HOLIDAY · BUYER'S · GUIDE

# ST LOG

THE ATARI ST [illegible]LY MAGAZINE

NOVEMBER 1988 ISSUE 25

USA $3.50
CANADA $4.75

Programs:

## ULTRA-GRAPH
A Spectacular Graphing Utility

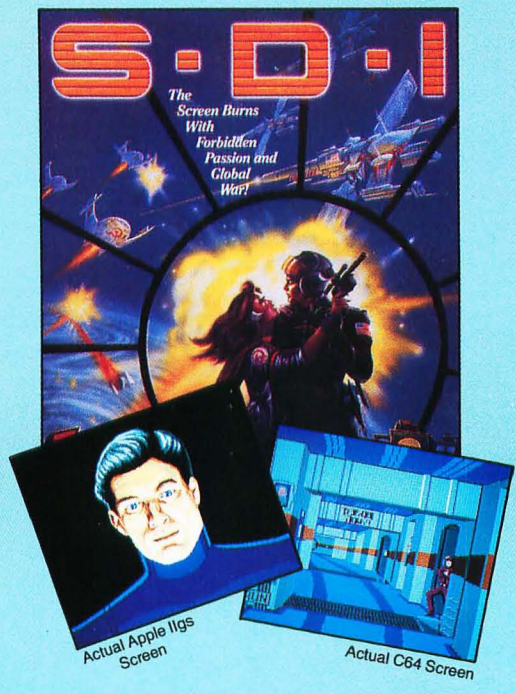
## THETATEN
An Arcade-Quality Game

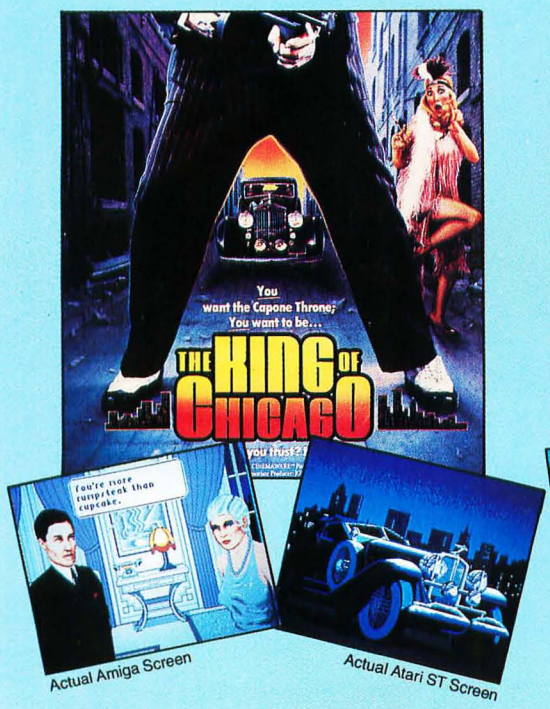
FDC 50076

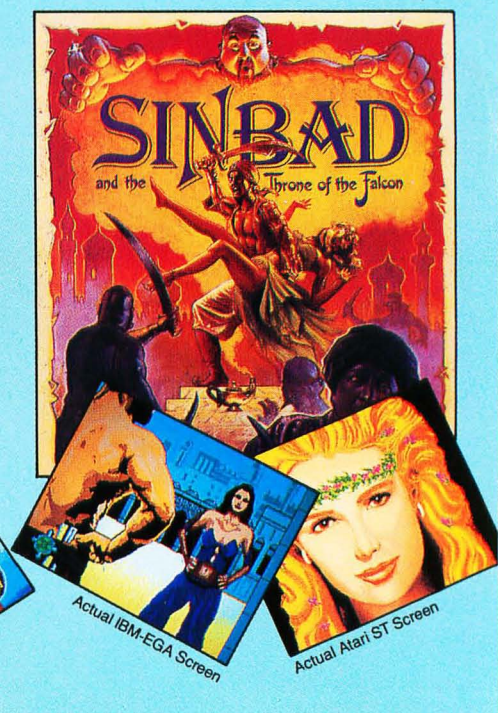
0 74369 50076 1

# CINEMAWARE

PRESENTS








## NOW PLAYING AT A SOFTWARE DEALER NEAR YOU

Cinemaware Corporation, 4165 Thousand Oaks Blvd., Westlake Village, Ca. 91362 Tel: (805) 495-6515

Available for Amiga, Atari ST, Apple IIgs, IBM PC and Commodore 64, which are trademarks respectively of Commodore-Amiga, Atari Inc., Apple Computer, Inc., International Business Machines and Commodore Electronics, Ltd. Not all products are available for all formats.

CIRCLE #125 ON READER SERVICE CARD.

# EDITORIAL

by Clayton Walnum

There's been much discussion recently, especially among privately-owned Atari dealers, about Atari's plans for the Federated stores, the chain of electronics "supermarkets" that Atari acquired last year. The dealers located near Federated stores complain that they face unfair competition since Atari is able to offer STs at reduced prices. Dealers everywhere claim that Federated stores get preferential treatment in product delivery and that Federated stores are kept well-stocked at the expense of the non-Atari-owned stores.

ST-Log attempted to get some answers from Federated, an effort that ended in frustration with little new to report. We were unable to get past Ambrose LaRocca's (the president of Federated) secretary, who simply said that Mr. LaRocca would make no comments to the press; and other calls were bounced from one department to another, each person who was contacted passing the buck down the line to the next lucky soul. What we *do* know is based mainly upon comments made by Atari's Neil Harris in the ST Forum on DELPHI.

In answer to the accusation that Atari was using unfair pricing policies in the Federated stores, Mr. Harris stated that he didn't believe that was the case. "It's hard to maintain margins and become profitable if Federated cuts prices as drastically as has been claimed." A brief conversation with a Federated store manager (one of the few people who would comment at all) gave us a similar answer—that, in fact, Federated's prices were generally higher than those of the private dealers.

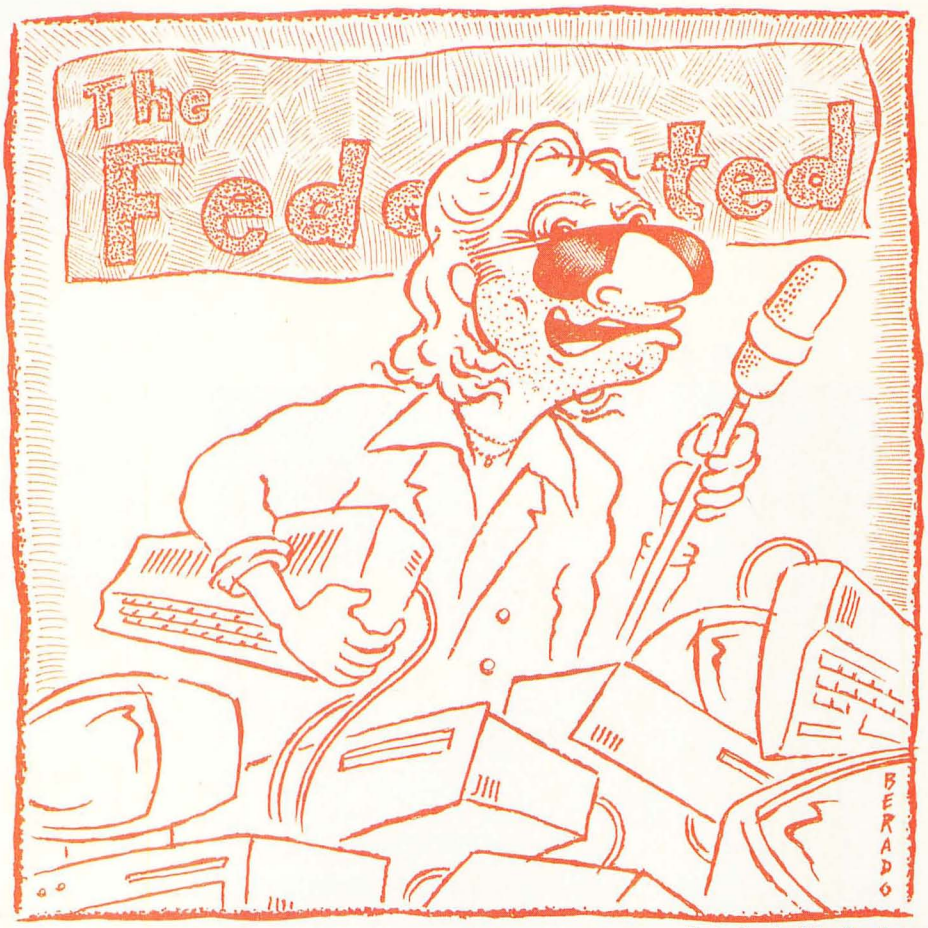


*Illustration by John Berado*

However, when ST-Log anonymously called two Federated stores in California to ask about prices, we were assured by the salesman in the computer department that they would match any other dealer's price. While this doesn't prove that the Federated stores are using unfair pricing policies (a salesman will tell you anything to get you into their store), it does show that they are being aggressive, that they are indeed in competition with other dealers.

When asked how Federated stores managed to keep 1040 STs in stock while other dealers' shelves were bare of that particular model, Mr. Harris explained that the Federated stores were stocked up with computers from the beginning, and, since they are not up to speed in sales yet, their allocation has lasted longer than other dealers'.

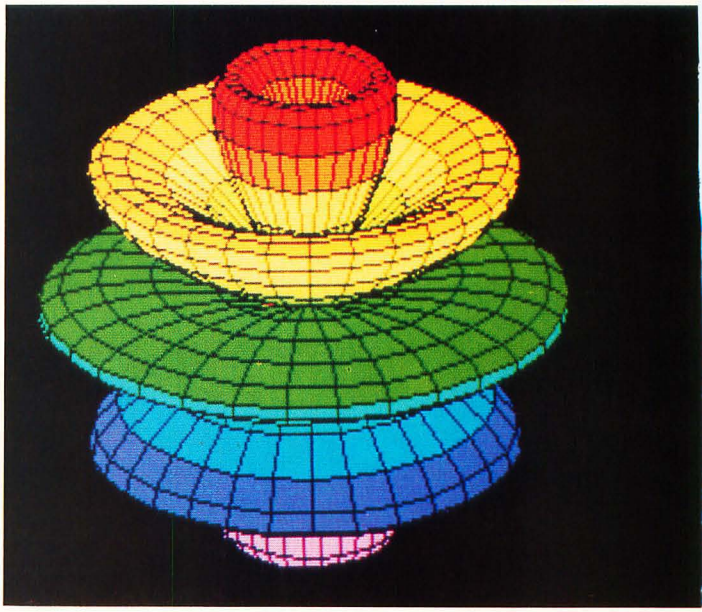
Is Atari cutting the throats of the privately owned dealerships? Are they indeed waging price wars on small computer outlets that can't afford to compete? Are they allocating more stock to their own stores, leaving the private dealers with nothing to sell? We couldn't come up with solid answers to any of these questions. But, unless Atari feels that it can support its product line solely through its own Federated stores, it had better take a good hard look at what is most definitely a conflict of interest.

"It is certainly a bit of a mess," says Neil Harris with regards to the Federated situation. But he is also quick to say, ". . .I think the outcome will be what we all want—a robust, thriving line of quality, inexpensive computers."

And that's what we all want, right? Atari claims it is making efforts to reassure the private dealers and bring them comfortably into the fold. If Atari can manage to balance its own interests carefully against those of the other dealers, we may see a healthy Atari retail network develop. Hopefully, it'll just be a matter of time.

