disk!"

The muffled reply came, as if spoken through a slightly soiled sock, "It seems that you have to retrace his steps and retrieve his misplaced documents. But get this: he's so scatterbrained you have to continuously whistle at him to follow you. And it also looks like you pick things up along the way."

"Oh, yeah. And I suppose we're doing this for points."

"Of course. And extra men. You get five to start with. Now press START, stupid."

"We're off! Man, the graphics are an improvement over the pathetic title screen. Now, what's this?"

At this point, I must add that I mustered up the courage to glance at the game screen. The graphics weren't that bad. In fact, they were the best thing about the game.

"When you press the button, you whirl. Apparently, it makes you invincible, as well as paving a path over sheer drops."

There's a whistling sound, then a thud. "Why did I fall?" Ace asks.

"I don't know; the game's stupid. There's just no point to it."

"What's this?"

"Looks like a storm. Better watch out for. . .(a cracking noise is heard). . . lightning. Start over again."

"What's happening now?" (There's a beeping sound).

"You've got to get the other figure—your brother, I guess—close to you. This manual, and I use the word in the most complimentary way, says to press the button, and he'll travel in the same direction as you."

"Great. Now where are we going?"

"To pier 15."

"What happens there?"

"We move on to chapter 2, the sailing ship."

"And how many chapters are there?"

"You're in luck; thirteen. But you get to repeat them sixteen times, and each time the challenge increases."

"You're not serious."

"Um-hmmn, I'm afraid so. Looks like I'll see you around the turn of the next century." Footsteps wander off.

"You seem to have forgotten one thing."

The footsteps stop. What's that?"

"You have to stay here with me and watch."

"That's right" replies the frightened voice. "Well, hurry up."

The rest of the tape is garbled and rather confusing. Most who listen to it are, on the whole, seriously disturbed by the torment the participants seem to have undergone.

It's obvious the only person who might suffer more is the one who actually purchased a copy. Don't blow your money on **Whistler's Brother**.

So, again, we have another month full of excellent entertainment, unless your tastes run to arcade action games.

Ballyhoo will quench the seemingly insatiable appetites of even the most demanding mystery fans, while **Ultima IV** will provide the fantasy fanatic with hours of exploration, discovery and conquest. Finally, for the chess expert, **Sargon III** refines the Hayden original.

Who knows what next month will bring? Well, actually, I do, but I'm not telling. I will give you this much: there'll be an acceptable (but not great) arcade game, and a big surprise.

The author wishes to thank the Magic One Computer Shop of Barberton, Ohio for its valuable assistance in the creation of this article.

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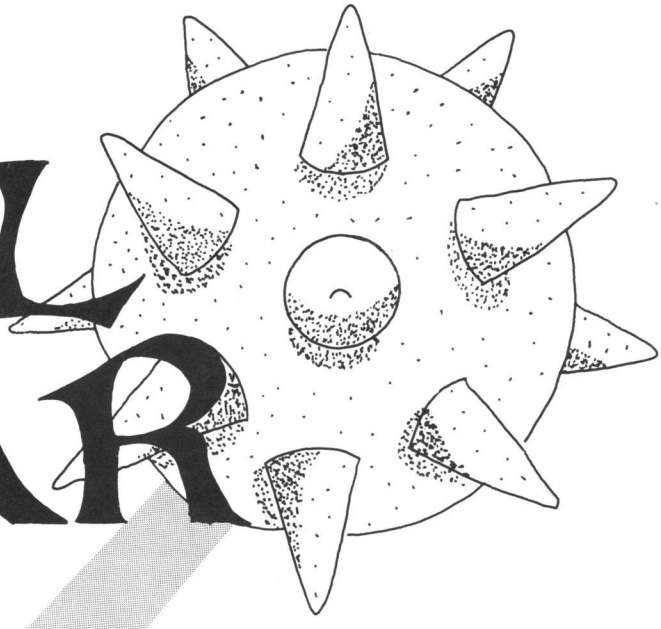

by Scott Langston

Your king watches over his lands from the lower left-hand corner of his realm. The force field protecting him and the countryside from invasion is at his far right.

You've just been promoted to the rank of Gunner First Class. As such, you've taken a position on the left flank of the treasure room above the king. To your right is open battlefield.

The task before you is to guard the royal treasure. It supplies power to the force field, keeping the enemy at bay. The atomic weapon you control is your key to success.

Warring trolls will appear at the screen's right. They race across the terrain in an effort to capture the treasure, for they know its value.

Typing it in.

Listing 1 is the BASIC data used to create both cassette and disk versions of **Troll War**. Those readers who are interested in how the game works may obtain the assembly listing on either the magazine disk version or the **ANALOG Computing** Atari Users' Group on Delphi.

Disk users should refer to the **M/L Editor** article on page 24 for typing instructions.

If you have a cassette system, type in Listing 1, then add the lines shown in Listing 2. Type *RUN* and press RETURN. The program will begin checking the data statements, printing the line numbers as it goes. It will alert you to any problems. Fix any incorrect lines and rerun the program until all errors are eliminated.

When all your data lines are correct, the computer will beep twice and prompt you to *READY CASSETTE AND PRESS RETURN*. Now, insert a blank cassette in your recorder, press the RECORD and PLAY buttons simultaneously, and hit RETURN. The message *WRITING FILE* will appear, and the program will create a machine language boot tape version of **Troll War**, printing each data line number as it goes. When the *READY* prompt appears, the game is recorded and ready to play. CSAVE the BASIC program onto a separate tape before continuing.

To play the game, rewind the tape created with the BASIC program to the beginning. Turn your computer off and remove all cartridges. Press the PLAY button on your recorder and turn on your computer, while holding down the START key. If you have an XL or XE series computer, you must hold the START and OPTION keys when you turn on the power. The computer will beep once. Hit the RETURN key, and **Troll War** will load and run automatically.

Playing.

To stop a troll dead in his tracks, wait until he's within your range. Use joystick 0 to move the weapon up or down, bringing the opponent into your sights. When you've gotten the gun into position, press the joystick button to send energy screaming at the attacker.

A single energy bolt is adequate to disintegrate a charging troll. One hundred valor points will be awarded for each enemy annihilated.

Should one of the trolls slip past you, he will steal some of the treasure, then turn to watch you frantically fight his allies. If another troll manages to gain the same position as the first in the treasure room, the king's force field will weaken. The opposing trolls will then be able to push the force field back toward the king.

The game is over when the royal force field disappears.

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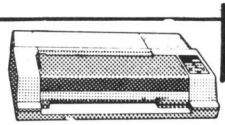

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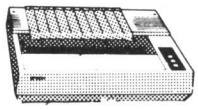

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Scott Langston received his B.A. in Mathematics and Computer Science from Augustana College in Illinois. He's been programming on the Atari 800 for a little over two years, as a hobby.

The two-letter checksum code preceding the line numbers here is *not* a part of the BASIC program. For further information, see the *BASIC Editor II*, page 43.

The code is simply a double check for Listing 1; it's of more use with Listing 2.