# IN THIS ISSUE

## ULTRA-GRAPH 12



## FEATURES


**Ultra-Graph** ..... **Blake Arnold & Phil Mast** 12

The ultimate graphing program, Ultra-Graph will not only generate colorful and accurate graphs in five different coordinate systems, but will also allow you to save your masterpieces in DEGAS, Neochrome or CAD-3D format.

**Software Engineering: Program Design Considerations** ..... **Karl E. Wiegers** 18

Professional software engineering concepts are explored further with a discussion of modular design, flowcharts, Pseudocode and action diagrams.

**ThetaTen** ..... **David Bohlke** 34

Battle the Saucerbots of ThetaTen in an effort to regain the abandoned mine shafts wherein a rare compound has been discovered.

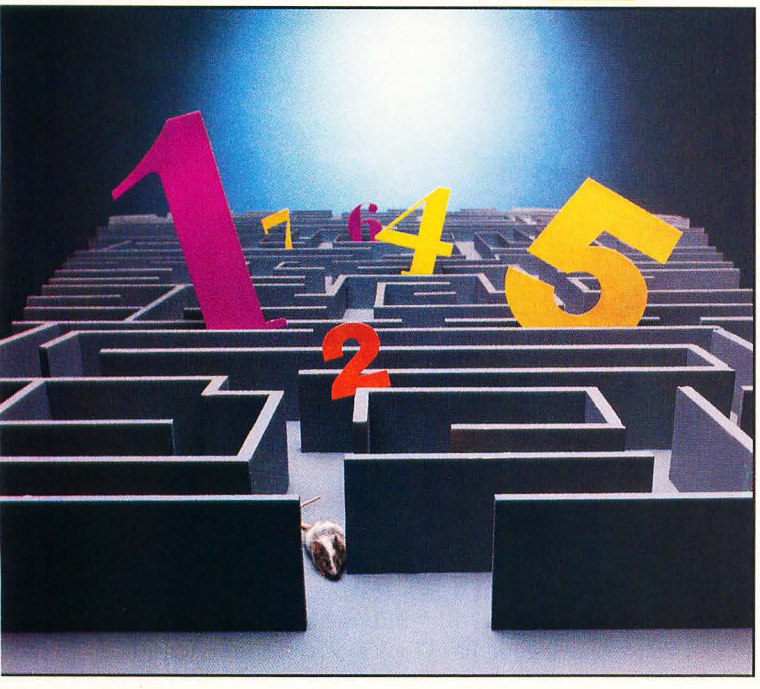
**Number Maze** ..... **Sol Guber** 40

Find your way through a mathematical maze in this educational program written in Modula-2.

**Ancient Corridors, Part 2** ..... **Bob Retelle** 48

The Dungeon Master player's guide and hint book continues with Part 2 of the three-part series.


## NUMBER MAZE 40




## REVIEWS


**Laser C (Megamax, Inc.)** ..... **Darek Mihocka** 78

**Jinxter (Rainbird)** ..... **Betty D. DeMunn** 84

**Scrabble (Electronic Arts)** ..... **Betty D. DeMunn** 86

**Test Drive (Accolade)** ..... **Scott Wasser** 88


## COLUMNS


**C-manship** ..... **Clayton Walnum** 24

**Database DELPHI** ..... **Andy Eddy** 32

**Step 1** ..... **Maurice Molyneaux** 65

**Ian's Quest** ..... **Ian Chadwick** 90

**ST User** ..... **Arthur Leyenberger** 94


## DEPARTMENTS


**Editorial** ..... **Lee Pappas** 3

**ST Gossip from Hollywood** ..... **TG** 6

**ST News** ..... 9



**ST-Log** (ISSN 0890-9601) is published monthly by L.F.P., Inc., 9171 Wilshire Blvd., Suite 300, Beverly Hills, CA 90210.


© 1988 L.F.P., Inc. Return postage must accompany all manuscripts, drawings, photos, disks, etc., if they are to be returned, and no responsibility can be assumed for unsolicited materials. All rights reserved on entire contents; nothing may be reproduced in whole or in part without written permission of the publisher.


U.S. subscription $28 for one year (12 issues), $52 for two years (24 issues), $76 for three years (36 issues). Foreign subscriptions: add $7 per subscription per year. Single copy $3.50 (add $1 for postage). Change of address: six weeks advance notice, and both old and new addresses are needed. POSTMASTER, send change of address to: **ST-Log** Magazine, P.O. Box 16928, North Hollywood, CA 91615. Second-class postage paid at Beverly Hills, CA, and additional mailing offices.

ST LOG
THE ATARI ST MONTHLY MAGAZINE
NOVEMBER 1988
ISSUE 25

## STAFF

**Publisher:** Lee H. Pappas. **Executive Editor:** Clayton Walnum. **Art Director:** Andy Dean. **Managing Editor:** Dean Brierly. **East Coast Editor:** Arthur Leyenberger. **West Coast Editor:** Charles F. Johnson. **Contributing Editors:** Ian Chadwick, Frank Cohen, Maurice Molyneaux, Steve Panak, Andy Eddy, Douglas Weir. **Copy Chief:** Katrina Veit. **Copy Editors:** Sara Bellum, Anne Denbok, Pat Romero, Kim Turner. **Chief Typographer:** Klarissa Curtis. **Typographers:** Judy Villanueva, David Buchanan. **Contributors:** Blake Arnold, Betty DeMunn, Darek Mihocka, Phil Mast, Bob Retelle, TG, Scott Wasser, Karl Wiegers. **Vice President, Production:** Donna Hahner. **Production Assistant:** Steve Hopkins. **Advertising Director:** Paula S. Thornton. **Advertising Production Director:** Janice Rosenblum. **Subscriptions Director:** Irene Gradstein. **Vice President, Sales:** James Gustafson.

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

**ST-Log** Magazine (L.F.P., Inc.) is in no way affiliated with Atari. Atari is a trademark of Atari Corp.

## ADVERTISING SALES

Correspondence, letters and press releases should be sent to: Editor, **ST-Log**, 9171 Wilshire Blvd., Suite 300, Beverly Hills, CA 90210.

Correspondence regarding subscriptions, including problems and changes of address, should be sent to: **ST-Log,** P.O. Box 16928, North Hollywood, CA 91615; or call (818) 760-8983.

Correspondence concerning a regular column should be sent to our editorial address, with the name of the column included in the address. We cannot reply to all letters in these (see Authors below) pages; so if you would like an answer, please enclose a self-addressed, stamped envelope.

J.E. Publishers Representatives — Los Angeles: (213) 467-2266.
San Francisco: (415) 864-3252. Chicago: (312) 445-2489.
Denver: (303) 595-4331.
6855 Santa Monica Blvd., Suite 200, Los Angeles, CA 90038.
New York: (212) 724-7767.

Address all advertising materials to: Paula Thornton — Advertising Director, **ST-Log**, 9171 Wilshire Blvd., Suite 300, Beverly Hills, CA 90210.

## PERMISSIONS

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

Due, however, to numerous requests from Atari club libraries and bulletin-board systems, our policy does allow club libraries to individually run BBSs to make certain programs from **ST-Log** available during the month printed on that issue's cover. For example, software from the January issue can be made available January 1.

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

In addition, any programs used must state that they are taken from **ST-Log** Magazine. For further information, contact **ST-Log** at (617) 797-4436.

## SUBSCRIPTIONS

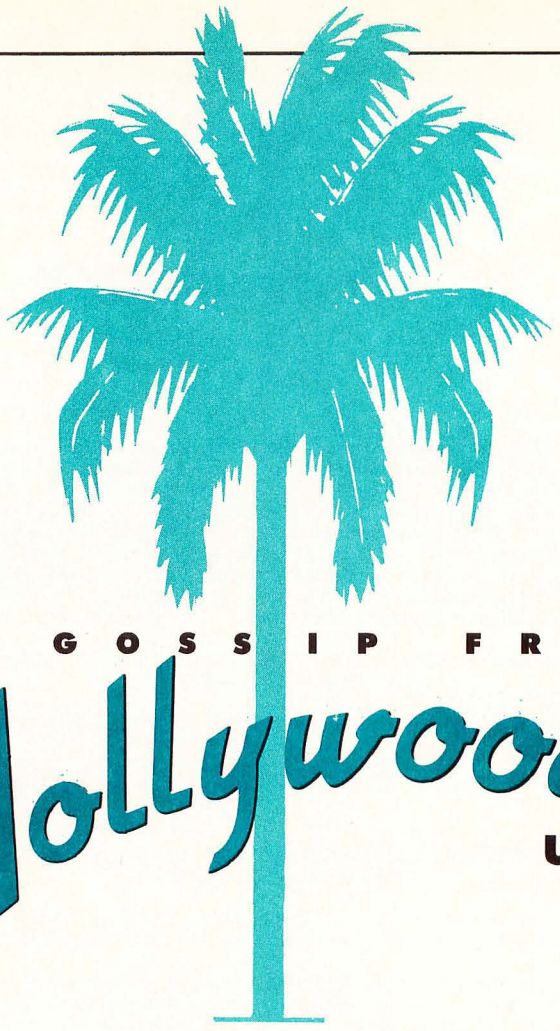
**ST-Log**, P.O. Box 16928, North Hollywood, CA 91615; or call (818) 760-8983. Payable in U.S. funds only. U.S.: $28.00-1 year; $52.00-2 years; $76.00-3 years. Foreign: add $7.00 per year per subscription. For disk subscriptions, see the cards at the back of this issue.

**COVER ILLUSTRATION BY ROB WESTERBERG**

**SOFTWARE ENGINEERING PHOTO BY KEN COOPER**

## 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 with your manuscript to **ST-Log**, P.O. Box 1413-MO, Manchester, CT 06040-1413.



# ST GOSSIP FROM Hollywood USA

What with new ROMs, double-sided 520 drives, a new GDOS and aggressive school discounts, you have to wonder what Atari has up its sleeve next. Wait until COMDEX! We have it from a good source that this is the show that **Atari has been gearing up** toward for over a year. This is the one that will finally begin to establish Atari as a computer for business and the university market.

The heat continues to mount on Atari from software houses about the **amount of piracy** in the Atari world. Actually, though, from what we have learned, Atari piracy is not much worse than that in the IBM world, *but* it's a lot more noticeable among the 300,000 or so U.S. Atari owners than it is among the millions of PC and PC clone users.

. . . . . .

**We have it from a good source that this year's COMDEX is the show that Atari has been gearing up toward for over a year.**

Best guess is that **almost 29% of U.S. families** have direct access to a computer either at school or home.

Where is Atari making its penetration? The big push is in the **specialty markets** more than anywhere else. There are products either now on the market or just about to break that simply have no match in any other computer's software library—products like a math word processor with syntax checking that has more power than anything available on *any* system and medical testing equipment that retails for less than half the cost of systems with the same power on other personal computers.

. . . . . .

Does anyone know what happened to the idea of doing a **low-cost MIDI network for the ST**? We've talked to a dozen developers who have realized that a MIDI network is a super idea since it would allow the ST to cheaply do what other machines require multi-hundred dollar cards to do.

. . . . . .

Have you seen *Dollar Wise Accounting*, the ***high*-end accounting package for the ST**? This is a dealer-customizable high-end system that rivals anything we have seen for the IBM/MAC systems in the $500 to $1000 price range. Selling for $399.95, this system is designed for the medium-size company and up. Who buys it? Seems like sales are pretty good to companies who are small and growing and don't want to be changing accounting packages every 18 months. Lots of sales to small accounting firms too.

. . . . . .

Recently I purchased a coffee pot. Not the most expensive coffee pot on the market, but a good coffee pot nonetheless. When I purchased this coffee pot, I talked to several store clerks about the choices available to me and what their features were. I was told about timers that would turn on the pot and make fresh coffee each morning or switches that tell the machine to make only a half pot instead of a full pot. In short, lots of good things were available for my convenience. I was told that some new features were due out on the next model to be released, but I chose to buy now.

I have gotten good use out of my coffee pot. In fact, I think it's probably the best buy on the market—more features for the dollar than anything else I have seen. There is a problem, however: The owners of the coffee pot company haven't advertised the pot! Can you believe it? They have the best coffee pot on the market, and they didn't bother to advertise it!

**Where is Atari making its penetration? The big push is in the specialty markets more than anywhere else.**

Now this causes real problems for me. I can't choose from 20 different brands of filters for my pot. Since it's not advertised strongly enough, the filter makers aren't all making filters for this model, and I have fewer choices. Not only that, but the promised new model—the one with all the new features—is not out yet! I have complained to the friend who put me on to this brand of coffee pot, and he only shrugs and tells me I got the best pot my money would buy. He also tells me he owns stock in the company, and they are starting to make money hand over fist—selling anything they can make.

Well, if you think I'm going to take this lying down you're wrong. I have written to the local paper and complained that they don't cover my pot in their food column. I also told them how badly the company has taken advantage of my trust. I told them I would never buy another pot from this company again. I have written to the chairman of the board of the New Coffee Pot Company and told him what I think of his business standards. I further told him that he is betraying the trust of his customers by not bringing out the new products he promised when he said he would. (He has said publicly that there were problems with development and the new products were delayed; can you believe it?.)

I've called food shows on the radio and complained about the company. Since I have a computer, I have even complained about the company on the local and national BBSs.

Do you know that the guy who runs this company did not even give my letter a personal answer? He has some guy he pays to answer questions and deal with the PR for the company—and *that* guy answered my letter! What nerve!

Lately, I've noticed some strange things. This is the best coffee pot on the market for the money, and I'd be the first to admit that, but I am seeing fewer and fewer filters for it in my area. The local supermarket manager says sales are down on the unit. And strangest of all, my next door neighbor just thanked me for warning him about the New Coffee Pot Company.

I wonder what he meant by that?■

# HOWARD MEDICAL COMPUTERS

**1690 N. Elston • Chicago, IL 60622 • ORDERS (800) 443-1444 • INQUIRIES AND ORDER STATUS (312) 278-1440**

**★ 5 STAR FINAL** NOV'88 **CLEAR**

# HMC SAVES BUDGET

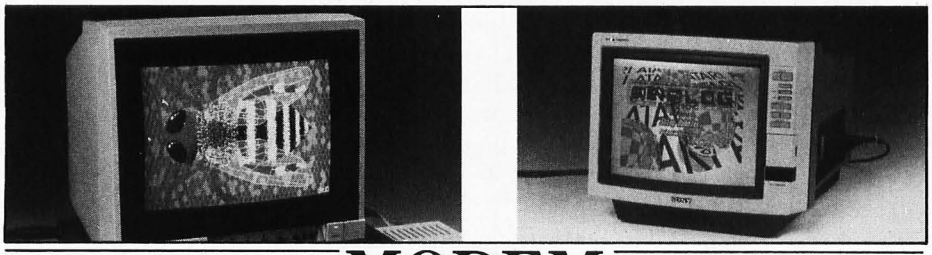
## MONITORS

**MAGNAVOX** color **8CM515** (14 ship) **$269** 3 inputs offer maximum versatility for this 13" color monitor; RGB Analog for the ST; composite for the 800/XL/XE or VCR and RGB TTL for IBM and Clones. The 640 × 240 resolution with .42 MM dot gives vivid colors and a green screen override for 80 column text. ST RGB cable $19.95 with monitor or $29.50 separate.

**MAGNAVOX 8CM 505 $220**
13" Color Monitor 390 × 240 resolution

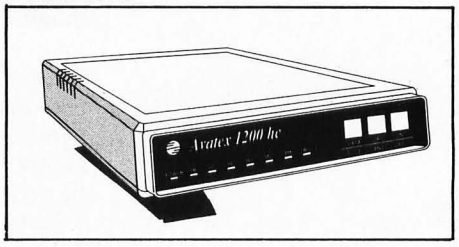
**SONY** color **KV1311CR** (15 ship) **$499** The Ultimate 13" color monitor includes a trinitron TV with remote control; 640 × 240 resolution with a .37 MM dot and a Micro Black screen that is vertically flat for distortion free viewing. Four inputs includes all of those from the Magnavox 515 plus a digital RGB. The colors are incredibly brilliant.

**ZENITH** green **123A** (7 ship) **$67.50** This close out from Zenith features a 12" non-glare composite Amber screen with 640 × 240 resolution. 90-day warranty valid at our 1200 locations. cable **$19.95**



## MODEM

**AVATEX 1200 HC** (2 ship) **$119.95** This Avatex modem is fully Hayes compatible and operates at 300 or 1200 baud. We include express 3.0, a public domain communications program free with each modem.




### HMC's Guarantee– A Promise you can take to the Bank.

Howard Medical's 30-day guarantee is meant to eliminate the uncertainty of dealing with a company through the mail. Once you receive our hardware, try it out; test it for compatibility. If you're not happy with it for any reason, return it in 30 days and we'll give you your money back (less shipping.) Shipping charges are for 48 states. APO, Canada and Puerto Rico orders are higher.

CIRCLE #101 ON READER SERVICE CARD.

**DRIVE A+ ($178.45)**
Howards Drive A+ features our DB-1 drive box and our DD-3 MPI double sided double density, 40 track full height drive with case and power supply for full 360K storage.

**DB-1 DRIVE BOX ($85.00)**
Howards drive box hooks up to a ST 1040 to give 2 external drivers. A 3 pole switch will configure an 80 track DSDD (double sided double density) drive or a 40 track DSDD drive or the new 3½ drive. Use with PC Ditto for IBM software compatability.

**SIO ($64.45)**
IDC's PR. Connector gives 2 RS 232 ports for a modem or serial printer and 1 parallel port for a parallel printer like EPSON or STAR. Ask for our special price on cables.

**SPARTA DOS COMBO ($50.00)**
This combo gives you IDC's SPARTA DOS OPERATING SYSTEM and the 2 chips ROM set that allows double sided access for the 1050's.

## hotline number

DON'T MISS OUT, ORDER TODAY!
800 / 443-1444
WE ACCEPT VISA • MASTERCARD • AMERICAN EXPRESS • C.O.D. OR CHECKS DISCOVER • SCHOOL P.O.

# ST NEWS

### The Naked Truth

Artworx Software has begun shipping *Strip Poker II* ($39.95 list). Almost five years ago, Atari 8-bit users first found themselves playing poker against a computer image that did more than say "Oh, no" when it lost a poker hand. The new ST version of *Strip Poker* contains two female opponents, complete with their own personalities to keep the game play as interesting as the graphics.

The digitized opponents are displayed using a process called "digitized plus," where the display graphics are first scanned from photographs, then touched-up by computer artists. The results are eye-catching.

**Artworx Software**
**1844 Penfield Road**
**Penfield, NY 14526**
**(800) 828-6573.**

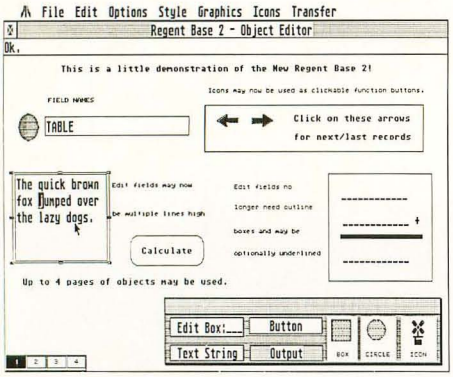
**STRIP POKER II · FROM ARTWORX SOFTWARE**

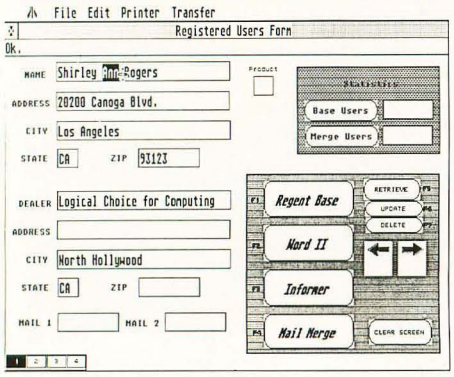
CIRCLE #102 ON READER SERVICE CARD.

## Regent Base II

Regent Software has begun shipping *Regent Base II: 4GL SQL Database. Regent Base* is a fourth generation language (4GL) that gives ST users with little programming experience the ability to develop sophisticated applications programs using a BASIC-like language. It also offers a powerful database management system with GEM interface controls. The system uses the American standard database language SQL (Structured Query Language), a system developed by IBM for novice database users on IBM's mainframe systems.

Regent Base II is a major upgrade over the older versions. The new system supports many new features: Macintosh-style text editing, faster data retrieval speed, internal variables, more forms objects (icons, boxes, lines and circles), multiple-page forms, more procedural commands and full compatibility with *Regent Base 1*. Regent Base II supports the Atari-sanctioned Clipboard for cutting and pasting text between ST applications.




Regent Base II is now shipping with a new list price of $150. Registered users of Regent Base I can purchase a $50 upgrade kit directly from Regent Software.

**Regent Software**
**P.O. Box 14628**
**Long Beach, CA 90803**
**(213) 439-9664.**

CIRCLE #103 ON READER SERVICE CARD.

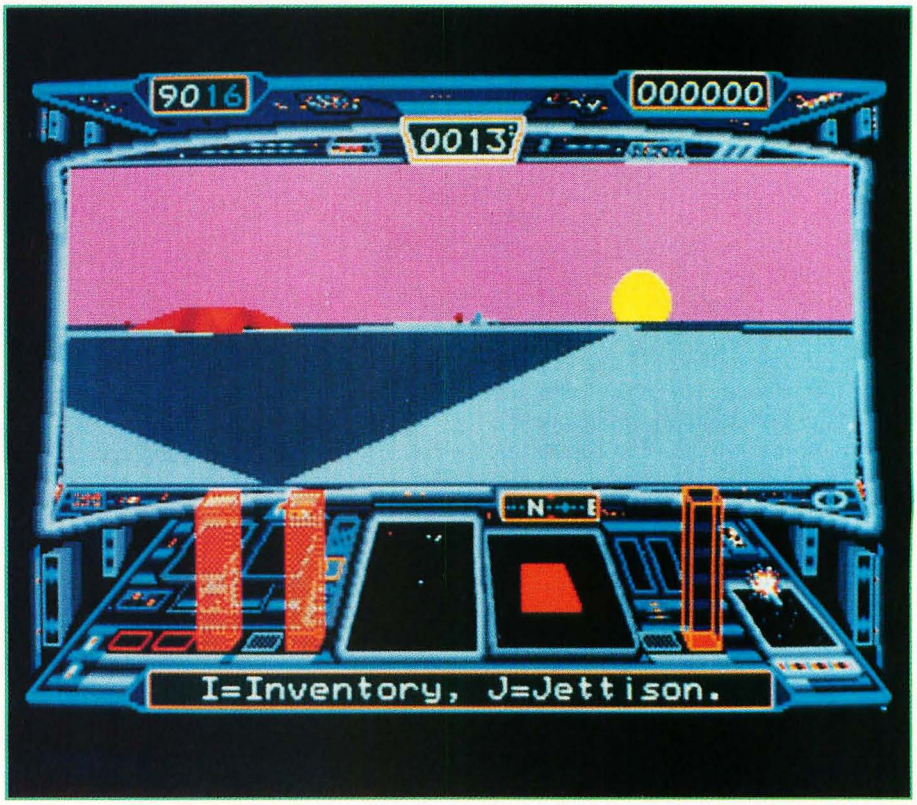
## Starglider II

Rainbird Software has released the long-awaited sequel to *Starglider. Starglider II* ($44.95 list) combines state-of-the-art graphics, sound and animation special effects into a fast-paced new game for the ST. In the new version, players pilot a futuristic spaceship through an alien desert in an effort to rescue alliance colonies under Egron attack. The Starglider vehicle is equipped with all the latest weapons to assist you in your mission: laser cannons, smart bombs and highly sensitive motion controllers.