Listing 1.
BASIC listing.

```
FS 1000 DATA 255,255,0,40,247,50,0,0,0,0,
   0,0,0,0,0,0,3460
ED 1010 DATA 20,85,85,85,85,20,0,0,20,69,
   69,81,81,20,0,0,6274
IP 1020 DATA 16,65,65,65,81,20,21,19,23,1
   65,138,58,12,60,80,16,8968
VA 1030 DATA 80,104,136,176,192,240,0,3,0
   ,12,2,0,12,3,85,245,389
JR 1040 DATA 245,86,186,168,207,3,5,63,15
   ,5,235,10,3,15,80,80,9898
VD 1050 DATA 80,96,160,128,0,0,12,60,3,60
   ,12,0,0,0,192,240,357
PS 1060 DATA 0,240,192,0,0,0,0,0,0,255,25
   5,0,0,0,204,59,1475
JJ 1070 DATA 29,28,30,15,15,15,192,0,0,12
   8,0,64,192,192,0,96,1582
FN 1080 DATA 240,255,255,252,248,96,0,3,1
   2,48,48,12,3,42,0,240,1170
DA 1090 DATA 0,80,80,0,240,168,0,240,0,0,
   0,0,240,168,0,15,1330
RB 1100 DATA 63,255,255,127,23,4,12,3,5,4
   ,5,61,51,59,204,240,2454
HO 1110 DATA 84,132,148,95,243,251,255,25
   5,15,15,15,15,15,15,243,243,7396
BD 1120 DATA 3,3,3,3,3,3,3,255,207,207,255,
   252,207,207,207,63,63,1835
XJ 1130 DATA 60,60,60,60,63,63,243,243,24
   3,243,243,243,243,243,192,192,8787
KT 1140 DATA 192,192,192,192,255,255,60,6
   0,60,60,60,60,63,63,0,0,986
HY 1150 DATA 0,0,0,0,240,240,240,240,240,
   243,255,60,60,60,60,60,8985
AJ 1160 DATA 60,60,252,240,240,240,255,24
   3,243,255,255,243,243,243,207,207,2861
KU 1170 DATA 207,207,207,207,207,207,252,
   60,60,252,240,60,60,60,255,243,3514
NM 1180 DATA 243,255,255,243,243,243,192,
   192,192,192,192,192,192,192,240,243,99
   59
NN 1190 DATA 243,243,240,240,243,240,252,
   255,192,252,255,15,255,252,255,243,184
   7
SN 1200 DATA 243,255,255,243,243,243,207,
   207,207,207,207,207,207,207,240,60,831
   1
LG 1210 DATA 60,240,240,60,60,240,255,255
   ,243,243,243,243,255,255,60,60,7226
CW 1220 DATA 60,60,60,60,252,252,255,255,
   15,15,15,15,15,15,240,240,6892
FV 1230 DATA 0,0,0,0,0,0,255,255,15,15,15
   ,15,15,15,243,243,3623
JJ 1240 DATA 3,3,3,3,3,3,255,255,207,207,
   207,207,255,255,63,255,5732
XA 1250 DATA 240,255,63,3,255,63,15,207,0
   ,0,192,192,192,0,255,255,432
VJ 1260 DATA 240,240,240,240,240,240,63,6
   0,60,63,63,60,60,60,243,243,8957
EX 1270 DATA 243,243,243,243,243,243,255,
   207,207,255,252,207,207,207,63,63,7025
VC 1280 DATA 3,3,3,3,3,3,252,252,192,192,
   192,192,192,192,15,63,9604
WA 1290 DATA 240,240,240,243,240,63,192,2
   40,240,0,0,252,240,192,255,243,7249
AY 1300 DATA 243,255,255,243,243,243,207,
   207,207,207,207,207,207,207,0,192,6923
NY 1310 DATA 243,63,12,0,0,0,60,252,252,6
   0,60,60,60,60,255,255,7924
AR 1320 DATA 240,255,255,240,255,255,192,
   192,0,0,0,192,192,255,255,2569
HV 1330 DATA 243,243,243,243,255,255,207,
   207,195,195,192,192,192,192,0,0,2975
CT 1340 DATA 195,195,255,255,60,60,243,24
   3,195,195,3,3,3,3,255,255,9775
HY 1350 DATA 192,252,252,192,255,255,63,6
   0,60,63,63,60,60,60,240,240,8939
WB 1360 DATA 240,240,192,240,240,240,112,
   112,69,12,55,68,248,50,4,4,4146
IY 1370 DATA 4,4,4,4,4,4,4,4,4,4,4,4,4,4,
   4,4,1914
OS 1380 DATA 4,132,70,248,54,65,64,42,85,
   96,102,96,81,64,72,81,2618
SK 1390 DATA 85,81,64,47,60,64,68,64,42,4
   7,50,47,42,47,53,47,8402
NN 1400 DATA 40,40,42,47,53,57,64,2,4,3,1
   ,3,2,2,4,1,3148
BG 1410 DATA 4,1,3,4,2,3,2,184,168,220,18
   4,220,168,168,220,220,2687
YU 1420 DATA 200,220,172,168,220,168,184,
   8,10,138,174,255,174,138,10,8,7624
JW 1430 DATA 0,0,0,0,51,35,47,50,37,0,0,1
   6,16,16,16,16,4077
SM 1440 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,15
   0,151,152,8237
KS 1450 DATA 153,154,155,156,157,0,0,0,0,
   0,0,158,159,160,161,162,4995
NB 1460 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
   0,163,4068
KG 1470 DATA 164,0,158,159,160,161,162,0,
   165,166,0,167,168,169,170,168,581
KU 1480 DATA 171,172,173,0,174,175,176,0,
   0,177,178,179,180,181,182,183,2074
NW 1490 DATA 184,0,0,0,185,186,187,188,18
   9,190,191,192,193,194,195,196,5820
DK 1500 DATA 197,198,199,28,62,42,54,28,1
   27,93,93,28,24,48,0,0,8382
AZ 1510 DATA 20,0,0,0,0,0,0,0,0,124,84,12
   5,57,255,188,190,5365
LG 1520 DATA 63,3,1,72,165,170,141,10,212
   ,141,9,212,104,64,162,0,5431
KU 1530 DATA 138,157,248,50,157,152,51,15
   7,136,52,157,120,53,157,0,36,4610
OP 1540 DATA 157,0,37,157,0,38,157,0,39,2
   32,208,229,96,162,15,160,7771
IC 1550 DATA 0,138,74,144,2,160,2,169,16,
   145,132,200,169,17,145,132,7128
HL 1560 DATA 32,188,45,202,16,233,169,21,
   153,240,53,169,20,136,153,240,427
RS 1570 DATA 53,162,39,169,12,157,200,53,
   157,32,51,157,24,54,202,16,4098
XW 1580 DATA 244,96,173,10,210,41,15,133,
   144,170,160,0,232,224,16,144,8492
BW 1590 DATA 2,162,0,189,145,42,153,200,5
   4,153,184,54,200,228,144,208,2288
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BI 1600 DATA 235,162,15,169,15,157,216,54
   ,189,129,42,157,232,54,202,16,8236
EH 1610 DATA 242,96,169,0,133,169,133,160
   ,133,161,133,162,133,155,133,168,1237
QR 1620 DATA 133,147,141,11,208,141,10,20
   8,141,9,208,141,8,208,141,12,6796
TE 1630 DATA 208,141,200,2,133,163,133,16
   4,133,166,133,167,133,157,133,158,1388
VL 1640 DATA 133,159,141,8,210,141,5,210,
   169,3,141,15,210,169,30,133,7113
IT 1650 DATA 165,169,1,133,148,133,152,13
   3,153,133,154,169,17,141,111,2,6675
LV 1660 DATA 169,170,141,1,210,141,3,210,
   169,162,141,7,210,169,41,133,8808
DQ 1670 DATA 145,169,16,141,3,55,141,4,55
   ,141,5,55,169,64,141,48,2725
ZC 1680 DATA 2,169,42,141,49,2,169,61,141
   ,0,2,169,43,141,1,2,537
VF 1690 DATA 173,14,212,9,128,141,14,212,
   169,32,141,7,212,169,62,141,7627
EF 1700 DATA 47,2,169,3,141,29,208,169,42
   ,141,196,2,169,12,141,197,7557
KH 1710 DATA 2,169,206,141,198,2,169,76,1
   41,192,2,169,196,141,195,2,8743
DE 1720 DATA 169,72,141,193,2,169,14,141,
   194,2,96,162,0,169,36,208,6478
MY 1730 DATA 10,162,1,169,37,208,4,162,2,
   169,38,133,131,169,0,133,5419
PN 1740 DATA 130,96,32,133,44,32,192,44,1
   62,0,32,252,44,32,139,44,3441
DI 1750 DATA 32,192,44,162,1,32,252,44,32
   ,145,44,32,192,44,162,2,3439
RQ 1760 DATA 32,252,44,76,90,45,181,149,2
   01,52,208,4,169,0,149,152,7440
JS 1770 DATA 201,175,208,4,169,1,149,152,
   181,152,240,17,214,149,180,149,2016
HA 1780 DATA 162,11,200,177,130,136,145,1
   30,200,202,16,246,96,181,149,246,3694
TF 1790 DATA 149,24,105,10,168,162,11,177
   ,130,200,145,130,136,136,202,16,8930
FK 1800 DATA 246,96,246,160,181,160,201,4
   ,144,40,169,0,149,160,24,181,7908
VU 1810 DATA 157,105,11,201,22,208,2,169,
   0,149,157,133,144,181,149,168,9880
EY 1820 DATA 24,105,11,133,156,166,144,18
   9,29,43,145,130,232,200,196,156,2013
DM 1830 DATA 208,245,96,162,10,169,70,133
   ,149,169,95,133,150,169,170,133,748
XG 1840 DATA 151,189,29,43,157,70,36,157,
   95,37,157,170,38,202,16,241,7751
OK 1850 DATA 142,0,208,142,1,208,142,2,20
   8,134,137,134,139,134,138,96,9063
DC 1860 DATA 198,137,198,137,165,137,141,
   0,208,165,169,201,20,144,24,198,9705
CM 1870 DATA 139,165,139,141,1,208,165,16
   9,201,50,144,11,198,138,198,138,789
JG 1880 DATA 198,138,165,138,141,2,208,96
   ,162,0,138,157,0,35,232,208,8500
OE 1890 DATA 250,173,10,210,141,199,2,162
   ,9,164,135,189,51,43,153,0,5599
ME 1900 DATA 35,136,202,16,246,169,242,13
   3,142,141,4,208,169,240,133,140,2899
SP 1910 DATA 141,5,208,169,238,133,141,14
   1,6,208,169,236,133,143,141,7,247
DV 1920 DATA 208,96,165,132,24,105,40,133
   ,132,165,133,105,0,133,133,201,8071
IU 1930 DATA 53,208,14,165,132,201,200,20
   8,8,169,51,133,133,169,72,133,9253
UY 1940 DATA 132,96,164,145,136,136,185,2
   40,53,201,21,240,14,185,240,53,865
MU 1950 DATA 240,10,169,0,153,240,53,136,
   153,240,53,96,169,15,153,240,435
MB 1960 DATA 53,136,169,19,153,240,53,96,
   165,146,56,233,40,74,74,74,6419
MO 1970 DATA 170,173,70,42,133,128,173,71
   ,42,133,129,202,48,13,24,165,5433
KE 1980 DATA 128,105,40,133,128,144,244,2
   30,129,176,240,96,165,169,201,250,6261
JS 1990 DATA 240,23,230,169,165,169,201,1
   00,144,7,169,10,133,165,76,67,7284
ZO 2000 DATA 46,201,70,144,4,169,20,133,1
   65,238,5,55,173,5,55,201,6412
KN 2010 DATA 26,208,41,169,16,141,5,55,23
   8,4,55,173,4,55,201,26,3768
LP 2020 DATA 208,26,169,16,141,4,55,238,3
   ,55,173,3,55,201,26,208,5632
KE 2030 DATA 11,169,16,141,5,55,141,4,55,
   141,3,55,96,164,163,185,5912
GF 2040 DATA 98,42,10,141,6,210,200,192,3
   2,144,5,169,0,133,163,96,6696
NT 2050 DATA 230,164,165,164,197,165,208,
   6,230,163,169,0,133,164,96,169,966
UY 2060 DATA 70,133,135,169,62,133,134,14
   1,3,208,162,8,189,161,42,157,8489
DX 2070 DATA 62,39,202,16,247,96,165,168,
   240,17,169,0,141,6,210,141,8702
TY 2080 DATA 4,210,141,2,210,141,0,210,76
   ,98,228,230,166,208,2,230,2223
DS 2090 DATA 167,32,220,45,32,119,46,32,2
   5,49,165,155,240,19,198,155,7839
CJ 2100 DATA 201,240,240,6,141,0,210,76,2
   35,46,169,0,141,0,210,133,7853
IS 2110 DATA 155,165,148,208,14,173,15,20
   8,240,25,169,90,133,148,169,78,9681
OO 2120 DATA 141,195,2,169,0,141,30,208,1
   41,2,210,32,156,44,198,148,8018
CA 2130 DATA 76,98,228,169,0,141,30,208,3
   2,90,47,32,156,44,169,196,6886
BP 2140 DATA 141,195,2,173,120,2,201,13,2
   08,25,166,135,160,12,224,184,9612
KH 2150 DATA 176,43,189,255,38,157,0,39,2
   02,136,208,246,230,134,230,135,4337
HE 2160 DATA 76,98,228,201,14,208,22,166,
   134,160,12,224,56,144,14,189,8324
LS 2170 DATA 1,39,157,0,39,232,136,208,24
   6,198,134,198,135,76,98,228,2904
ZH 2180 DATA 173,132,2,240,6,169,0,141,2,
   210,96,230,147,165,147,201,1331
BG 2190 DATA 11,144,242,169,150,141,2,210
   ,169,0,133,147,165,134,24,105,7990
TO 2200 DATA 4,133,146,32,2,46,160,5,177,
   128,208,217,169,15,145,128,8877
TT 2210 DATA 96,162,15,160,36,177,132,201
   ,17,208,7,169,18,145,132,76,6887
GI 2220 DATA 218,47,201,18,208,7,169,17,1
   45,132,76,218,47,201,15,240,9175
GT 2230 DATA 9,201,19,208,43,169,15,76,18
   2,47,169,19,133,136,169,0,5835
OY 2240 DATA 145,132,192,36,240,26,200,17
   7,132,208,7,165,136,145,132,76,9860
EG 2250 DATA 218,47,169,0,145,132,200,145
   ,132,169,255,133,155,32,38,46,8194
RB 2260 DATA 136,208,178,32,188,45,202,16
   ,170,96,160,38,177,132,201,5,8176
KE 2270 DATA 208,9,169,9,145,132,169,8,13
   6,145,132,96,160,2,177,132,7956
JG 2280 DATA 201,7,208,13,169,9,145,132,1
   36,169,8,145,132,200,76,129,8603
YB 2290 DATA 48,201,9,240,3,76,129,48,136
   ,136,177,132,240,91,201,17,9281
IE 2300 DATA 240,66,201,18,240,62,201,5,2
   40,5,200,200,76,129,48,152,9122
SQ 2310 DATA 170,198,145,198,145,164,145,
   192,1,208,25,169,14,153,240,53,9527
IK 2320 DATA 169,13,136,153,240,53,169,1,
   133,168,169,30,133,165,32,101,7475
UI 2330 DATA 49,76,155,50,169,5,153,240,5
   3,136,169,4,153,240,53,138,9158
MV 2340 DATA 168,76,104,48,169,5,145,132,
   136,169,4,145,132,200,200,169,1028
DA 2350 DATA 0,145,132,200,145,132,76,129
   ,48,169,6,145,132,200,169,7,8008
XA 2360 DATA 145,132,200,169,0,145,132,20
   0,192,39,176,3,76,248,47,96,8230
II 2370 DATA 160,37,177,132,201,1,208,5,1
   69,2,145,132,96,201,2,208,8310
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QJ 2380 DATA 5,169,3,145,132,96,201,3,208
   ,15,200,177,132,240,1,96,8952
TV 2390 DATA 169,5,145,132,136,169,4,145,
   132,96,162,15,189,184,54,201,9583
NQ 2400 DATA 255,144,22,32,246,47,32,228,
   47,32,138,48,189,200,54,157,8113
VR 2410 DATA 184,54,201,253,176,3,254,200
   ,54,254,184,54,32,188,45,202,1246
EO 2420 DATA 16,218,96,162,15,160,37,189,
   232,54,208,5,189,216,54,240,1721
GW 2430 DATA 20,56,189,216,54,233,1,157,2
   16,54,189,232,54,233,0,157,747
YA 2440 DATA 232,54,76,18,49,177,132,208,
   15,169,15,157,216,54,189,129,9312
ET 2450 DATA 42,157,232,54,169,1,145,132,
   32,188,45,202,16,201,96,173,8957
HM 2460 DATA 9,208,201,8,144,3,76,42,49,1
   73,11,208,201,8,144,9,4943
OK 2470 DATA 169,90,133,148,169,78,141,19
   5,2,165,169,201,70,144,43,198,348
TZ 2480 DATA 140,198,140,165,140,141,5,20
   8,198,143,198,143,165,143,141,7,821
BZ 2490 DATA 208,198,141,198,141,165,141,
   141,6,208,198,142,198,142,165,142,3444
LA 2500 DATA 141,4,208,201,10,176,3,32,13
   0,45,96,169,52,133,133,169,7401
WN 2510 DATA 136,133,132,160,39,169,0,145
   ,132,169,0,136,192,3,208,247,437
UW 2520 DATA 169,42,141,199,2,160,29,169,
   5,145,132,136,169,4,145,132,7636
AS 2530 DATA 136,169,9,145,132,136,169,8,
   145,132,169,14,133,144,160,11,7307
SB 2540 DATA 177,132,208,35,32,216,49,32,
   246,47,160,11,177,132,201,6,7636
KB 2550 DATA 240,8,200,192,26,208,245,76,
   152,49,166,144,189,14,43,157,9097
DT 2560 DATA 149,52,198,144,76,152,49,169
   ,4,145,132,200,169,5,145,132,8862
```



```
ZJ 2570 DATA 206,199,2,173,31,208,201,6,2
   40,3,76,202,49,96,162,255,671
DP 2580 DATA 160,255,136,208,253,202,208,
   248,96,173,244,2,133,170,169,40,2993
FO 2590 DATA 141,244,2,141,9,212,32,72,43
   ,32,204,43,162,59,169,0,4840
GW 2600 DATA 157,248,54,202,16,250,162,39
   ,189,230,42,157,136,52,202,16,9378
RN 2610 DATA 247,169,14,141,199,2,206,199
   ,2,32,216,49,173,199,2,208,9537
EJ 2620 DATA 245,32,72,43,160,35,169,6,15
   3,152,51,200,169,7,153,152,8438
DU 2630 DATA 51,169,51,133,133,169,152,13
   3,132,32,246,47,32,216,49,160,9024
SF 2640 DATA 19,177,132,240,244,169,4,145
   ,132,169,5,200,145,132,32,216,793
OS 2650 DATA 49,32,216,49,169,42,141,199,
   2,162,39,189,190,42,157,12,7223
MH 2660 DATA 55,202,16,247,32,216,49,32,2
   16,49,32,216,49,32,216,49,6697
OX 2670 DATA 169,4,141,19,55,141,29,55,14
   1,33,55,141,40,55,169,5,2911
ZV 2680 DATA 141,20,55,141,30,55,141,34,5
   5,141,41,55,169,20,141,31,3433
SO 2690 DATA 55,169,21,141,32,55,162,19,1
   89,170,42,157,248,54,202,16,8499
TH 2700 DATA 247,32,156,43,32,204,43,32,7
   2,43,32,153,46,32,130,45,2574
WW 2710 DATA 169,7,162,46,160,176,32,92,2
   28,32,211,45,32,103,43,32,4627
GG 2720 DATA 45,45,169,0,133,77,238,199,2
   ,32,211,45,32,180,48,32,5114
JN 2730 DATA 221,48,165,169,201,131,144,1
   2,32,221,48,165,169,201,160,144,1834
DM 2740 DATA 3,32,221,48,32,139,47,165,16
   7,201,2,144,14,162,15,94,5747
ZO 2750 DATA 232,54,202,16,250,169,0,133,
   166,133,167,76,188,50,224,2,9197
MO 2760 DATA 225,2,227,49,0,0,0,0,0,0,0,0
   ,0,0,0,0,3866
```