During play, an alien desert is seen through the cockpit viewer, with the terrain appearing as solid three-dimensional objects on your ST's color monitor. The three-dimensional effect is convincing and shows some ingenious programming.

Starglider II is the first program released from Rainbird that runs on both an Amiga and Atari ST from one disk. Rainbird has re-released the original Starglider game with a lower price and new packaging.

**Rainbird Software**
**3885 Bohannon Drive**
**Menlo Park, CA 94025**
**(415) 322-0412**




## More Beta-ware

SoftLogik has begun shipping beta testing copies of *Publishing Partner Professional* to the thousands of ST users that paid for an upgrade to the new desktop-publishing system as long ago as April, 1988. Originally, *Publishing Partner Professional* was slated to be released last May, but due to technical problems and numerous last-minute problems the program was held off the market until just recently.

SoftLogik polled its customers who had ordered the upgrade and found that a majority was willing to receive a test or pre-release version of *Publishing Partner Profession* before the final manual was printed, and all of the known bugs were removed.

The upgraded version was shipping with a bug list recorded on the program diskette. SoftLogik pledged to send frequent update diskettes to the upgrade customers, as the product grows closer to being ready for general release.

**SoftLogik**
**11137 S. Town Square #C**
**St. Louis, MO 63123**
**(314) 894-8608.**

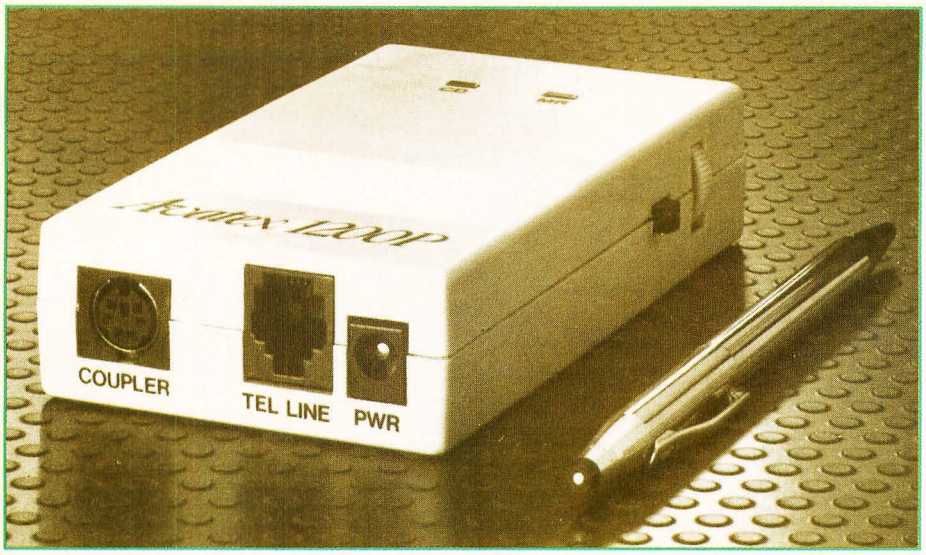
### Pocket Modem

Avatex has introduced a new Hayes compatible modem that can be easily connected to the Atari ST. The new *Pocket Modem* is billed as the most reliable portable modem on the market, and it fits into your shirt pocket. At only 4.75″ by 2.5″ by 1″, the pocket modem has its own rechargeable battery, a power switch, modular phone line connector and a two-year warranty.

The pocket modem auto-dials and can transmit at 300 or 1200 baud. A dial buffer is included that stores up to 40 characters. Pulse or touch-tone dialing is also supported. The list price is only $149.00, and the modem comes with an IBM-PC communications software program that runs using *PC-Ditto*.

Avatex
1230 Oakmead Parkway, Suite 310
Sunnyvale, CA 94086
(408) 732-1181.

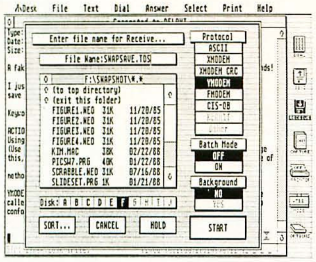
CIRCLE #106 ON READER SERVICE CARD.




▲
THE NEW POCKET MODEM IS BILLED AS THE MOST RELIABLE PORTABLE MODEM ON THE MARKET, AND IT FITS INTO YOUR SHIRT POCKET.

### ST-Talk Professional

John DeMar of QMI Software has released a "beta" testing version of his new telecommunications program, *ST-Talk Professional*. The new system sports new disk utility functions (e.g. delete file, rename file, etc.), 80-column text display full capture and text editing features and a new easy-to-read manual.




QMI released the beta version to the ST user community in advance of the finalized version of the product. QMI expects the average Atari ST user will easily master the use of ST Talk Professional in this un-released state, even though the product is not "complete." Other ST software developers have made prereleased software available, rather than wait for finished software and manuals to be created.

Quantum Microsystems Inc.
P.O. Box 179
304 First Street
Liverpool, NY 13088
(315) 451-7747.

CIRCLE #107 ON READER SERVICE CARD.

### Solar Software

A new version of *SolaPak* ($30 list) has been introduced by Solar Powered Software and features a new dynamic loading technique that loads only the functions selected by the user. *SolaPak v3.0* includes three new functions and more than a dozen enhancements over the previous versions. SolaPak was originally introduced to ST users in 1986.

An integrated desk accessory, *SolaPak* features a print spooler, reset-proof RAM-disk, screen saver, screen clock, and other utilities. The program is not copy protected, installs automatically and takes up less than 12,000 bytes of your ST computer's memory.

A demonstration version of SolaPak is available on DELPHI, GEnie and CompuServe. The demonstration files are titled SOLADEMO.ARC and RD_BENCH.ARC.

Solar Powered Software
1807 N. Evergreen
Chandler, AZ 85224
(602) 899-6992

CIRCLE #108 ON READER SERVICE CARD.

### Compuserve Changes Forums

In a move to redesign its nationwide system of special-interest groups, CompuServe has changed the forum user interface (menus, commands, etc.) to make their system easier to use. Efforts were directed toward producing commands that would be intuitive to forum members, with some of the changes suggested by CompuServe users themselves.

A forum is an electronic messaging system dedicated to a specific subject or industry. Among the more than 150 forums available, CompuServe supports the Atari community with four individual forums: ATARI8 supports news, views, politics and downloadable software for the Atari 8-Bit home computers. ATARI16 provides up-to-the-minute information and downloads for Atari ST and Mega owners. ATARIDEV is where developers of ST software and hardware can pose questions and find answers to problems encountered while creating new products for the ST. And finally, in ATARIVEN, forum members have direct access to third-party manufacturers of software and hardware for the Atari 8-bit and ST. Many times it is possible to communicate directly with a product's author.

CompuServe is educating new forum users with a special forum that is free of connect charges. Typing GO PRACTICE at any main prompt will bring you to the "try-out" forum.

Compuserve
P.O. Box 20212
5000 Arlington Centre Blvd
Columbus, OH 43220
(617) 457-0802.

CIRCLE #109 ON READER SERVICE CARD.

# ULTRA-GRA

# PH

By
Blake Arnold
and
Phil Mast

APPLICATION
ANY RESOLUTION

Ultra-Graph is a two- and three-dimensional graphing program. Despite the complexity usually associated with powerful graphing programs, Ultra-Graph is relatively easy to use and understand, because we have gone to great lengths to make sure that complex calculations are not required to operate the program. In fact, Ultra-Graph is almost fully automated.

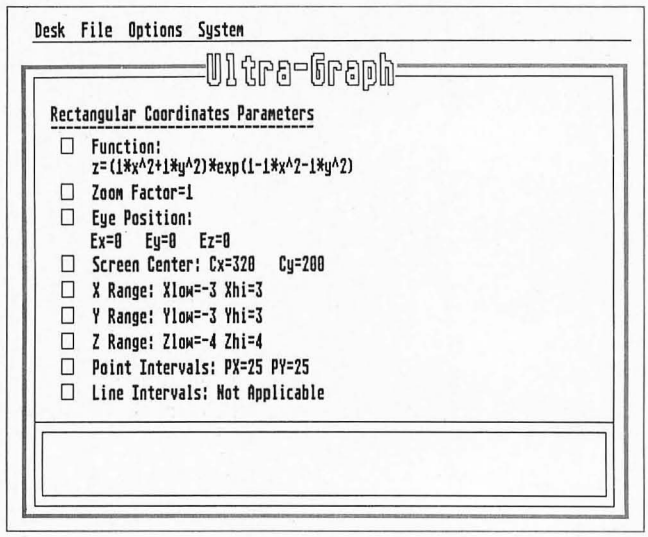
Ultra-Graph began as a simple three-dimensional plotting program and slowly evolved into its present state over the period of almost a year. (Okay, we did take the summer off!) As we got closer and closer to finishing it, we always found another feature that would be nice to add. Originally the program was able to graph equations only in the rectangular coordinate system, but eventually other coordinate systems were added. As it stands now Ultra-Graph is capable of graphing equations in cartesian, polar, rectangular, spherical and cylindrical coordinate systems in any screen resolution.

The program itself is written in GFA BASIC, and the source code is relatively easy to follow so we're not going to give you a line-by-line analysis of the program. What we will do is give you a little information about the program, and a few hints on operating it. If you're interested in how the program projects a three-dimensional image on a two-dimensional screen or how the perspective effect works, that information can be found in the Abacus book *Atari ST 3D Graphics*.

**Due to the large size of this program, the GFA BASIC listing could not be printed in the magazine. The complete program, including a compiled version that will run without GFA BASIC, is available on this month's disk version or in the ST user's group on DELPHI. See "Database DELPHI" in this issue for further information on getting a DELPHI account.**

## Coordinate Systems

Ultra-Graph supports a total of five different coordinate systems for plotting equations. (See Figure 1). Cartesian and polar coordinate systems produce two-dimensional graphs; rectangular, spherical and cylindrical coordinate systems are used for graphs in three-dimensional space. An almost infinite variety of shapes can be created by graphing various mathematical functions within these five coordinate systems.




The simplest of the five coordinate systems is the cartesian system (Figure 1.1). Using this system any point may be located in the x-y plane by plotting its x and y displacement (distance) along the respective axes. Plotting a series of these points provides a two-dimensional graph.