Listing 2.
BASIC listing.

```
KR 10 REM *** TROLL WAR ***
LI 20 REM CASSETTE MAKER PROGRAM
EI 40 DIM DAT(16):LINE=990:RESTORE 1000:T
   RAP 120:? "CHECKING DATA"
DO 50 LINE=LINE+10:? "LINE:";LINE:FOR X=1
    TO 16:READ DAT:IF DAT<0 OR DAT>255 TH
   EN 220
YY 60 DAT(X)=DAT:NEXT X:DATLIN=PEEK(183)+
   PEEK(184)*256:IF DATLIN<>LINE THEN ? "
   LINE ";LINE;" MISSING!":END
WP 70 TOTAL=LINE:FOR X=1 TO 16
HM 80 IF PASS=2 THEN PUT #1,DAT(X):NEXT X
   :READ CHKSUM:GOTO 50
AJ 90 TOTAL=TOTAL+DAT(X)*X:IF TOTAL>9999
   THEN TOTAL=TOTAL-10000
LR 100 NEXT X:READ CHKSUM:IF TOTAL=CHKSUM
    THEN 50
MO 110 GOTO 220
ZR 120 IF PEEK(195)<>6 THEN 220
ZT 130 IF PASS=0 THEN 200
AD 160 FOR X=1 TO 128:PUT #1,0:NEXT X:CLO
   SE #1:END
SD 200 ? "READY CASSETTE AND PRESS RETURN
   ";:OPEN #1,8,128,"C:":RESTORE 230:FOR
   X=1 TO 40:READ N:PUT #1,N:NEXT X
QS 210 ? :? "WRITING FILE":PASS=2:LINE=99
   0:RESTORE 1000:TRAP 120:GOTO 50
MI 220 ? "BAD DATA: LINE ";LINE:END
HF 230 DATA 0,23,210,39,249,39,169,0,234,
   234,234,169,60,141,2,211,169,0,141,231
   ,2,133,14,169,64,141,232,2
AP 240 DATA 133,15,169,227,133,10,169,49,
   133,11,24,96
```

THE END USER

THIS MONTH:

Networking for teachers, great services, a game for all seasons, the writer's friend and the gambler's pal

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.

CompuServe — 71266,46
Delphi — NJANALOG

by Arthur Leyenberger

Welcome! I hope you're reading this in some warm, sunny place with a balmy breeze wafting by. I'm in my basement computer lab at the moment, wishing I was where you are. On with the show.

For teachers only.

If you're a teacher who wants to learn from others using Atari computers in the classroom, you should join the Atari Teachers Network (ATN). Even if you're not in the educational business yourself, teachers usually have good advice. . .these folks definitely do.

What's so special about this group of educators? They *share*. They share information about teaching techniques; they share information about good *and* bad software; and they share their excitement, enthusiasm and knowledge about computer use in the classroom. ATN deals mainly with Atari 8-bit machines, but the STs are gradually finding their way into students' hands.

The ATN is an independent, nonprofit organization, not affiliated with Atari in any way. Their quarterly newsletter can be obtained for $6 per year: Atari Teachers Network, c/o Teaneck High School, 100 Elizabeth Avenue, Teaneck, NJ 07666. For more information, contact the editor, John Hanna, at (201) 837-1188.

Infomania.

No, wait a minute. I'm not talking about the incurable disease I share with many users. Nope, we're not going to talk about the compulsive desire to collect all kinds of information, from every source imaginable, and store it for possible future use. Or are we?

If you're confused about the multitude of electronic services currently available to any user with a modem, there's a book you should get. *Infomania: The Guide to Essential Electronic Services*, by Elizabeth Ferrarini, will help you get the most out of your on-line time.

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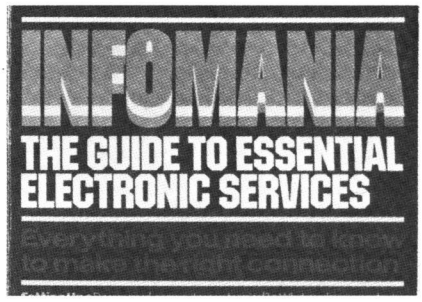

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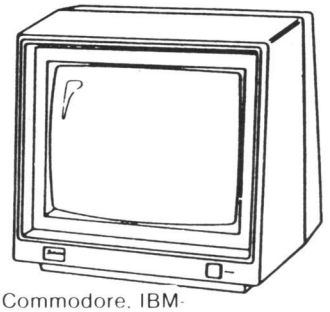

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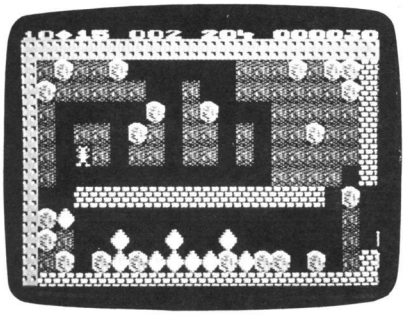
EA's BoulderDash.

Electronic Arts recently reissued a classic game for 8-bit Ataris, **BoulderDash**, in a package that includes the game's second version, **Super BoulderDash**. The original was put out by First Star Software, about two years ago. You may recall that company, formed around Fernando Hererra, the first Atari Star award winner and author of *My First Alphabet*.

BoulderDash was and is an excellent game. When I first saw it, it blew my socks off. I must have played it three hours per night for three straight weeks. I still go back to it. In my opinion, it's one of the most original and challenging games ever made for the 8-bit computer.

As mentioned in a previous **End User**, there are a lot of new Atari 8-bit owners. Folks who've joined the Atari adventure within the last year or so may never have experienced the excitement and challenge of this game. It's to them that this mention of **BoulderDash** is directed.



Super BoulderDash.

In **BoulderDash**, you become the character Rockford. Your quest is to gather as many diamonds as possible by tunneling through the earth, avoiding being squashed by a boulder. The job is more difficult than it sounds; whenever Rockford digs under a diamond or boulder, it falls. One wrong step will cost him his life.

Each level takes place in a different cave, composed of several scrolling screens. The caves range in difficulty from very easy to extremely hard, based on the amount of time Rockford has to complete the cave, through various obstacles and hazards found there. On each level, the action is not simply increased, but, rather, the quota raised and obstacles rearranged. Five levels for each of the sixteen caves creates plenty of challenge and variety.

BoulderDash is just plain fun, with very good detail. For example, when Rockford's standing still, he taps his foot, blinks and places his hands on his hips. Moreover, the "physics" of the falling boulders and diamonds is very realistic.

If you've never seen or played this game, I strongly recommend it. If you've played it, but never purchased a copy, now's your chance to obtain your own *legal* copy from Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404. I can't imagine anyone buying it and not being satisfied.

Hacking around with an ST.

I had a dream about Jack Tramiel the other night—about Atari, too. It frightened me so much, I thought I'd better tell you you about it. I dreamt that the only people who bought STs were hackers—you know, the hobbyists.

This was partly due to a lack of serious software available for it. Sure, there was a scattering of word processing and telecommunications programs, but the majority of ST software was for games. Whew!

I dreamt that there were no accounts receivable, accounts payable and general ledger programs available. . .the kind businesses really need, and the kind that, if not available, would cause business people to completely ignore the ST.

I also dreamt Atari and their handful of employees were interested only in their own purses, in making as much as they could from a cheaply made, not fully mature computer. In fact, in my dream, ol' Jack, Sam, Leonard and the clan were peddling computers as if selling size 8½D wingtips.

Another thing scared me about the dream. I saw printers for the 8-bit and ST computers taking a year and a half to come to market from the time they were announced. On top of that, they were *old* technology when *first* announced.

I even dreamed that the Atari printer meant for the 8-bits couldn't even work with **The Print Shop**. It was horrible—my dream, that is.

I woke up in a cold sweat. I was wide awake, I thought. Reality returned, and I realized that many people were using the ST for *serious* applications, not just tinkering. Yup, I sure was glad to see it wasn't only hackers who made up the ST market.

And, Atari. . . Boy, I was happy to know they're not just pumping out new models for the sake of new models; they're seriously interested in the **End User** having a productive machine that can maintain the owner's investment.

When I really woke up, I was confused. It was a scary dream, all right. Also, after a bad dream, it's sometimes difficult to tell the difference between fantasy and reality. But I soon realized which was which.

Thunder and lightning.

Batteries Included had some interesting news recently, at COMDEX. Mark Skapinker was demonstrating his program **Thunder**. It's a combination ST desk accessory and stand-alone spelling checker/word counter/style checker. This program is a virtual writer's toolbox.

The first part of **Thunder**, the desk accessory, can be used during any program, but is meant specifically to be used with a word processing program. It actually follows your keystrokes. At the end of a word, it checks its 50,000-word, memory-based dictionary and beeps if the word's not found.

At that point, you can call up a form which will offer intelligent suggestions (not just similarly spelled words), or you can add the word to the dictionary. If you choose one of the suggestions, the program automatically backspaces over the original word to insert the correct spelling.

Thunder also has an expander, allowing you to set up a file with over a hundred expansion entries. For example, a paired entry may be *fyi* and *for your information*.

Whenever you type in *fyi*, the program will expand it, automatically inserting *for your information*. Entire paragraphs can be paired with an expansion entry, and there are built-in expansions for states, months, days, etc.

The second part of **Thunder** is a stand-alone program. It's made up of two parts: a spelling checker for a disk-based file and some utilities for writers. The spelling checker looks at an entire file at a time and can use multiple dictionaries. The utilities include: character, word, sentence and paragraph counts, as well as a "fog" index to measure readability (grade level) of a document.

Thunder will be available for the Atari ST (and later, perhaps, for the IBM PC) in the third quarter. A price has not yet been announced. Be on the lookout for **Thunder**, yet another productivity tool from the good folks at Batteries Included, 30 Mural Street, Richmond, Ontario L4B 1B5, Canada.

Playing cards.

I really enjoy playing cards; I love all kinds of card games. Whenever I go to Las Vegas on business, I tend to skip the nightlife, in favor of the blackjack tables. If you enjoy playing blackjack as I do and can't make it to Vegas (or want to limit your losses), I have a suggestion: **Cards** by MichTron.

Cards is a graphics program of five different card games. It runs from the desktop of an ST and includes: Blackjack, Klondike, Poker Squares, Cribbage and Solitaire. The program runs on any ST (color or monochrome), although, for best effect, a color monitor's recommended.

Running **Cards** is straightforward, in

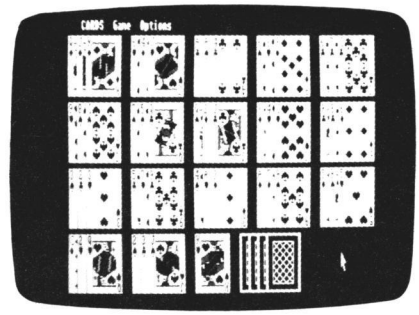
that, once the program is executed, you choose the game you'd like to play from a drop-down menu. Playing options, like redealing or shuffling, are chosen the same way.