The rectangular system (Figure 1.2) is a three-dimensional adaptation of the cartesian system that is produced by rotating the x-y plane into a horizontal position and adding a z axis perpendicular (vertically) to it. A three-dimensional graph will result by measuring displacements along the x, y and z axes and plotting the associated points.

Another useful way of locating points is by using polar coordinates (Figure 1.3). This system locates a point in a plane by its distance (r, or radius distance) along a ray emanating from the origin at an angle (theta) measured from an initial ray. The initial ray is a horizontal line beginning at the origin pointing to the right.

As we did with the cartesian coordinate system to create the rectangular system, we can add a z axis to the polar system to create a three-dimensional system called the cylindrical system (Figure 1.4). The r-theta plane is positioned horizontally and the z axis extends vertically through the plane. The angle theta is measured horizontally from an initial ray pointing out toward you, and the distance z is measured along the z axis. The distance r is always measured perpendicularly to the z axis. This characteristic makes the cylindrical system convenient for graphs for which there is an axis of symmetry such as cylinders and cones.

The final three-dimensional system is the spherical system (Figure 1.5). It is useful for graphs that have a point of symmetry; the perfect example, as the name implies, is a sphere. When using the spherical coordinate system, all distances are measured from a single point, the origin. Points are located by an angle (theta) measured horizontally, an angle (phi) measured vertically, and its radius distance (r) from the origin.

In trying to understand the spherical coordinate system, it helps to realize that the angles of the spherical system are related to the latitude and longitude measurements of points on the earth used in navigation. The angle phi is the latitude and the angle theta is the longitude. There are differences in the points from which the angles are measured but the basic principles are the same.

## How the program works

Maximum and minimum values for each argument of the function are specified by the user in the main menu. The values of the arguments are steadily incremented through the range specified and the equation is evaluated with each of these values substituted into the equation. The number of points calculated is specified by the user by the point intervals of each argument in the main menu.

The value of the function is checked each time to see if it exceeds the maximum value specified by the user; if it does these values are discarded as errors. An array is constructed of all the points, and maximum and minimum values are tracked for drawing axes and coloring. No matter what type of coordinate system is selected, the points are all converted to the rectangular system for plotting.

After computing points, a matrix is constructed for projection onto a two-dimensional plane (your monitor screen). The orientation of the plane and its distance are determined by the eye position, and the size of the graph is determined by the zoom factor. The three-dimensional points are then converted by some matrix algebra to two-dimensional screen coordinates, and the maximum and minimum values of the screen coordinates are computed for auto-centering and auto-scaling. The first point of the graph is plotted and each succeeding point has a line drawn to it to complete the graph.

## Using the program

We recommend using *Ultra-Graph* in low or high resolution. Low resolution is preferred because of the ability to use color gradients; high resolution produces excellent definition of the graphs. The program will function normally in medium resolution, but the graphs will lack the color gradients of low resolution and the definition of high resolution.

If you have a 520 ST (that hasn't been upgraded to one megabyte of RAM), before you boot the program make sure you have no desk accessories installed and no programs in an AUTO folder on your boot disk that remain memory resident. The program doesn't leave much memory free in a 512K ST because of its point arrays and the extra screen it stores in memory, so it's possible that you won't have enough memory if you use accessories. (The program will not allow you to access them anyway; our version of a subtle hint.)

The mouse itself has a few hidden uses that should be understood before using the program. A click on the right mouse button will toggle the display between the actual plotting screen and the selection screen. (There are essentially two screens that remain in memory and alternate.) Clicking on both buttons at the same time has the same effect as clicking on "Graph it!" under the "Options" drop-down menu. There is a little trick here, though; if you click on the right button before the left it will just take you to the other screen, so you'll have to press and hold the left button down and click on the right button to get the desired effect.

## The drop-down menus

Although the drop-down selections aren't very complex, they do require a little explanation. Most drop-down items are straightforward, but selecting certain ones will void others or change the way they perform. Because of this we will explain each menu item, and the interrelations it has with other program options if applicable.

## The File menu

***NeoChrome Save***: Saves a picture of the current graph (and its associated color palette) in *NeoChrome* format.

***DEGAS Save***: Saves a picture of the graph (and its associated color palette) in *DEGAS* format.

***CAD-3D*** Save: Saves the graph as a *CAD-3D* (2.0) object that may then be loaded into *CAD-3D* and manipulated as a normal *CAD-3D* object. Valid only in three-dimensional coordinate systems. For more detailed information please refer to the "Saving CAD-3D Objects" section of this article.

***Save Parameters***: Saves the parameters and equation that created a graph for later re-creation. Parameter files follow a special format and are not designed to be user edited.

***Load Parameters***: Loads a parameter file and allows the original graph to be redrawn without the user entering any information. Parameter files have a number in the extender (for example, SPHERE.PM1) that refers to the resolution that they were saved in (similar to the way DEGAS uses PI1, PI2 and PI3 to determine picture resolution).

When a parameter file that is in the current screen resolution is loaded, the Autoscale and Autocenter features will be temporarily disabled to speed the drawing of the graph and also allow it to be viewed exactly as it was saved (i.e. with a modified center or zoom). If the parameter file's resolution information does not match the current screen resolution, Autocenter and Autoscale will be enabled, even if the graph's parameter file was saved with a modified center or zoom. This is necessary in order for the graph to appear on the screen at all.

***Quit***: Exits the program and returns the user to the Desktop.

## The Options menu

***B/W Swap***: Changes the background color of the screen to white and the color that the graphs are drawn in to black. In high resolution it reverses the background color. It is intended primarily for printouts of graphs.

***Gradient***: Changes the color palette to one of three (red, green or blue) gradually shaded palettes (low resolution only).

***Rainbow***: Changes the color palette to a rainbow gradient. It is perhaps the easiest palette to work with, since small details can result in large changes in the color of the graph (low resolution only).

***Elevation***: Changes the color palette to an elevation map palette (low resolution only).

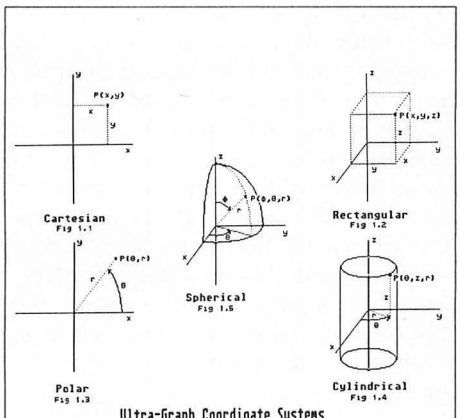



**FIGURE 1**

***Fill Pattern***: This changes the pattern that is used to fill the polygons that three-dimensional graphs are drawn with (valid only with Hidden Lines enabled). It is selectable from empty to solid-fill. Options are shown visually. To select a fill-pattern, click on the desired pattern with the mouse.

***Grid Lines***: Valid only in two-dimensional coordinate systems, this option will draw numbered axes on the screen or number a side, top, or bottom of the screen if an axis is out of the screen range. It will disable (until it is de-selected) the Draw-Axes option.

***Hidden Lines***: Valid only in three-dimensional coordinate systems, this option determines whether the graph will appear as a solid object (hidden lines enabled) or a wire-frame object.

***Draw Axes***: Draws the appropriate unnumbered axes superimposed on the graph. Positive axes appear as solid lines, negative axes appear as dashed lines. Note that when in a two-dimensional system, both Draw Axes and Grid Lines are initially selectable, but when one is selected, the other becomes void. (Both will become selectable again if the currently selected one is turned off). The reason is that the Grid Lines option does draw the axes, so there's no reason to have the program go back and recalculate them for the Draw Axes option. Draw Axes is also valid in 3-dimensional coordinate systems.

***Auto Center***: Automatically centers the graph on the screen, whether or not the entire graph appears on the screen.

***Auto Scale***: Automatically scales the graph to fit the screen.

***Graph it!***: Draws the graph from the current settings.

***Demo Mode***: Cycles through each of the coordinate systems and graphs one of the predefined functions for each. The only way out of the demo is to hit the Escape key after the program is finished drawing a graph. Due to what we think is a bug in the GFA Compiler, Demo Mode currently exits to bombs in the compiled program, but the runtime version performs flawlessly.

***Defaults***: Restores the default settings to the program.

## System

***Cartesian***: Graphs functions in the cartesian coordinate system (two-dimensional).

***Polar***: Graphs functions in the polar coordinate system (two-dimensional).

***Rectangular***: Graphs functions in the rectangular coordinate system (three-dimensional).

***Cylindrical***: Graphs functions in the cylindrical coordinate system (three-dimensional).

***Spherical***: Graphs functions in the spherical coordinate system (three-dimensional).

## Main screen options

The main screen options are a little more complex than the drop-down menu selections, but once you understand their functions, they're relatively easy to use. Most are heavily interrelated, so we will go into a little more detail with the explanations.

***Function***: Selecting this item allows the current function to be changed or edited. For detailed information on changing functions please refer to the "Changing Functions" section of this article.

***Zoom***: Changing the zoom factor moves the point of view closer (small values) or farther away (large values) from the graph. It temporarily disables the Autoscale option. (Autoscale will defeat the changed zoom if it is left enabled.)

***Eye Position***: These three values change the viewpoint of the graph, relative to their respective axes. Larger values increase the distance along that particular axis. It's possible to get over, under, beside or anywhere else around the graph. Extremely high values should be avoided, as should values that might be inside or on a graphed object. If the Eye x (Ex) or Eye y (Ey) positions are within the range that the graph is drawn in, the graph will be distorted severely. (This is caused by the perspective factor that is used). Eye Position values are valid only in three-dimensional coordinate systems.

***Screen Center***: These two values change the apparent center of the screen relative to the graph. If they are changed, the Auto-center option will be temporarily disabled.

***Range Values***: These values change the size and relative position of the box that the graph is drawn in. Changing any of the high or low limits will terminate the graph at those points (x-hi and x-lo, etc.). For example, setting rectangular limits of X from 0 to 5, Y from 0 to 5, and Z from 0 to 5, would give you the portion (if there is a portion) of the graph in that "box." The program keeps track of the box's position and it will display an error message if no part of the graph lies within those bounds. Range values should also be kept to reasonable limits, or the perspective effect will distort the graph.

***Point Intervals***: The Points (Px and Py) selection will alter the number of points that the program will calculate in that particular plane. Zero is not allowed, and it is recommended (in most cases) that it be kept over 20 for any detail at all.

More points produce more detail, but the calculations will take a few seconds longer. Using an excessive number of points might result in a cluttered look for some functions.

The number of points used in each direction is always one more than the number of point intervals. Note that if more detail is required in a single plane only, it is possible to have more points calculated in that particular plane by altering only one of the Point Interval values.

***Line Intervals***: Valid only in three-dimensional coordinate systems with Hidden Lines deselected, the Line Intervals selection will alter the number of lines drawn in that particular direction. Setting one of the values to zero will keep the program from drawing lines in that direction; it will only draw lines one way. This can be desirable if the second set of lines seems to destroy some of the detail.

The Line Intervals option can also be used to make the program draw every other line or every second line, etc. A value of one will draw every line (if set to one, it draws one line for every interval in that direction), two will draw every second line, three will draw every third, 0 will draw no lines (in that direction), etc. Note that five is the maximum value that the program will accept, and that only one interval at a time may be equal to zero.

Also note that the number of points should be divisible evenly by the number of intervals. If you make the number of Point Intervals a value that isn't evenly divisible by the number of Line Intervals, the graph will be missing a line. Using the Line Intervals selection to skip lines is a useful function. As an example, a graph that is drawn with 99 lines and an interval value of 3 will result in the same amount of detail that 99 lines would normally represent, but only 33 lines will actually be drawn. This reduces the overcrowded look of functions with large numbers of lines, but does not reduce detail at all.

## Grid intervals

Grid intervals are valid only for two-dimensional coordinate systems. Grid-x and Grid-y determine the interval between lines that form the grid for the graph. If "Pi" is entered for Grid-x, a trigonometric scale with Pi/2 intervals will be used along the x axis.

## Changing functions

When you click on the box to change the function, you'll be shown a list of a few (10 or more) functions. Each of these will have several variables in it, and each of the variables may be edited. In this way it is possible to negate portions of the equation by multiplying them by zero, to turn a plus into a minus by multiplying by a negative number, or to divide a parameter by multiplying it by a decimal number (for instance, .5 or .75). If you don't want to change all the variables, pressing Return for variable "A" will place a one in all variables; pressing Return for any other variable will result in zeroes for the remaining variables.

A user-defined function may be input by hitting the F1 key when in the function select menu. Type in the desired function (255 characters or less) in the standard BASIC format, being sure to use the proper variables for the coordinate system currently selected, as shown below. Note: some of the equation will not be displayed on the main menu-screen if your equation will not fit in the space provided. It will, however, evaluate properly.

| Coordinate System | Variables |
|---|---|
| Cartesian | X |
| Polar | θ |
| Rectangular | X, Y |
| Spherical | θ, φ |
| Cylindrical | θ, Z |

(θ=theta, φ=phi)

To exit without entering a function, simply hit Return with a blank function line. A previously entered function may be edited by returning to the function input screen.

The following arithmetic are operations that may be used:

| | | |
|---|---|---|
| + | addition | 2+2=4 |
| – | subtraction or negation | 4–2=2 |
| * | multiplication | 2*3=6 |
| / | division | 6/3=2 |
| ^ | exponentiation | 2^3=8 |

The following functions are supported:

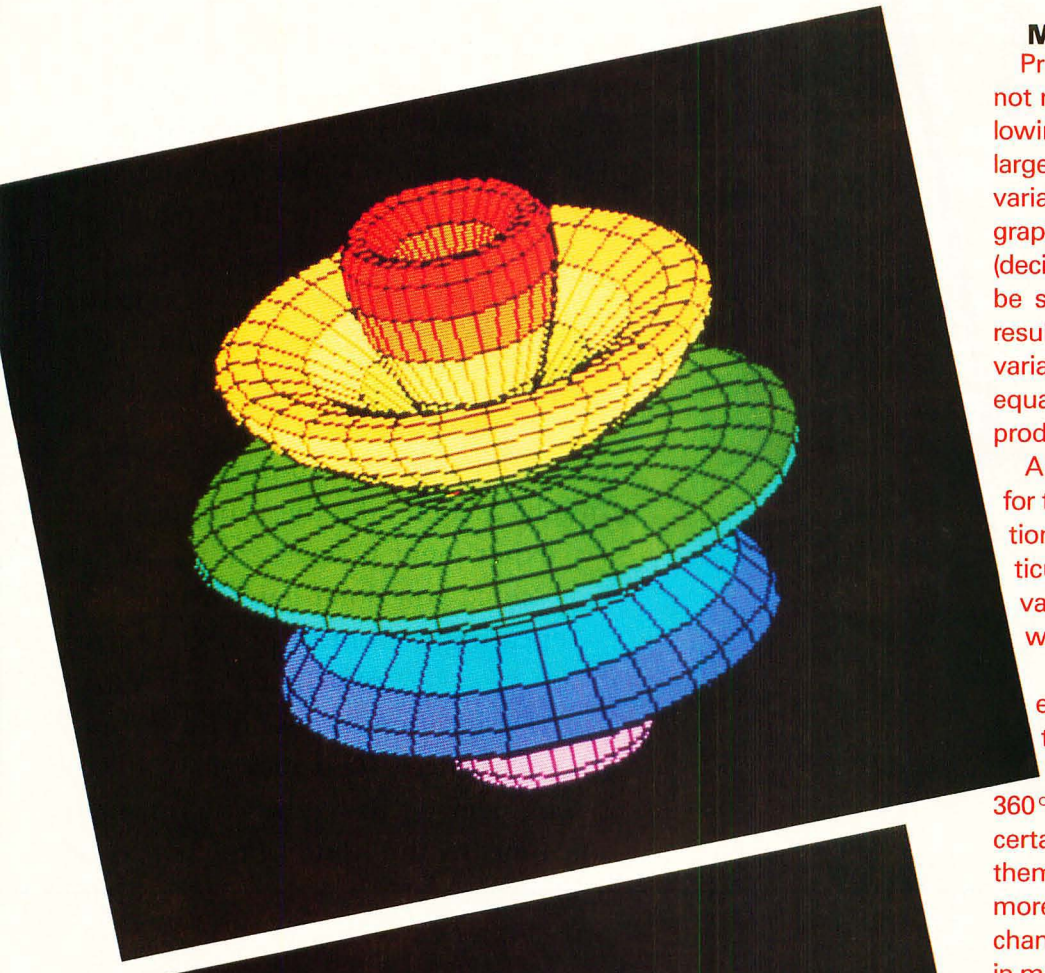
sin() sine
cos() cosine
tan() tangent
atn() arc tangent
exp() exp(x)=e^x
log() natural logarithm
sqr() square root
abs() absolute value

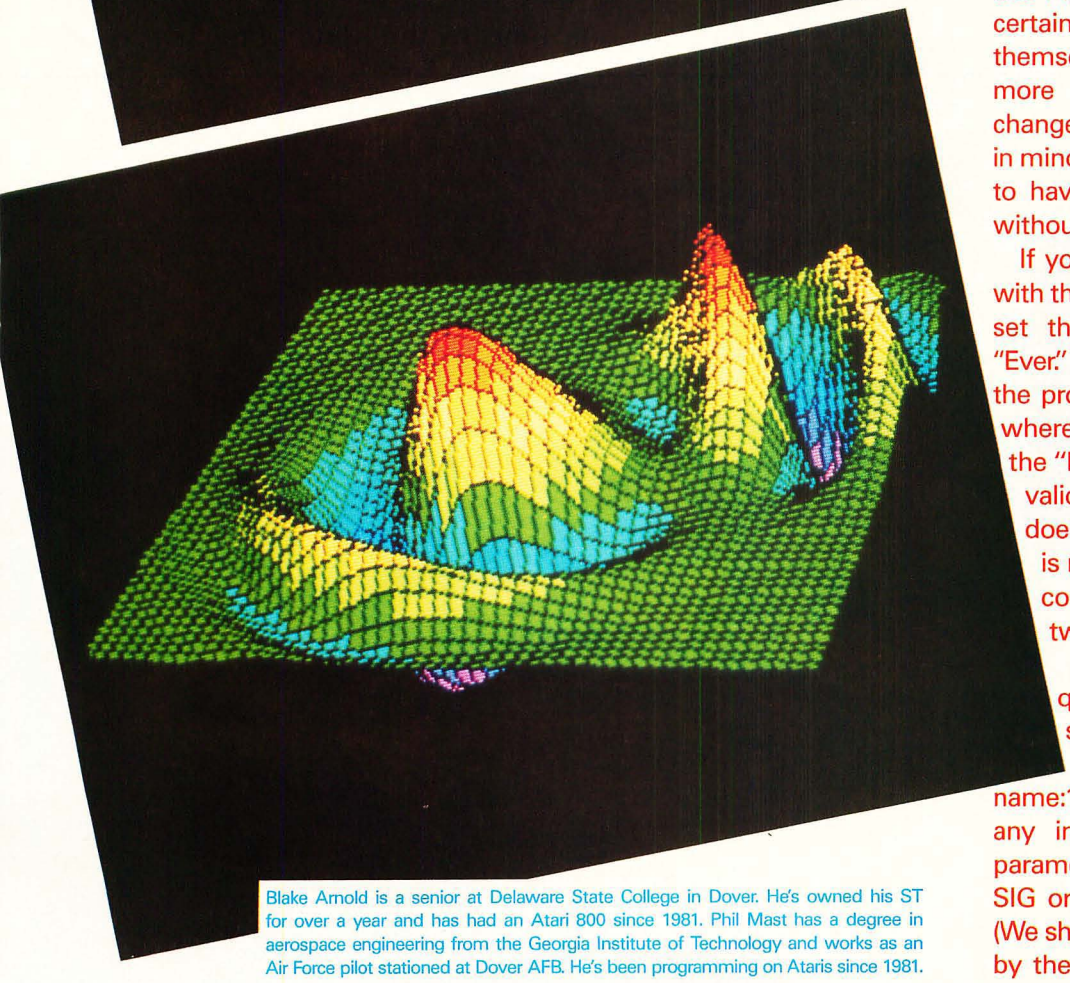
The normal algebraic system of function priorities has been used. Functions and operations are dealt with in the following order: Anything in parentheses is calculated first, followed in order by exponentiation, prefix plus and minus signs, multiplication and division, and addition and subtraction.

## Saving *CAD-3D* objects

When the CAD-3D Save option is selected, the object must be named; the name must be an alphanumeric string of eight characters or less. A selection must also be made with regard to the number of "sides" that will be visible on the saved object. In most cases the object should be saved with both sides visible (two-sided), but completely closed objects such as spheres may be saved as single-sided objects. This will reduce the number of faces in the object and make it easier to join another object to them. However, if a hollow object is the desired result the two-sided option should be used (for example, a hollow sphere). If there is any doubt about the object being completely closed, the two-sided option should be used to avoid creating an object with invisible surfaces.

A few other things must be kept in mind when creating an object for *CAD-3D*. To avoid unnecessary complexity, use as few points as possible to achieve the desired detail in the object. Most of the objects that Ultra-Graph creates are inherently complex, and it is possible to create an object that will be difficult to join if too many points are used. If difficulty is encountered during a join operation refer to *CAD-3D*'s hints on joining objects.





Blake Arnold is a senior at Delaware State College in Dover. He's owned his ST for over a year and has had an Atari 800 since 1981. Phil Mast has a degree in aerospace engineering from the Georgia Institute of Technology and works as an Air Force pilot stationed at Dover AFB. He's been programming on Ataris since 1981.

### Miscellaneous information

Producing exceptional graphs does not require much practice, but the following hints should help. In general, large numbers for the user-definable variables do not produce satisfactory graphs. Numbers between -5 and 5 (decimal numbers are valid, too) should be sufficient to produce any desired result. The relationship between the variables is far more important (i.e. equal to, less than, greater than) in producing different graphs.

Also, be sure to try different values for the high and low limits of the functions. A graph that does not look particularly interesting with one set of values may become a masterpiece with another set of values.

Another thing that should be noted is that the default parameters for the spherical coordinate system for angle phi are from 180° though 360°. This was done in an effort to keep certain functions from drawing over themselves, but some functions are more interesting if the values are changed to 0° through 360°. Keep this in mind if a particular function appears to have parts missing (most will be without an outer sphere).