In addition to enjoying blackjack on my ST, I've also gotten fond of Klondike. It's a single-player game most people think of when somebody mentions solitaire. In the game, cards are dealt automatically into seven piles. They can be drawn one at a time from the remaining stack, or repositioned on the piles to play on alternating colors, in reverse order. Also, four suit piles are built, in ascending order starting with the ace of each suit.

Klondike is a gambling game, since the deck must be "purchased" for $52. Then, for each card played onto the suit piles, you receive $5. The program displays your cumulative total on-screen continuously.

The most exciting part of Klondike is being able to use up all cards in the stack and reveal the cards on the seven piles. You're almost guaranteed a win. Once the program sees you've won, cards are played to the suit piles automatically.

Cards was written by J. Weaver, author



Cards.

of several other MichTron ST titles, including **Mi-Term**. MichTron is *the* most prolific ST software publisher, and just about all their programs are winners. **Cards** isn't copy-protected, so please don't give or receive illegal copies. Play by the rules; help the ST software industry survive.

If you like playing cards, you'll probably like playing **Cards**. From MichTron, 576 S. Telegraph, Pontiac, MI 48053, (313) 334-5700.

Making the connection.

I enjoy hearing from **ANALOG Computing** readers as much as I enjoy writing **The End User**. Unfortunately, there's only one of me—and many of you. That means there's no way I can respond to everyone who writes with a question or comment. But there *is* an alternative.

I generally frequent two of the most popular on-line data services and can be reached there, electronically. I check into CompuServe almost every day. You can leave me electronic mail or a message on one of the Atari SIGs. My PPN is 71266,46. On Delphi, I can be reached as *NJANALOG* (I live in New Jersey and write for **ANALOG Computing**). Clever, huh? Anyway, I check into Delphi once or twice a week.

If you want to contact me, these are the forums in which to do so. I'll still read your letters, but if you contact me electronically, your chances of a response are better. So, keep those (electronic) cards and letters coming.

R-Time 8 and SpartaDOS 3.2b

ICD INC.
1220 Rock Street, Suite 310
Rockford, IL 61101-1437
(815) 229-2999
R-Time 8 with SpartaDOS $69.95

by Matthew J.W. Ratcliff

R-Time 8 from ICD is a real-time clock cartridge for Atari 8-bit machines (except the 400). It's designed to work with the newest version of **SpartaDOS**, **3.2b**, which is provided with it.

This latest DOS release comes with some utilities promised in the **SpartaDOS** review, which appeared in **ANALOG Computing**'s issue 39. The major enhancements for version 3.2b will be detailed later.

The excellent ICD documentation gives complete technical information on **R-Time**, for use with their competitor's DOSs. The *RTIME8* command file is provided, to use the software with all versions of **SpartaDOS**, Atari DOS 2 or 2.5, MYDOS, TOPDOS, SmartDOS, and OSS's DOS XL. Even the assembly source listing for the **R-Time** handler is provided, for the advanced programmer.

R-Time was created primarily for the time- and date-stamping of your disk files with **SpartaDOS**. The battery backup will power the **R-Time** from three to five years before needing a replacement.

R-Time provides quartz timing accuracy for BBSs, unlike the VBI timers, which are affected by most I/O functions. It also provides time automatically with **SpartaDOS 3.2b**, when your computer's booted —minimal effort for you. Programmers who maintain backup files of their work, know how useful this feature is.

R-Time plugs into the right-hand slot of the 800. It has an expansion port on top, for use with the XL/XEs. **R-Time** is easily pried apart and snapped together again, making battery replacement quite simple.

There were some minor bugs in **SpartaDOS 2.3**. After booting DOS, the 850 interface wouldn't initialize properly without power cycling. This has been fixed.

SDCS with **3.2b** now recognizes extended sectors of Atari DOS 2.5 disks. Earlier releases wouldn't read past sector 720. **SDCS 3.2b** will read an enhanced-density 2.5 disk, but won't write past sector 720 (except for SCOPY, see below).

As mentioned in the **SCDS** review of issue 39, the sector copy utility SCOPY is now available. When using it, you have several "slash" options. If none are given, a disk-to-disk sector copy is done.

A */U* tells SCOPY the source disk has UltraSpeed sector skew, or to write it on the destination. A */R* indicates that the disk's really a RAMdisk (only with RD.COM, see below).

An entire disk may be compacted to or uncompacted from a file, just by specifying a filename. You can easily transfer entire disks over the modem this way.

Although not mentioned in the documentation, this compression feature works with **SpartaDOS** disks only.

If your drive has US Doubler, SCOPY does its reading and writing at UltraSpeed, no matter what type of disk you're duplicating. It's one fast utility!

The 32-key type-ahead buffer is built into **SDCS 3.2b**. It also speeds up your key repeat rate. It works fine with **AtariWriter**, handy for fast typists.

Note that this does conflict with DDT of MAC/65 and Action! If the "KEY" buffer is on, then the system will lock up when you go to DDT.

It works fine with the editor portion of MAC/65, however. Just put a KEY OFF command in your STARTUP.BAT file on MAC/65 development disks, to avoid this conflict.

Now, either **R-Time** or the software system clock can be hooked into Atari BASIC (or just about anything else), by adding a Z: handler to the system. It's installed with the ZHAND command file.

This handler makes "real time" readily available, from nearly any Atari-compatible DOS you want. The Z: handler may be treated just like any other device in the system, using the commands *OPEN, CLOSE, GET, PUT* and *XIO* for complete control of clock functions.

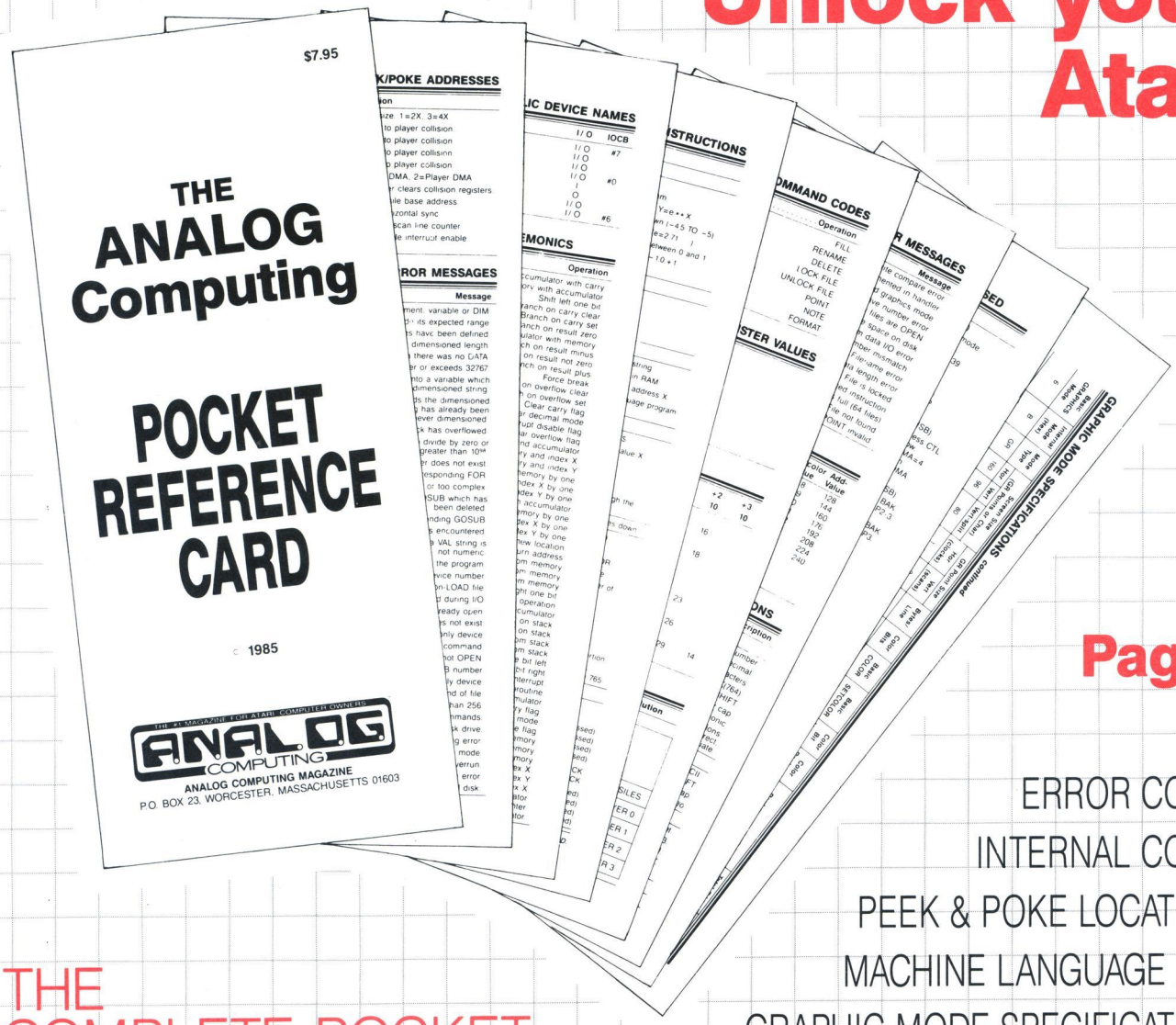
If you're at the *DOS* prompt and press RESET, control is returned to DOS, even if a cartridge is installed. **SDCS** gives you *complete* control of your Atari. You may even force a batch file of your choice to automatically execute, anytime RESET is pressed. This is enabled with the AUTOBAT command.

The new RAMdisk command, *RD.COM*, automatically diagnoses what hardware configuration you're running. It recognizes the 130XE, a 64K upgrade for the 130XE from Ron Boling, and ICD's new 256K RAMBO XL upgrade for the 800/1200XLs.

RD260 supports the 800XL RAM upgrade published in the September 1985 *Byte*, by Claus Buchholz. With these upgrades, you can have a true double-density, 192K RAMdisk!

SpartaDOS is ready to be the DOS of

Unlock your Atari



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choice for hard disk use, according to its manual. **SDCS 3.2b** provides full support of the Supra hard disk. You're given flexible control of drive selection for booting and configuring the system (as opposed to Supra's MYDOS 4.0, which locks you into one configuration). If you like **SDCS** on a floppy, you'll love it on a hard disk!

In revision 2.3 of **SDCS** there were some conflicts for RAM hidden under the OS ROMs if you used OSS BASIC XE (BXE). **SDCS 3.2b** now fully supports BXE. When booted, **SDCS** checks to see if BXE is installed.

If so, it sets up fewer disk buffers, moves them below LOMEM and eliminates its plain English error messages—usually stashed in this conflicting RAM region. You also lose the AINIT Atari DOS 2 format command, but you won't miss it. For any other cartridge, you'll retain these amenities.

The features mentioned here come on a disk with your **R-Time 8**, but it's not complete. You must purchase the **SDCS 3.2b** (or the US Doubler with **SDCS**) separately, to get other command utilities and additional documentation.

Some may still have reservations about this DOS, however, since it isn't a "standard" format. True, you can't boot Atari DOS 2.0S and then load a file from a **SpartaDOS** disk.

I was a little skeptical at first, and worried about having to convert all my files to a new DOS. But, after using **SpartaDOS** for several months, I'm sold. Since **SpartaDOS** can read any other DOS disk, I have not bothered to convert any of my disks. There's no need to. Because **SpartaDOS** is density smart, you don't have to "reconfigure" every time you put in a different density disk, a common annoyance with some DOSs.

Once you've booted **SpartaDOS**, it just doesn't matter what disk you put in the drive. You don't even need to know—**SpartaDOS** does all the thinking for you.

R-Time 8 makes a superb DOS even better. The RAMdisk and UltraSpeed I/O have saved me countless hours in developing programs and articles for **ANALOG Computing**. **SpartaDOS 3.2b** is the standard by which all other Atari DOSs should be measured.

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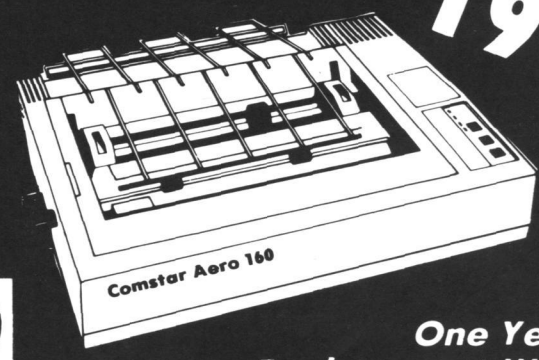

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Join us on Delphi

We hope you've noticed the "**ANALOG Computing** on Delphi" ad in both last issue and this. As it states, the Telecommunications System (TCS) was so popular that we decided to transfer over to Delphi.

This gives members Delphi's many services—news and sports, weather reports, movie reviews, shopping services, travel information, etc. And, on **ANALOG Computing**'s Atari Users' Group, you'll find all the TCS features and more: programs to download, a forum, a conference system, and some very knowledgeable people to answer questions and keep you up to date. We'll also be arranging electronic panel discussions from time to time.

If you're an **ANALOG Computing** magazine subscriber, join Delphi free of charge, with a lifetime membership and $5 of line time. To be eligible, you can subscribe to **ANALOG Computing** directly, while online.

If you were already a TCS subscriber, you should have received complete information on the changeover in the mail.

Join us. . .

It's easy. First, pick the data communications network you'll use: Uninet, Tymnet or DataPac (in Canada). To get your local numbers, look in NETWORK-INFO available in USING-DELPHI, or call: Uninet at 800-821-5340 (in Missouri, 800-892-5915); Tymnet at 800-336-0149. If you have any difficulty, call Delphi Customer Service at: 1-800-544-4005 (in Massachusetts, 1-617-491-3393).

Signing on.

You may sign on directly, or via your network. Here's how:

To Delphi directly:

In the Boston area, dial 617-576-0862.
When you have carrier, enter 1 or 2 returns <CR> <CR>.
At "USERNAME" enter your membername (use *JOINATARI* if you're a current **ANALOG Computing** magazine subscriber, or if you're going to subscribe on-line) and <CR>.
At "PASSWORD" enter your password (use *ANALOG* for current subscribers, *SUBSCRIBE* if you wish to subscribe) and <CR>.

Using Uninet

Dial your local Uninet number.
Enter <CR>.<CR> at the |x| prompt.
Enter *DELPHI* at the SERVICE prompt.
Then enter your USERNAME and PASSWORD as outlined in the Delphi section above.

Using Tymnet

Dial your local Tymnet number.
When "PLEASE TYPE YOUR TERMINAL IDENTIFIER" appears, type *A*.
When "PLEASE LOG IN" appears, type *DELPHI*.
Then enter your USERNAME and PASSWORD as outlined in the Delphi section above.

Using Datapac (Canada)

Dial your local Datapac number.
Enter . for 300 baud or .. for 1200 baud.
Enter *Set 2:1,3:126* for full duplex allowing deletes.
Enter *p 1 3106,DELPHI;* <CR> (Tymnet), or enter *p 1 312561703088* <CR> (Uninet).
Then enter your USERNAME and PASSWORD as outlined in the Delphi section above.

General commands.

Most commands require only enough letters entered to make them unique. For example, to get to GROUPS AND CLUBS from the main menu, simply type *GR* and <CR>. Do not press <CR> after commands using the CONTROL keys. Most other commands require a <CR> to be activated. Entering ? will generally display a full menu or provide help.

Items marked with an asterisk (*) are premium services, for which there's an extra charge (for more details, see RATES and PRICES in USING-DELPHI).

Immediate commands.

These can be used at any time, except in MAIL and EDITORS. They include: /BYE, /HELP, /ECHO, /NOECHO, /EXIT, /GAG, /NOGAG, /PROMPT (1, 2, or 3 — 1=No Menu, no explanation; 2=No Menu, some explanation; 3=Menu plus explanation), /LENGTH, /TIME, /WHOIS (username), and /WIDTH.

GOTO command.

The GOTO command can be used at any MENU prompt, except in MAIL, CONFERENCE, or EDITORS.

GOTO works on menu selections from the main menu, but you can enter strings to denote what menu you wish to access. For example: GOTO MAIL.

You may abbreviate the strings (e.g.,GOTO LIB CA, rather than GOTO LIBRARY CAIN). In places such as SIGs, you're taken to the main SIG menu. After you enter a GOTO command string, just enter a ^Z or EXIT, and the GOTO string will be executed.

Main menu.

Choose from the following subjects.

BULLETIN BOARD — Public message system.

CONFERENCE — Real-time communication with one person or a group.

DELPHI MAIL — Electronic mail and other MAIL services.

ENTERTAINMENT — Games and member pubishing; movie reviews.

(continued on page 115)

A report from COMDEX

by Lee H. Pappas

COMDEX has always been a business-oriented show, with official-sounding attendees like VARs, VADs, OEMs, System Integrators, and other resellers.

They attend to learn of new products, acquire selling techniques, or otherwise find new ways to increase their sales volume and bring bigger profits to their businesses. More than 600 manufacturers displayed everything from the latest CD ROMs and CAD/CAM devices to micro-to-mainframe links—and every imagineable peripheral. Companies seen at COMDEX included the likes of IBM, AT&T, TeleVideo, 3M, Panasonic and Atari.

Atari's display consisted of a mini-city made up of several dozen developers, all vying to show their wares. The **130XE** was exhibited, with some useful (and needed) accessories and software, but it was the 16-bit line that stole the spotlight.

Atari itself touted the **1040ST**, in this, the first major show in the U.S. to feature that model. The company also showed the **3½-inch hard disk**, which was in very real production form. The manual for the hard disk was still at Atari in a prerelease stage at showtime; we received ours a couple weeks later. We found it to be very complete, to the point of going into the hardware itself.

The **SMM804** dot-matrix printer, the ST version of the 8-bit XMM801 with interface modules, sported tractor and friction feed, with line and form feed, plus a printing speed of 80 characters per second. The printer is now shipping.

On the subject of hard copy, **ANALOG Computing** has been using the inexpensive (under $2000) QMS **Kiss** laser printer for several weeks now. It's been putting out everything, from extremely high-quality text printouts to program listings, to graphic screen dumps.

The printer's almost *too* quiet and boasts a very fast print time. Incidentally, Regent Software's **Regent Word II** word processor supports the **Kiss**. We'll be featuring a review in the near future.

The Atari **MS DOS emulator** will be hitting the market soon, running advanced software such as **Multimate**. The price is still in the works, but should sit somewhere between $200 and $220.

The **Z80 CP/M 2.2 emulator**, running software like **WordStar** and **Turbo Pascal**, should also be available in the near future, for around $50.00.

BMB Compuscience Canada had their **Imaginet** system, a card and software allowing up to sixty-three STs to run on one host PC computer. Used in conjunction with **The Manager**, a database, dozens of STs can access and update a single database.

The Manager in ST format is identical to its IBM version. A translator program, **DataVac** from BMB allows noncompatible micros to communicate with one another—and even permits **Manager** files from various computers to work on the **Imaginet** network.

The **Imaginet** card and software for the PC will sell for about $895.00. The ST card will go for $499.00. These products are available now. They'll be followed this fall by **Net Mail**, an inter-office memo system, and **Blink**, which provides a standardized interface over phone lines. **Blink** allows remote users access to all software and filing systems at other offices. All of these products are supported with extensive documentation, accompanied by on-line help files.

Grafikon, Ltd. announced and exhibited their Ansi/Graphics terminal emulator. As the name implies, **AnsiGraf** is a terminal program designed to handle graphics. Some of its features include the ability to emulate a Tektronix 4014 terminal, a VT-102 mode, Xmodem file transfer protocol, separate text and graphics screens, and disk and printer functions. **AnsiGraf** sells for $79.95.

MiGraph announced **Sidecar**, a pop-up organizer containing a calculator, ASCII table, notepad, calendar and address/phone book. A mini-DOS is also included, permitting disk functions without reverting back to the desktop.

Omnitrend was demonstrating a science fiction role-playing game, **Universe II** The one-player game clearly showed sophisticated enhancements over the 8-bit version. The $69.95 price tag includes several disks, along with a detailed 105-page manual, a phone number to call for assistance, and free membership on the Universe Bulletin Board System.

A new game scheduled by Omnitrend for release later on this year is tentatively called **Breach**. It, too, is a SF-based strategy game, with a scenario builder.

Prospero Software attended COMDEX, with their **Pro Fortran** and the **Pro Pascal** compiler. These packages add extensive power to the ST. **Pro Fortran** lets you recompile any existing mini- and mainframe software to run on the ST. Each compiler lists for $149.95.

TDI showed new versions of **Modula-2**. The standard version has been enhanced with a desktop which presents **Modula-2** files as icons and automates the edit/compile/link cycle. Other enhancements include: a desk accessory to set directory search paths, an enhanced editor, an ability to write desktop accessories, and even more.

A developers' version supplies an extra disk, containing, among other things, a source file cross referencer, symbol file decoder and a high-level GEM application library.

The standard package sells for $79.95, and the developer **Modula-2** for $149.95.

COMDEX *continued*

Current users can upgrade at $39.95 or $69.95 for the respective packages.

If you're looking for serious software, Business Operating Systems offers general ledger, accounts payable, accounts receivable, invoicing and inventory control programs.

These are available as packages consisting of: an **Office Pack**, with AutoClerk, Finder, Planner and Writer for $795.00; an **Accounting Pack**, containing Accounts Receivable, Accounts Payable, General Ledger, Invoicing and Inventory for $995.00; and a **Development Pack** with MicroCobol, MicroCobol/APF and AutoClerk for $795.00. Each of these packages has the BOS/5 operating system included.

OS/9 from TLM systems gives you true multitasking and multi-user ability. Patterned after UNIX, **OS/9** has a 68000 macro assembler and development tools, I/O redirection, wild card matching, a UNIX-like structure and command vocabulary, shell-oriented command line processing, and a full-screen editor—among its many other pluses.

OS/9 sells for $295.00. Programmers' packages, which consis of C, Pascal and BASIC, are also available, at the price of $495.00 each.

Some of the most exciting products being shown were in the Batteries Included booth. The company's known for quality software for the Atari 8-bits, and they're wasting no time matching—if not exceeding—that reputation for the ST.

Following on the heels of **PaperClip**, **DEGAS** and **HomePak** is **Thunder!**, a real-time spelling checker desk accessory. It functions within any ST GEM application and contains a 50,000-word real-time dictionary.

B/Graph Elite will give its user serious graphics and charting capability, via two- and three-dimensional bar charts and area graphs, in addition to pie charts. The **Consultant** is a relational database for business and personal use, said to have unique features. **BTS Spreadsheet** gives you a full-featured spreadsheet with math capability, logical and financial functions, plus a 1000x1000-cell worksheet.

Other products soon to be released are: **I*S Time and Billing**, **PaperClip Elite**, **Time Link**, **DEGAS Elite**, **I*S Talk** and **Portfolio**.

DAC Software is also offering business software: general ledger, accounts payable, accounts receivable, forecaster, inventory, billing and purchase ordering.

Sierra breaks further away from the entertainment field with **Cash Disbursements**, **Accounts Receivable** and **General Ledger**.

Each of these $129.95 programs boasts power with very simple-to-use functions. **Cash Disbursements**, for instance, is based on the popular manual accounting system used in most small companies. Balance sheets and vendor reports produced can give you an overall view of data.

Haba, in addition to their current software library, is releasing a **512K-memory board** for under $100.00. This made-in-Canada product is supposed to be fairly easy to install. Haba's **Haba Writer** word processor is being adapted to work with Batteries Included's **Thunder!**

Next issue, we'll be reporting on the Summer Consumer Electronics Show from Chicago and reviewing some of the products discussed here. The only question I have is. . .where are all the games?

READER COMMENT *continued from page 6*

have a copy service on a program-by-program basis.

Any of these suggestions would be helpful to people like me, who want to try only a few of the games (for example), but really don't have the patience and energy any more.

I await your reply! Thanks.
Sincerely,
Laurel L. Tryforos
Chicago, IL

*We're planning to publish a **Compendium**-like special issue for 8-bit owners within the next few months. It will contain the best games, programs and utilities submitted to us and not yet used in these pages. We're also working on a disk package much like your suggestion, containing games and other programs from past issues. You'll be able to purchase the disks separately, to get the programs you want most.* —*Ed.*

Cover files.

This letter is to enquire about the cover pictures of **ST-Log**. I was wondering where and how the data files for these pictures can be acquired.

Also, I would like to enquire about two new products for the Atari ST series computer, the SHD 204 20-megabyte hard disk drive and the game **Star Raiders**. I would like to know when they will be released by Atari and what the price of each will be, if you have any idea of either.

Thank you,
David K. Hair
North Charleston, SC

*Data files for pictures used on the **ST-Log** covers are found on our Delphi Atari Users' Group and on the disk version of the magazine.*

*As for **Star Raiders**, the game should be shipping in the next month or two, while the hard disk drive should be shipping now. At this time, we're not sure of prices on these items. Check with us next month; there should be more information in our CES report.* —*Ed.*

Plotting mode.

Mr. Bevard's graphic plotting program (**Visiplot**) in issue 40 of **ANALOG Computing** is a useful program. If existed a few years ago, I might not have had the motivation to create **B/GRAPH**.

I would like to draw to your readers' attention one inaccuracy in the accompanying article. Mr. Bevard indicates that **B/GRAPH** uses graphic modes 7 or 7+. This is not the case. It uses mode 8, the Atari's highest-resolution graphic mode.