If you'd like to compile *Ultra-Graph* with the GFA compiler it's necessary to set the compiler "Stop" option to "Ever." The "Stop Ever" selection forces the program counter to keep track of where it's at, which is necessary for the "Resume next" statements to be valid in the compiled program. This does slow the program down, but it is necessary and still results in the compiled version being about twice as fast as the BASIC version.

If you have any suggestions or questions about the program, send them to ST-Log or leave us E-Mail on DELPHI (username:1BLAKE). If you come up with any interesting graphs, upload the parameters file to DELPHI's Atari ST SIG or mail them on disk to ST-Log. (We should already have a few up there by the time you read this). ■

"Measure one thousand times, cut once." This old Chinese proverb suggests that a good way to accomplish a task is to make sure you know what you're doing, then do it right the first time. The time spent on planning, thinking, and measuring more than makes up for the cost of repeating the task because you blew it initially.

"If you don't have time to do it right, when will you have time to do it over?" This old high school chemistry lab proverb means that you might as well take the time to do the experiment properly at the outset, since you don't gain anything by repeating the entire project because of a first-pass screwup.

"Design one thousand times, code once." This modern software engineering proverb (which I made up) means the same thing as the old

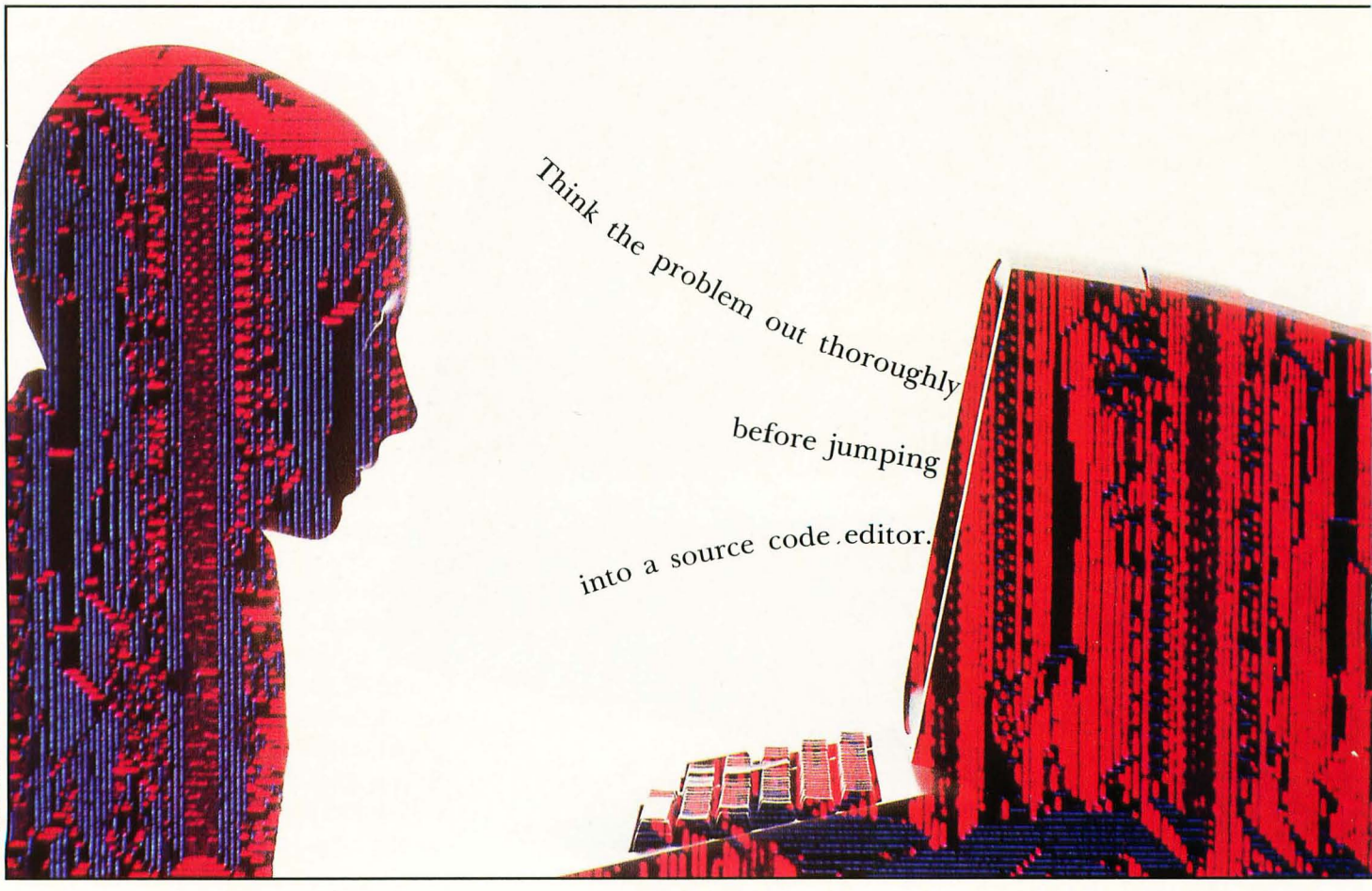



PHOTO: KEN COOPER

Chinese proverb. Make sure you're solving the right problem, design the most effective software solution to that problem, try to think of every possible angle, get all the details in hand, figure out exactly what programs need to be written—and then write them, correctly, the first time.

Quite a concept, eh? Well, that's the goal of software engineering. Think the problem out thoroughly before jumping into a source code editor. You really don't want to notice that the swimming pool is empty on your way down from the high dive. And if you follow this precept, you'll find that your programs are much more robust, easier to understand, and easier to change. Unlike a saw cut, you may have to modify a program over and over until you get it right, or until it's such a mess that you have to start over from scratch (see proverb #2).

BY KARL WIEGERS

# SOFTWARE ENGINEERING

## Program Design Considerations

## Reference Material

By now I hope you have bought into the software engineering philosophy for modern computer programming. If so, you might want to start building a library of reference books for additional reading beyond the quick coverage I can present in this series of articles. Run, don't walk, to your nearest technical bookstore and pick up a copy of Roger Pressman's excellent book, *Software Engineering: A Practitioner's Approach*, Second Edition, McGraw-Hill, 1987. It's worth reading cover-to-cover.

## Who's Driving?

The software development methodology I've been describing in the past few months is a "process-driven" or "data flow-oriented" approach to complex program design. That is, we are focusing on the transformations carried out on the data in our system. The information that flows into and out of each process sews the individual processes together into (we hope) a unified whole.

The process-driven approach makes good sense when the emphasis of the software system is to "do" something: perform calculations, animate some figures on the screen, and so on. However, many software applications focus more on the data itself than on the activities performed in the course of running the program. The processes may exist simply to extract the data we want from some repository (like a database), and get it into the form we want for viewing or printing. The interesting part in a system like this is the information itself. Personnel and inventory programs are examples.

A "data-driven" or "data structure-oriented" approach to design makes more sense for this sort of application. The important facts of the design are no longer the details of how one piece of data gets changed into another, but rather the hierarchical structure, links, and relationships among the items of data used by the system. As you might suspect, clever people have invented several conventions for building models of data structure-oriented systems, analogous to those we've been discussing for data flow-oriented systems. We may get into those tools in the future.

A third approach, "object-oriented design" or OOD, is gaining popularity with some software engineers. In object-oriented design, items in the real world that must be dealt with in a software system are treated as discrete "objects," with their own sets of internal and external (that is, as seen by other objects) characteristics. Some computer languages, such as Ada and Smalltalk, are designed explicitly for object-oriented programming. We probably won't try to relate OOD to the Atari world in this series.

## Structured Design Levels

In the traditional sequence of software development, design follows analysis (we'll talk about different life cycles for software development one of these days). In the design step, you take the abstract, logical models from analysis (the structured specification), and set about creating a mechanism to implement everything necessary for the final, operational system.

This gradual progression from the abstract to the concrete is intended to insulate you from intimate details when you really want to see the big picture. By way of analogy, suppose you're considering buying a particular house. Your first impression is probably based on a view of the home's exterior in the context of its surroundings. A close look at the heating system ductwork comes much later, if at all. Similarly, your system design should reveal only the degree of detail you really need at any given time.

We can think of two levels of structured design: overview design and program design. The overview design uses data flow diagrams to represent the fundamental functions of the system. Each process on the diagram corresponds to one or more program "modules," rather than representing just an abstract transformation of inputs into outputs, as was the case when DFDs were used for structured analysis. Data stores begin to correspond to actual data files or collections of variables used by program modules, instead of just logical groupings of information.

In the detail design phase, we describe the internal structure and function of each program module. Data flow diagrams aren't very useful for this purpose, so other tools are used. If you've ever drawn a flowchart, you've done some detail design; we'll look at other techniques, as well.

Finally, after detail design is completed and you're convinced that everything is hunky-dory, you can begin the coding phase and actually type out BASIC, C, Pascal, or some other kind of code. Try hard to resist the temptation to immerse yourself in code prematurely. You'll thank me for this advice one day.

An interesting aspect of modern software engineering, as opposed to the historic code-and-fix-until-it-sort-of-works approach, is the large front-end loading of effort. To the casual programmer, it seems as though you really aren't "working" unless program statements are streaming from your fingertips. Not so. If the goal is to have a properly functioning program, every minute of time you spend thinking, planning, and critiquing will pay off in the final product. Trust me, I'm a doctor.

## Tools of Overview Design

We've already discussed the important tools of overview design: data flow diagrams and data dictionaries. These are the same methods used in structured systems analysis. The only real difference is that, rather than building an abstract or logical model of our system, we're laying the foundation for a real-life software system that can be implemented in some particular computer environment.

Here's a quick refresher course on data flow diagrams (DFDs). DFDs can contain four kinds of objects: processes, externals, data stores, and data flows. The context diagram is the top level diagram. It represents the entire system as a single process and shows all the objects outside the system that interface to it in some way. Additional diagrams are drawn through a process of stepwise decomposition of the context diagram, showing increasing detail at each lower level of child diagrams. Remember that DFDs don't give you any information about the sequence in which various processes might be executed. They simply show the movement of data throughout the system and the kinds of transformations the data undergo.

"Make sure you're so
tion to that problem,
exactly what program

The data dictionary is a repository of information about all of the objects in your system. Each object on a DFD should have a corresponding entry in the data dictionary, describing what that object is or does. A hierarchical notation can be used to illustrate the grouping of individual data elements into data flows and stores. The DFDs are valuable for ensur-

ing that your system can accomplish what it's supposed to; the data dictionary is important for maintaining the consistency of names, meaning, and characteristics of each piece of information processed by your system.

The end product of the functional decomposition process you perform during structured design is a bunch of low-level processes, sometimes called "primitive" processes. Each primitive is identified by a numbering scheme that represents its parentage. For example, process 3.1.4 is a child of process 3.1, which is itself a child of process 3.

## Modular Construction

A software system ultimately is made up of a number of small program "modules." The word "module" has specific meanings in particular computing environments; I use the word here to mean simply a named, addressable piece of software code. Some languages use terms like "subroutine," "function," or "procedure" to refer to program modules. These are all the same sort of beast, although their detailed characteristics may vary. Modules are the building blocks from which complete programs are constructed.

In the olden days, prior to the advent of computer languages that lend themselves to modularity, programs were monolithic monstrosities, sometimes containing thousands of lines of code all packed together into a single file. 8-bit Atari BASIC is an example of such a primitive language. You can get awfully frustrated if you really want to do structured programming and all you can use is Atari BASIC. You can make some progress by organizing the functions of your program into separate subroutines and using the GOSUB command skillfully. But this is a poor substitute for a truly modular program, with individual procedures that can be compiled separately and linked together as needed.