B/GRAPH achieves a multicolor display in mode 8 through the use of artifacting. This required a significant amount of additional programming, but was well worth the effort.

Yours sincerely,
Michael H. Reichmann
President, Batteries Included

FINANCIAL SERVICES — Banking, bill-paying, financial calculations, stock prices, brokerage and advisory services.

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NEWS-WEATHER-SPORTS — Reports from major news services; AP Videotex online.

PEOPLE ON DELPHI — Describe yourself and find out about others.

TRAVEL — Plan and make travel arrangements.

WORKSPACE — Maintain files, write, or submit a file for publication.

USING-DELPHI — Help and valuable information from Delphi.

HELP — Explanation of main menu commands and other Delphi services.

EXIT — Sign off the Delphi system.

CONFERENCE.

The CONFERENCE option will let you join a group, start a new one, change your name or "handle," page another user, tell you who the current users are, send messages to others, and receive or reject messages of your own.

ENTERTAINMENT.

The ENTERTAINMENT section lets you choose from adventures, board games, children's games and collaborative novels. There's DELPHI-CASINO, LOGIC-GAMES,MEMBER'S CHOICE (a collection of programs submitted by Delphi members for your enjoyment), MOVIE REVIEWS* (including what's on cable and TV), POLL, SPORTS GAMES, TRIVIA QUEST, VT GAMES (for users with VT-50 or VT-100 terminals), and WITT'S END (lets you test *new* games received by Delphi).

FINANCIAL SERVICES.

This portion of Delphi gives you: BANKING, HOME PROGRAM LIBRARY, NAICO-NET (Brokerage)*, FINANCIAL and COMMODITY NEWS, AP FINANCIAL NEWSWIRE*, DOW JONES AVERAGE, and COMMODITY QUOTES*.

GROUPS AND CLUBS.

These include: ANNOUNCEMENTS, CONFERENCE, DATABASES, DMAIL, ENTRY LOG, FORUM, MEMBER DIRECTORY, POLL, SHOPPING ONLINE, TOPICS AVAILABLE, and WHO'S ONLINE.

Hidden Options available are: MAIL, SEND (username) MESSAGES.

LIBRARY.

In the LIBRARY, you may look through: ASTRO-PREDICTIONS, AUTONET/AUTOBASE, BOOKSHELF, CAIN, HEALTHNET, KUSSMAUL ENCYCLOPEDIA, LIBRARIAN, NEWSLETTERS, PERSONAL & HEALTH, RESEARCH LIBRARY,* SPACE RESEARCH NETWORK, and VIOLETTE WINE REPORTS.

MERCHANTS' ROW.

This group includes many services: AUTONET,* BAZAAR, the BOSTON-COMPUTER-EXCHANGE, CATALOG AND SPECIALTIES, COMPUTER EXPRESS, GOLD (Copier & Computer Supplies), and WINE-ON-LINE.

NEWS-WEATHER-SPORTS.

Here, you can choose from: ACCUWEATHER FORECASTS, NEWSBRIEF (AP), AP VIDEOTEX NEWS,* COMEDY BY WIRE, FINANCIAL NEWSWIRE,* SPORTSWIRE,* THE DIRECT CONNECTION (TDC), TODAY IN HISTORY (AP), and VIOLETTE WINE REPORTS.

USING-DELPHI.

This section will give you all the facts on Delphi. Here's what you'll find...

ADVICE FROM DELPHI — Answers to most frequently asked questions.

CREDIT POLICY — Delphi's current credit policy.

FEEDBACK — Send your ideas and suggestions!

GUIDED-TOUR — A brief version of the tour you took at sign-on.

MAIL TO SERVICE — If you have a question, ask Delphi Customer Service.

MANUALS — Information on how to purchase Delphi-related manuals.

NETWORK-INFO — Phone numbers and log-in procedures for data networks.

PREMIUM-SERVICES — Information concerning the extra-cost services.

WHAT'S NEW ON DELPHI — Get the word on what's new.

RATES-AND-PRICES — Official Delphi rates and prices.

SETTINGS (PROFILE) — Terminal and network configuration.

LENGTH — Lets you find your screen length and tailor Delphi accordingly.

MENU — Choose default menu at sign-on.

PASSWORD — Change your password (frequent changes are recommended),

PROMPT — Select level of menu prompting desired.

SET-TYMNET — Experiment with setting network parameters.

TERMINAL — Special features for DEC VT100 and VT52 users.

WIDTH — Tailor Delphi to fit your screen width.

USAGE-HISTORY — View your to-date activities on Delphi.

Delphi Terminal Configuration.

General information: 8-bit ASCII, 1 stop bit, no parity, asynchronous, full-duplex, no auto-linefeed or carriage-return linefeed, XON-XOFF or Handshaking should be enabled. *Note:* sometimes you have to experiment with other combinations, such as: 7 bit, 1 stop, no parity; or 8 bit, 1 stop, even or odd parity.

To erase a character, Delphi uses the ASCII DELETE/RUBOUT key, which is decimal 127. If necessary, the terminal program should translate the BACKSPACE key to a DELETE/RUBOUT. Unfortunately, the networks do not echo the delete/rubout correctly. However, it will have the desired effect.

Delphi uses the following control characters:

CONTROL-Z — End of input, or exit to next higher menu.

CONTROL-S — Suspends sending.

CONTROL-Q — Resumes sending.

CONTROL-O — Skips to end of file or message.

CONTROL-U — Cancels input for current line.

CONTROL-R — Redisplays current line.

CONTROL-X — Cancels everything typed ahead but unsent.

CONTROL-C — Cancels current activity and starts over.

If a particular control key is causing the terminal program to take some other action, then the terminal program should be reconfigured to use any of the other available control keys in place of the one required by Delphi.

A final note.

The following trademarks are used by Delphi, and in these two pages, in reference to services provided by the following: Telex - Western Union; ECOM - the U.S. Postal Service; Tymnet - Tymshare, Inc.; Dialog - Lockheed/Dialog Information Services, Inc.; OAG - Official Airline Guides, Inc.; SOS - Security Objective Services; NAICONET - North American Investment Corporation; AUTONET - Access Dynamics Inc.; THE ELECTRONIC CONNECTION - Interactive Offices Services, Inc.; AP - The Associated Press; Uninet - Uninet, Inc.; KUSSMAUL ENCYCLOPEDIA - General Videotex Corporation; NEWS-A-TRON is trademarked.

DELPHI is a trademark of General Videotex Corporation, 3 Blackstone Street, Cambridge, MA 02139 — (800) 554-4005 (in Massachusetts, 617-491-3393).

We hope this brief look at the Delphi system will give you a better understanding of it. We're proud to be a part of it as the Atari Users' Group.

LBASIC

Write BASIC programs on your word processor

by Kent Peterson

Imagine BASIC without line numbers. Imagine BASIC with a library of named subroutines that can be loaded into any program. Imagine **LBASIC**.

LBASIC stands for "Labelled BASIC." The labels give names to subroutines, serve as reminders of what certain sections of code do and, generally, give the programmer a better picture of the program logic.

Program debugging and rewriting is simplified with **LBASIC**, because time is no longer wasted in trying to determine what the GOSUBs and branches do. **LBASIC** programs don't have line numbers, thus they *never* have to be renumbered.

Another benefit derived from converting BASIC to a non-numbered language is the fact that a library of subroutines may be created. These may easily be incorporated into a variety of programs—without the worry of line number conflicts.

Two routines used by **LBASIC** are SETFIND and SETINV. The first, SETFIND, loads a machine language program into FIND$. A USR call to FIND$ will return the location of a small string within a larger string.

This very useful routine is employed extensively in **LBASIC** and comes from COMPUTE! Books' *Machine Language for Beginners*.

The second handy routine, SETINV, will load a machine language routine to INV$. This is a clever and compact way of simulating a string array. The routine comes from an article by Scott Sheck in the December 1984 issue of *ANTIC*.

Using LBASIC.

To write programs in **LBASIC**, you'll need: (1) a computer running Atari BASIC; (2) the **LBASIC** program accompanying this article; and (3) a text editor or word processor.

Type in Listing 1 in the usual manner. Listing 2 is the source file that generated Listing 1. It's included as an example of an **LBASIC** program.

Writing an **LBASIC** program is, of course, different from writing one in BASIC. An **LBASIC** source file is written with a word processor. This source file doesn't have line numbers. Instead, it has labels to mark branches and subroutines.

If you've never written a program file with a word processor before, you're in for a pleasant surprise. You can move lines, copy subroutines from disk and, generally, write and rewrite code much faster than you could using BASIC's line editor.

Writing a program in **LBASIC** is quite simple. The language follows the same rules as regular Atari BASIC—with these exceptions:

(1) Don't use line numbers. The one exception to this is the statement *TRAP 40000*. This statement is still used to deactivate error trapping.

(2) Don't use the array *LLL()* in your program. **LBASIC** utilizes it for the program branches. If you use it for anything else, you'll get into very deep trouble.

(3) A label must begin with an inverse character.

(4) A label must not contain any inverse characters except for its first character.

(5) A label must be at least three characters long.

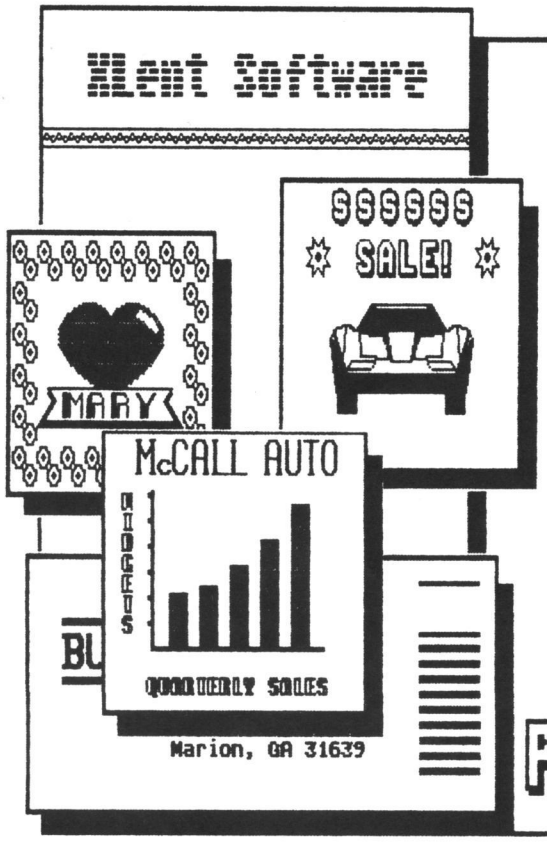
(6) A label can not contain a space, a colon, a semicolon, a comma, a quotation mark, or the word *REM*.

(7) A label reference in an IF. . .THEN statement must be preceded by a GOTO or GOSUB. For example:

```
RIGHT --> IF X=0 THEN GOTO ITS-ZERO
WRONG --> IF X=0 THEN ITS-ZERO
```

(8) A label must be the only statement in its line:

```
RIGHT --> ITS-ZERO
          REM THIS IS A LABEL
WRONG --> ITS-ZERO:REM THIS IS A LABEL
```



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CIRCLE #153 ON READER SERVICE CARD

LBASIC *continued*

When you've finished editing your source file, run **LBASIC**. It will take your source file as input, add line numbers and replace all the branches to labels with *LLL()*.

Even though it'll take a bit of time to initialize the branch array, branches to a variable take less space and execute more quickly than branches to a constant.

LBASIC will print the message *INITIALIZING. . .* when setting these values. To erase this message, place a *PRINT CHR$(125)* in your program after its initialization code.

When you run **LBASIC**, it will ask you for the names of your input and output files. **LBASIC** also asks if you want to save the labels. If you answer yes, **LBASIC** will place the labels as remarks in the output file. Answer yes to this question unless you're worried about the possibility of the output file being too large for memory.

An **LBASIC** output file can be entered and run on any Atari, because it's simply an Atari BASIC file. Your fellow Atari owners can enjoy the fruits of your programming labors, even if they don't have a word processor or **LBASIC**.

Now you can write that great program you always wanted to—and know that you can easily change and edit it. You can begin to build your own library of **LBASIC** subroutines. And, perhaps best of all, you'll never again have to puzzle over what *GOSUB 1117* means.

Kent Peterson has been a professional programmer for the past seven years. He's written educational, entertainment and systems software for a wide variety of machines. He lives in Connecticut with his wife, son, two computers and a robot.

The two-letter checksum code preceding the line numbers here is *not* a part of the BASIC program. For further information, see the *BASIC Editor II*, page 43.

Listing 1.
BASIC listing.

```
PX 0 DIM LLL(34):GOSUB 20000
BC 10 REM LBASIC
AZ 20 REM
MT 30 REM AN ATARI BASIC
CG 40 REM PREPROCESSOR
BC 50 REM
DU 60 REM by
NY 70 REM KENT PETERSON
BF 80 REM
SO 90 DIM L$(120),LC$(123),B$(30),BR$(200
   0),LABEL$(2000),TARG$(30),FI$(15),FO$(
   15)
QI 100 DIM LBL(200),BR(300,1),LR$(30)
OD 110 GOTO LLL(4)
OF 120 REM THESE ARE I/O SUBROUTINES
YX 130 REM GETLINE
YP 140 INPUT #1,L$
QB 150 REM TRIM
GT 160 IF LEN(L$)<2 THEN GOTO LLL(0)
QY 170 IF L$(1,1)=" " THEN L$=L$(2,LEN(L$
   )):GOTO LLL(1)
TI 180 LC$=L$:LINE=LINE+1
ZP 190 RETURN
HZ 200 REM PUTLINE
HI 210 IF ASC(L$(1,1))<128 THEN GOTO LLL(
   3)
BW 220 IF  NOT WL THEN RETURN
OW 230 LC$=L$:L$="REM ":L$(5)=LC$
CU 240 REM WRITE
BU 250 PRINT #2;LINE*10;" ";L$:RETURN
FN 260 REM START
ZC 270 REM THIS LOADS THE MACHINE CODE EQ
   UIVALENT OF MICROSOFT INSTR$
HK 280 GOSUB LLL(31)
OC 290 REM THIS LOADS A MACHINE CODE STRI
   NG ARRAY HANDLER
IB 300 GOSUB LLL(33)
TP 310 PRINT "INPUT FILE:";:INPUT FI$
PN 320 PRINT "OUTPUT FILE:";:INPUT FO$
DS 330 PRINT "SAVE LABELS";:INPUT TARG$:L
   $="Yy"
GY 340 WL=USR(ADR(FIND$),ADR(L$),2,ADR(TA
   RG$),1)
VK 350 OPEN #1,4,0,FI$
CB 360 OPEN #2,8,0,FO$
EP 370 BRCOUNT=0:LINE=0:LABCOUNT=0
RR 380 TRAP LLL(15)
BS 390 REM NEXTLINE
ZK 400 GOSUB LLL(0)
CB 410 TARG$=CHR$(34)
AG 420 REM FINDQUOTE
TP 430 REM FIND QUOTED SEGMENTS OF A LINE
    AND REPLACE THEM WITH *S IN LC$
RY 440 P=USR(ADR(FIND$),ADR(LC$),LEN(LC$)
   ,ADR(TARG$),1)
BB 450 IF P THEN P=P-ADR(LC$)+1
XG 460 IF  NOT P THEN GOTO LLL(8)
AD 470 LC$(P,P)="*"
DF 480 IF P=LEN(L$) THEN GOTO LLL(8)
HR 490 REM MOREQUOTE
TK 500 P=P+1
ZS 510 LC$(P,P)="*"
WY 520 IF L$(P,P)=CHR$(34) THEN GOTO LLL(
   6)
QB 530 GOTO LLL(7)
NP 540 REM NOQUOTES
VK 550 REM FIND REMARKS IN LC$ AND REPLAC
   E THEM WITH *S
PM 560 TARG$="REM"
WD 570 P=USR(ADR(FIND$),ADR(LC$),LEN(LC$)
   ,ADR(TARG$),3)
BI 580 IF P THEN P=P-ADR(LC$)+1
UR 590 IF  NOT P THEN GOTO LLL(10)
BK 600 REM MORER
ZT 610 LC$(P,P)="*"
ID 620 IF P<LEN(L$) THEN P=P+1:GOTO LLL(9
   )
HD 630 REM NOR
YS 640 LC$(LEN(LC$)+1)="END"
AT 650 REM CHECKLAB
YM 660 P=USR(ADR(INV$),ADR(LC$),1)
ZW 670 IF P>LEN(L$) THEN GOTO LLL(5)
KV 680 IF P=1 THEN GOTO LLL(14)
JC 690 C=1:B$="":POS=P
LP 700 REM MOREBR
IY 710 B$(C,C)=LC$(P,P):LC$(P,P)="*"
BJ 720 P=P+1:C=C+1
IZ 730 IF P>LEN(L$) THEN GOTO LLL(13)
KT 740 IF LC$(P,P)=":" THEN GOTO LLL(13)
LN 750 IF LC$(P,P)=";" THEN GOTO LLL(13)
BF 760 IF LC$(P,P)="," THEN GOTO LLL(13)
AL 770 IF LC$(P,P)<>" " THEN GOTO LLL(12)
HK 780 REM DONEBR
AT 790 BR$(LEN(BR$)+1)=B$
DB 800 BR(BRCOUNT,0)=LINE:BR(BRCOUNT,1)=P
   OS
XN 810 BRCOUNT=BRCOUNT+1
QS 820 GOTO LLL(11)
MF 830 REM LABEL
BZ 840 LABEL$(LEN(LABEL$)+1)=L$
DX 850 LBL(LABCOUNT)=(LINE+1)*10
GI 860 LABCOUNT=LABCOUNT+1
PK 870 GOTO LLL(5)
OQ 880 REM PASS2
HC 890 GOSUB LLL(30)
IC 900 POP :CLOSE #1:OPEN #1,4,0,FI$
BW 910 BR$(LEN(BR$)+1)="E":LABEL$(LEN(LAB
```

```
   EL$)+1)="E"
RT 920 LINE=0:IF LABCOUNT THEN GOTO LLL(1
   7)
UJ 930 TRAP LLL(29)
MS 940 REM SIMPLE
OV 950 GOSUB LLL(0):GOSUB LLL(2):GOTO LLL
   (16)
CQ 960 REM NOTSIMPLE
PY 970 BRCOUNT=BRCOUNT-1:LABCOUNT=LABCOUN
   T-1
GL 980 LINE=0:L$="DIM LLL(":L$(9)=STR$(LA
   BCOUNT)
FO 990 L$(LEN(L$)+1)=")":GOSUB 20000":GOSU
   B LLL(2)
DE 1000 TRAP LLL(25)
EF 1010 X=0:GOSUB LLL(0):ADJST=0
ZT 1020 REM CHECKBRANCH
FL 1030 IF X>BRCOUNT THEN LC=LINE-1:GOTO
   LLL(19)
RC 1040 LC=BR(X,0):POS=BR(X,1):P=USR(ADR(
   INV$),ADR(BR$),X+1)
GI 1050 C=PEEK(1):B$=BR$(P,P+C-1)
DL 1060 REM LINE-OK
OX 1070 IF LC=LINE THEN GOTO LLL(20)
UO 1080 ADJST=0:GOSUB LLL(2):GOSUB LLL(0)
   :GOTO LLL(19)
BW 1090 REM ARESET
YM 1100 Y=0
LL 1110 REM LOOK-FOR-LABEL
PN 1120 P=USR(ADR(INV$),ADR(LABEL$),Y+1)
PI 1130 C=PEEK(1):LC$=LABEL$(P,P+C-1)
UO 1140 IF LC$=B$ THEN GOTO LLL(22)
WJ 1150 Y=Y+1:IF Y>LABCOUNT THEN GOTO LLL
   (24)
DE 1160 GOTO LLL(21)
QH 1170 REM GOTIT
QK 1180 LC$=L$:LR$="LLL(":LR$(5)=STR$(Y):
   LR$(LEN(LR$)+1)=")"
GI 1190 L$=L$(1,POS+ADJST):L$(POS+ADJST,P
   OS+ADJST+LEN(LR$))=LR$
AM 1200 IF POS+ADJST+LEN(B$)>LEN(LC$) THE
   N GOTO LLL(23)
FT 1210 L$(POS+ADJST+LEN(LR$))=LC$(POS+AD
   JST+LEN(B$),LEN(LC$))
KF 1220 REM ALL-OF-LINE
FR 1230 ADJST=ADJST+LEN(LR$)-LEN(B$):X=X+
   1:GOTO LLL(18)
QL 1240 REM NOMATCH
XV 1250 PRINT "LABEL ";B$;" CAN NOT BE FO
   UND.":STOP
ZK 1260 REM FINALDATA
VK 1270 GOSUB LLL(30)
JA 1280 LINE=2000:L$="PRINT ":L$(7)=CHR$(
   34):L$(8)="INITIALIZING...":L$(LEN(L$
   )+1)=CHR$(34)
PN 1290 L$(LEN(L$)+1)=":":L$(LEN(L$)+1)="
   RESTORE 20010:FOR X=0 TO "
AT 1300 L$(LEN(L$)+1)=STR$(LABCOUNT):L$(L
   EN(L$)+1)=": READ Y:LLL(X)=Y:NEXT X:RE
   TURN"
VJ 1310 GOSUB LLL(2):X=0
II 1320 REM MOREDATA
MJ 1330 LINE=LINE+1:L$="DATA "
CY 1340 REM MOREROOM
EC 1350 IF X>LABCOUNT THEN GOTO LLL(28)
GD 1360 IF LEN(L$)>5 THEN L$(LEN(L$)+1)="
   ,"
PI 1370 L$(LEN(L$)+1)=STR$(LBL(X))
WB 1380 X=X+1:IF LEN(L$)<100 THEN GOTO LL
   L(27)
YC 1390 GOSUB LLL(2):GOTO LLL(26)
ZJ 1400 REM END-OF-DATA
NH 1410 GOSUB LLL(2)
MY 1420 REM ALLDONE
VC 1430 GOSUB LLL(30)
OI 1440 CLOSE #1:CLOSE #2:PRINT "ALL DONE
   .":END
KQ 1450 REM CHECK-ERROR
GW 1460 E=PEEK(195):IF E=136 OR E=0 THEN
   RETURN
CM 1470 EL=PEEK(187)*256+PEEK(186)
DA 1480 PRINT "ERROR ";E;" AT LINE ";EL
NO 1490 PRINT "THE LINE BEING PROCESSED I
   S:"
LQ 1500 PRINT L$:CLOSE #1:CLOSE #2:STOP
VL 1510 REM MACHINE LANGUAGE SUBROUTINES
RV 1520 REM SETFIND
FZ 1530 DIM FIND$(126)
YV 1540 RESTORE LLL(32):FOR X=1 TO 126:RE
   AD C:FIND$(X,X)=CHR$(C):NEXT X:RETURN
KT 1550 REM FINDDAT
KJ 1560 DATA 104,104,133,204,104,133,203,
   104,133,206,104,133,205,104,133,208
SS 1570 DATA 104,133,207,104,104,133,209,
   160,0,177,207,133,210,166,206,240,24
CW 1580 DATA 169,255,133,217,160,0,177,20
   3,197,210,240,23,200,196,217,208,245,2
   30,204
NA 1590 DATA 202,48,6,208,232,165,205,208
   ,230,169,0,133,212,133,213,96
GU 1600 DATA 132,212,132,211,160,1,132,21
   4,165,203,133,215,165,204,133,216,164
IA 1610 DATA 214,196,209,240,22,177,207,2
   30,214,164,211,200,208,2,230,216
BV 1620 DATA 132,211,209,215,240,233,164,
   212,24,144,189,24,165,212,101
AZ 1630 DATA 203,133,212,165,204,105,0,13
   3,213,96
LC 1640 REM SETINV
PJ 1650 DIM INV$(57)
MU 1660 RESTORE LLL(34):FOR X=1 TO 57:REA
   D C:INV$(X,X)=CHR$(C):NEXT X:RETURN
BR 1670 REM INVDAT
DL 1680 DATA 104,104,133,1,104,133,0,104,
   133,3,104,133,2,169,1,133,212,160,0,13
   2,213,177,0,16,18
IN 1690 DATA 198,2,208,14,165,3,208,8,200
   ,177,0,16,251,132,1,96,198,3,230,212,2
   08,2,230
MT 1700 DATA 213,230,0,208,224,230,1,208,
   220
NQ 20000 PRINT "INITIALIZING...":RESTORE
    20010:FOR X=0 TO 34:READ Y:LLL(X)=Y:N
   EXT X:RETURN
CY 20010 DATA 140,160,210,250,270,400,430
   ,500,550,610,640,660,710,790,840,890,9
   50,970,1030,1070,1100,1120,1180
ZP 20020 DATA 1230,1250,1270,1330,1350,14
   10,1430,1460,1530,1560,1650,1680
```

Listing 2.
LBASIC listing.

```
REM         LBASIC
REM
REM      AN ATARI BASIC
REM       PREPROCESSOR
REM
REM           by
REM      KENT PETERSON
REM

DIM L$(120),LC$(123),B$(30),BR$(2000),
LABEL$(2000),TARG$(30),FI$(15),FO$(15)

DIM LBL(200),BR(300,1),LR$(30)

GOTO START



REM THESE ARE I/O SUBROUTINES
```

```
GETLINE
INPUT #1,L$
TRIM
IF LEN(L$)<2 THEN GOTO GETLINE
IF L$(1,1)=" " THEN L$=L$(2,LEN(L$)):G
OTO TRIM
LC$=L$:LINE=LINE+1
RETURN


PUTLINE
IF ASC(L$(1,1))<128 THEN GOTO WRITE
IF NOT WL THEN RETURN
LC$=L$:L$="REM ":L$(5)=LC$
WRITE
PRINT #2;LINE*10;" ";L$:RETURN


START
REM THIS LOADS THE MACHINE CODE EQUIVA
LENT OF MICROSOFT INSTR$
GOSUB SETFIND
REM THIS LOADS A MACHINE CODE STRING A
RRAY HANDLER
GOSUB SETINV
PRINT "%INPUT FILE:";:INPUT FI$
PRINT "OUTPUT FILE:";:INPUT FO$
PRINT "SAVE LABELS";:INPUT TARG$:L$="Y
y"
WL=USR(ADR(FIND$),ADR(L$),2,ADR(TARG$)
,1)
OPEN #1,4,0,FI$
OPEN #2,8,0,FO$
BRCOUNT=0:LINE=0:LABCOUNT=0
TRAP PASS2
NEXTLINE
GOSUB GETLINE
TARG$=CHR$(34)
FINDQUOTE
REM FIND QUOTED SEGMENTS OF A LINE AND
 REPLACE THEM WITH *S IN LC$
P=USR(ADR(FIND$),ADR(LC$),LEN(LC$),ADR
(TARG$),1)
IF P THEN P=P-ADR(LC$)+1
IF NOT P THEN GOTO NOQUOTES
LC$(P,P)="*"
IF P=LEN(L$) THEN GOTO NOQUOTES
MOREQUOTE
P=P+1
LC$(P,P)="*"
IF L$(P,P)=CHR$(34) THEN GOTO FINDQUOT
E
GOTO MOREQUOTE
NOQUOTES
REM FIND REMARKS IN LC$ AND REPLACE TH
EM WITH *S
TARG$="REM"
P=USR(ADR(FIND$),ADR(LC$),LEN(LC$),ADR
(TARG$),3)
IF P THEN P=P-ADR(LC$)+1
IF NOT P THEN GOTO NOR
MORER
LC$(P,P)="*"
IF P<LEN(L$) THEN P=P+1:GOTO MORER
NOR
LC$(LEN(LC$)+1)="END"
CHECKLAB
P=USR(ADR(INV$),ADR(LC$),1)
IF P>LEN(L$) THEN GOTO NEXTLINE
IF P=1 THEN GOTO LABEL
C=1:B$="":POS=P
MOREBR
B$(C,C)=LC$(P,P): LC$(P,P)="*"
P=P+1:C=C+1
IF P>LEN(L$) THEN GOTO DONEBR
IF LC$(P,P)=":" THEN GOTO DONEBR
IF LC$(P,P)=";" THEN GOTO DONEBR
IF LC$(P,P)="," THEN GOTO DONEBR
IF LC$(P,P)<>" " THEN GOTO MOREBR
DONEBR
BR$(LEN(BR$)+1)=B$
BR(BRCOUNT,0)=LINE:BR(BRCOUNT,1)=POS
BRCOUNT=BRCOUNT+1
GOTO CHECKLAB
LABEL
```

```
LABEL$(LEN(LABEL$)+1)=L$

LBL(LABCOUNT)=(LINE+1)*10

LABCOUNT=LABCOUNT+1

GOTO NEXTLINE

PASS2

GOSUB CHECK-ERROR

POP:CLOSE #1:OPEN #1,4,0,FI$

BR$(LEN(BR$)+1)="E":LABEL$(LEN(LABEL$)
+1)="E"

LINE=0:IF LABCOUNT THEN GOTO NOTSIMPLE

TRAP ALLDONE

SIMPLE

GOSUB GETLINE:GOSUB PUTLINE:GOTO SIMPL
E

NOTSIMPLE

BRCOUNT=BRCOUNT-1:LABCOUNT=LABCOUNT-1

LINE=0:L$="DIM LLL(":L$(9)=STR$(LABCOU
NT)

L$(LEN(L$)+1)=")":GOSUB 20000":GOSUB PU
TLINE

TRAP FINALDATA

X=0:GOSUB GETLINE:ADJST=0

CHECKBRANCH

IF X>BRCOUNT THEN LC=LINE-1:GOTO LINE-
OK

LC=BR(X,0):POS=BR(X,1):P=USR(ADR(INV$)
,ADR(BR$),X+1)

C=PEEK(1):B$=BR$(P,P+C-1)

LINE-OK

IF LC=LINE THEN GOTO ARESET

ADJST=0:GOSUB PUTLINE:GOSUB GETLINE:GO
TO LINE-OK

ARESET

Y=0

LOOK-FOR-LABEL

P=USR(ADR(INV$),ADR(LABEL$),Y+1)

C=PEEK(1):LC$=LABEL$(P,P+C-1)

IF LC$=B$ THEN GOTO GOTIT

Y=Y+1:IF Y>LABCOUNT THEN GOTO NOMATCH

GOTO LOOK-FOR-LABEL

GOTIT

LC$=L$:LR$="LLL(":LR$(5)=STR$(Y):LR$(L
EN(LR$)+1)=")"

L$=L$(1,POS+ADJST):L$(POS+ADJST,POS+AD
JST+LEN(LR$))=LR$

IF POS+ADJST+LEN(B$)>LEN(LC$) THEN GOT
O ALL-OF-LINE

L$(POS+ADJST+LEN(LR$))=LC$(POS+ADJST+L
EN(B$),LEN(LC$))

ALL-OF-LINE

ADJST=ADJST+LEN(LR$)-LEN(B$):X=X+1:GOT
O CHECKBRANCH

NOMATCH

PRINT "LABEL ";B$;" CAN NOT BE FOUND."
:STOP

FINALDATA

GOSUB CHECK-ERROR

LINE=2000:L$="PRINT ":L$(7)=CHR$(34):L
$(8)="INITIALIZING...":L$(LEN(L$)+1)=
CHR$(34)

L$(LEN(L$)+1)=":":L$(LEN(L$)+1)="RESTO
RE 20010:FOR X=0 TO "

L$(LEN(L$)+1)=STR$(LABCOUNT):L$(LEN(L$
)+1)=": READ Y:LLL(X)=Y:NEXT X:RETURN"

GOSUB PUTLINE:X=0

MOREDATA

LINE=LINE+1:L$="DATA "

MOREROOM

IF X>LABCOUNT THEN GOTO END-OF-DATA

IF LEN(L$)>5 THEN L$(LEN(L$)+1)=","

L$(LEN(L$)+1)=STR$(LBL(X))

X=X+1:IF LEN(L$)<100 THEN GOTO MOREROO
M

GOSUB PUTLINE:GOTO MOREDATA

END-OF-DATA

GOSUB PUTLINE

ALLDONE

GOSUB CHECK-ERROR

CLOSE #1:CLOSE #2:PRINT "ALL DONE.":EN
D



CHECK-ERROR

E=PEEK(195):IF E=136 OR E=0 THEN RETUR
N

EL=PEEK(187)*256+PEEK(186)

PRINT "ERROR ";E;" AT LINE ";EL

PRINT "THE LINE BEING PROCESSED IS:"

PRINT L$:CLOSE #1:CLOSE #2:STOP
```

```
REM MACHINE LANGUAGE SUBROUTINES

SETFIND

DIM FIND$(126)

RESTORE FINDDAT:FOR X=1 TO 126:READ C:
FIND$(X,X)=CHR$(C):NEXT X:RETURN

FINDDAT

DATA 104,104,133,204,104,133,203,104,1
33,206,104,133,205,104,133,208

DATA 104,133,207,104,104,133,209,160,0
,177,207,133,210,166,206,240,24

DATA 169,255,133,217,160,0,177,203,197
,210,240,23,200,196,217,208,245,230,20
4

DATA 202,48,6,208,232,165,205,208,230,
169,0,133,212,133,213,96

DATA 132,212,132,211,160,1,132,214,165
,203,133,215,165,204,133,216,164

DATA 214,196,209,240,22,177,207,230,21
4,164,211,200,208,2,230,216

DATA 132,211,209,215,240,233,164,212,2
4,144,189,24,165,212,101

DATA 203,133,212,165,204,105,0,133,213
,96

SETINV

DIM INV$(57)

RESTORE INVDAT:FOR X=1 TO 57:READ C:IN
V$(X,X)=CHR$(C):NEXT X:RETURN

INVDAT

DATA 104,104,133,1,104,133,0,104,133,3
,104,133,2,169,1,133,212,160,0,132,213
,177,0,16,18

DATA 198,2,208,14,165,3,208,8,200,177,
0,16,251,132,1,96,198,3,230,212,208,2,
230

DATA 213,230,0,208,224,230,1,208,220
```

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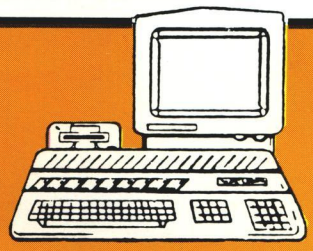

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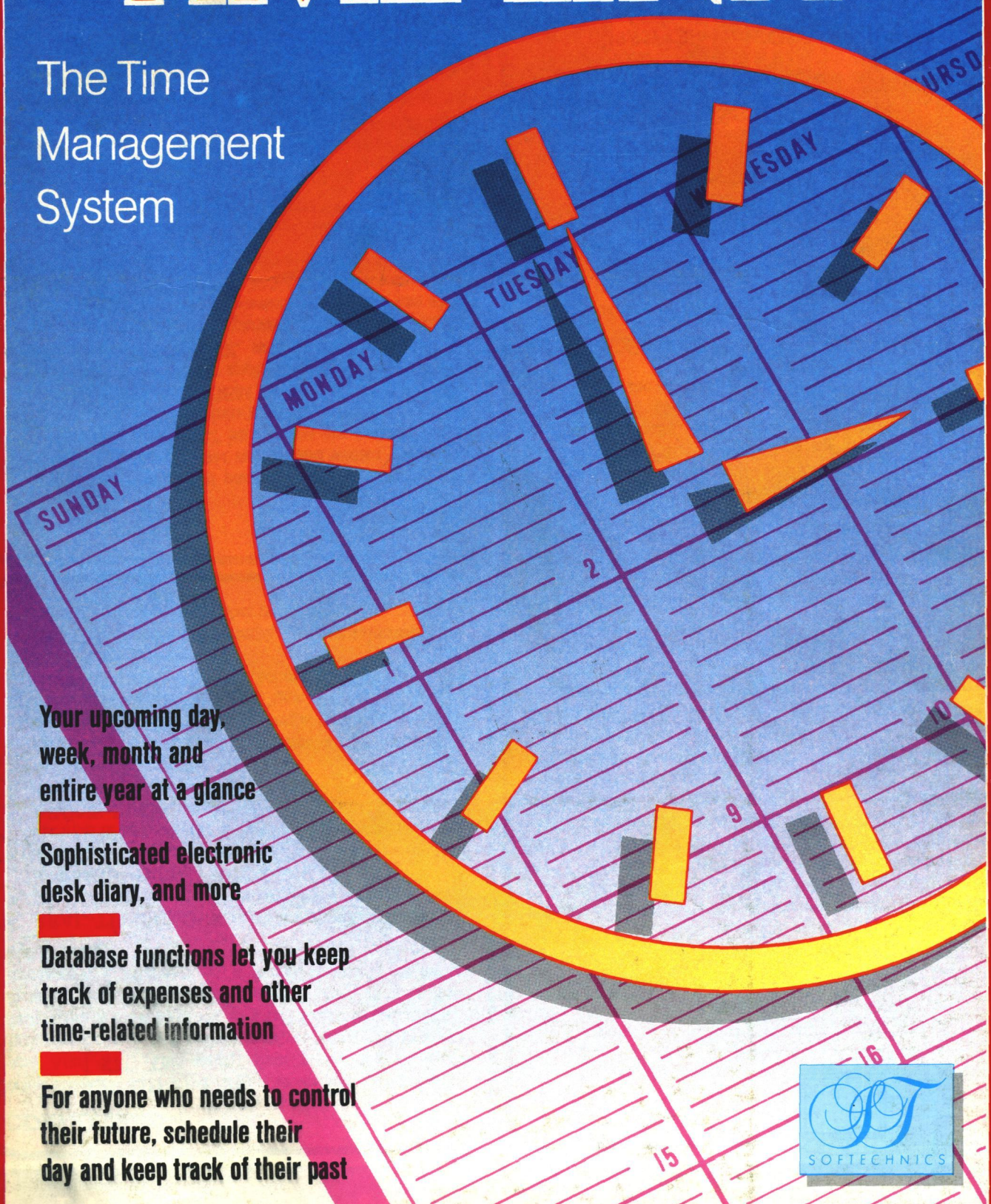

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