The primitive processes in the lowest level data flow diagrams created during structured design correspond to individual program modules. This is why the partitioning task carried out during analysis and design is so critical: we want to end up describing the software system to be built in terms of many small, independent pieces. Partitioning should be continued until each process (and hence module) performs a single well-defined function. Of course, the definition of "single function" is up to you, but that's the goal.

Next time, we'll look in more detail at the characteristics of "good" program modules. For now, let me just mention a few general ideas to keep in mind. You should work on the partitioning process until the lowest-level processes will translate into modules having these desirable features:

1. Each module should be short. A reasonable target is from 10 to 100 executable statements.
2. Each module should have good internal "cohesion." This refers to the logical integrity of the module's function, meaning that the purpose of the module is well-focused on a specific task.
3. Each module should be independent of all other modules. When you assemble a complete program from a bunch of modules, one module shouldn't have to know anything about the internal functioning of another. This brings up the idea of module "coupling," which we'll discuss next time.
4. A module should access the minimum amount of data. A well-defined data interface for each module is required to sew them together into a final program. This idea flies in the face of the "global variables" characteristic of BASIC and some other unstructured languages.
5. A module's complexity should be minimized. If the behavior of the module is so complex that it requires considerable explanation to comprehend, you might be better off subdividing it into a family of smaller, more understandable modules. Ever notice how much easier it is to understand short paragraphs than long ones, no matter what the subject matter?

These rules about modules have several purposes. One is to make your program more understandable by human beings, which becomes critical any time the program needs to be changed—the old maintenance bugaboo. Also, by creating large programs from lots of little programs, we increase the chances of being able to reuse a module we already have sitting around. The concept of reusability is the most important key to maximized programming effectiveness.

## Tools of Detail Design

Two tasks remain to be performed at this stage of the design. First, we must somehow represent the internal functions of each primitive process in enough detail that someone can actually write a computer program to carry out those functions. The internal details of a process are described in a document variously called a "process narrative," "process specification," or "minispec," among other names. And second, we need to illustrate how the various primitive processes (modules) are linked together. The DFDs show the information that can move from one process to another. But now we want to depict the hierarchical relationship of the modules. One way to do this is by drawing a "structure chart," which we'll discuss in our next installment.

ving the right problem, design the most effective software solu-
hink of every possible angle, get all the details in hand, figure out
need to be written—then write them, correctly, the first time."

## Process Narratives

The purpose of the process narrative is to give enough detail so that someone skilled in the art of programming (as opposed to the science of software design) could write a module to properly carry out that process's appointed duties. You see, we're gradually bridging the gap between the abstract (what's the problem?) and the physical (here's the solution). However, we still wish to keep the logic and actions to be performed in each *process* separate from the exact code that will be used in each *module*. In fact, at this point in our design, it is still not essential to know what computer language will be used. Now let's look at several ways to write process narratives.

*Flowcharts.* You're probably familiar with the flowchart. This graphical method has been used for many years to represent the details of logic and execution sequence in a program. A sample flowchart is shown in Figure 1. This example, like

the others in this article, is drawn from my chemistry game "Reaction Time," written for the 8-bit Atari computers in assembly language.

Several symbols commonly appear on flowcharts. The rectangle simply indicates some process to be performed, such as reading a file or performing a computation. The diamond represents a decision, in which the next action to be taken depends upon some condition. The lines moving from one object to another indicate the sequence in which actions will be performed. Other symbols are used to represent things like printed output, disk files, and so on, but we can skip all that.

The flowchart has the advantage of being visual, which can make it a more effective communication method than reams of text. However, it's difficult to derive a clean program structure from inspecting a flowchart. Where are the loops? How should the IF/THEN blocks be coded? Which IFs are nested inside other IFs? Such things often are not obvious without carefully studying the flowchart.

Flowcharts do have their uses, one of which is diagramming the detailed logic of a complicated procedure. However, they also have many deficiencies. They don't lend themselves well to programming in modern structured languages, such as Pascal and C. For example, it's not easy to use a flowchart to indicate decision making when more than three possible outcomes exist. This sort of task is handled by SELECT/CASE constructs in many languages. Overall, there are better methods for representing the internal functions of processes than flowcharts.

*Structured English or Pseudocode.* These two terms refer to pretty much the same thing, so I'll lump them together under the "pseudocode" moniker because it's a neater sounding word. Pseudocode is a technique for representing the internal details of a process in a very readable yet structured way. An example of pseudocode is found in Figure 2, which represents the same part of the Reaction Time program that is shown in Figure 1's flowchart.

Notice the program-like structure of the pseudocode illustration. This is not an accident! The hierarchical structure (as indicated by the indentation), and the keywords used in the pseudocode statements are chosen so as to bear a similar structure to the program that will be written eventually. This again helps bridge the gap between the logical and the physical aspects of system development.

While in principle the pseudocode really should be independent of the computer language that will be used during the coding phase, people tend to make their pseudocode look like their favorite structured language. I prefer REXX, which is a very nicely structured language used on IBM mainframe computers, somewhat similar to Pascal. It's perfectly fine to throw in ordinary English text to describe the functions of the module when writing pseudocode. You may have guessed this from the "Structured English" term.

There really aren't any hard and fast rules for pseudocode. Basically, whatever makes the most sense to you (and to whomever has to read your documentation) is just fine. The method you select should be able to represent the three basic structured programming constructs, however. As you may recall, these constructs are:

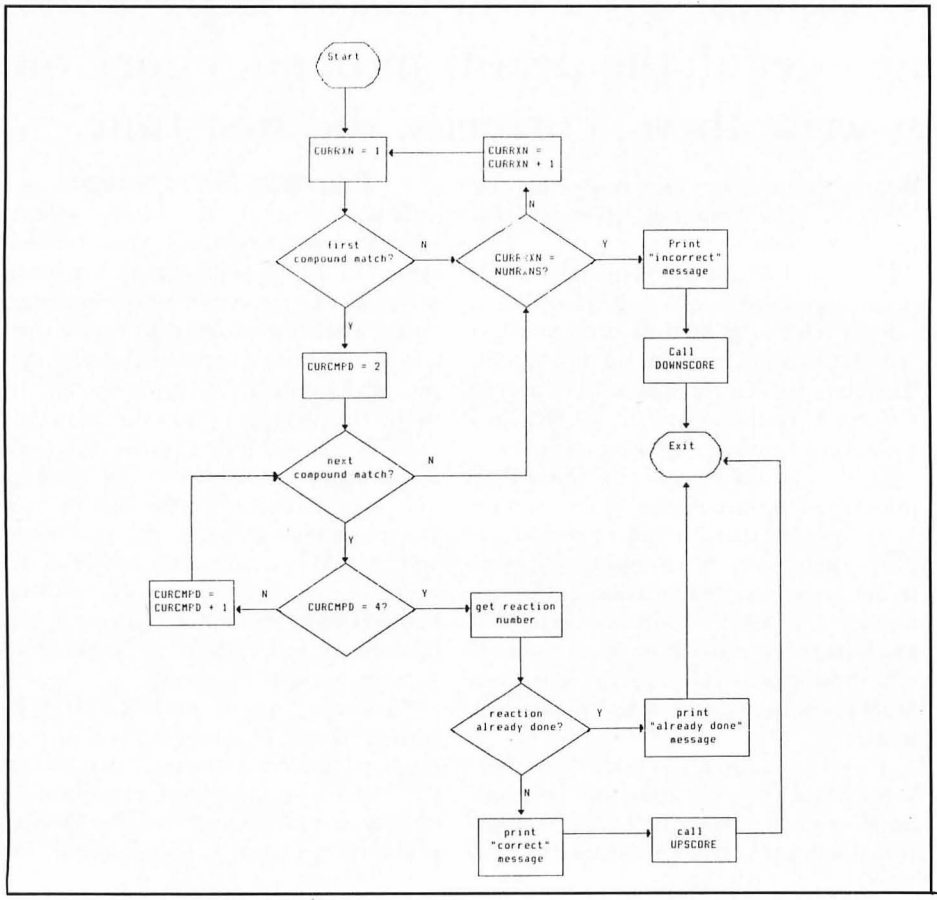
1. Sequence—simply taking one action after another, in the order in which they appear in the program.
2. Selection—choosing from several possible actions to be taken, based on some condition.
3. Repetition—repeating a specific set of operations until some condition is met.

The detailed syntax for each of these constructs differs from language to language. For example, the selection construct can appear as IF/THEN, IF/ELSE IF/ELSE/ENDIF, SELECT/WHEN/OTHERWISE/ENDSELECT, SELECT/CASE/CASE ELSE/ENDSELECT, and so on. Any one of these approaches could be used for the pseudocode equivalent in your process narratives. Repetition uses keywords like LOOP, DO, or REPEAT. And, of course, simple sequential processing is indicated by a list of instructions (or English phrases) all at the same level of indentation.

It's a very good idea to use indentation to indicate the hierarchy of logic within the process. I like to use explicit ENDDO and ENDIF statements to conclude a DO or IF logic block, and I align the beginning and ending statements of such blocks so that it's easy to read through the logic.

Your pseudocode conventions can be anything you like, but *be consistent.* Even though you aren't using an official programming language, you still should choose some rules and stick with them. The basic idea, of course, is effective com-

**FIGURE 1**
**FLOWCHART EXAMPLE**



munication, as with *all* of the structured techniques we've been discussing. Another programmer should be able to read your process narratives and understand what is going on. And if you're really lucky, you might be able to simply hand a stack of process narratives to somebody who will do all the typing for you: a coder. (Of course, there are those who feel more fortunate being on the coding end, rather than having to struggle with design. Each aspect of the software development process has its rewards.)

Notice how Figure 2 looks a lot more like a computer program than Figure 1, even though they represent exactly the same process. I find the logical structure of pseudocode much easier to translate into an actual programming language than the two-dimensional structure of a flowchart.

*Action Diagrams.* Another technique for writing process specifications is the action diagram. Action diagrams can be used for either overview or detail design representation, although I tend to stick with data flow diagrams for overview designs. In a sense, action diagrams can be thought of as a more formal sort of pseudocode, in which a bracket notation is used to indicate specific instances of selection, repetition, and simple sequential operations.

Figure 3 shows an action diagram for the same process that appeared earlier in flowchart and pseuducode forms. A program module is drawn as a bracket; I like to put the name of the module at the top of the bracket and an "END module" notation at the bottom. If you read down the contents of the bracket from top to bottom, each entry represents operations to be carried out sequentially. Brackets can be nested to show how other procedures might be carried out conditionally. If this module calls a lower-level module, the latter is shown by putting its name in a box and placing the box in the appropriate spot in the bracket. This tells the reader, "you don't need to know exactly what happens inside this other module, but you could go look at its own action diagram for details whenever you're ready."

Loops (that is, sequences of operations that are repeated) are shown in action diagrams by placing a double horizontal line at the top of the bracket enclosing the repeated instructions. Sometimes the double line will appear at the bottom of the bracket instead, indicating that the condition for terminating the loop is tested at the end of the loop rather than at the beginning. The simple FOR/NEXT loop in BASIC always tests at the top of the loop; this is like a DO WHILE command in some languages. A loop expressed like this might never be executed. A loop that tested at the bottom (DO UNTIL) is always executed at least once.

Other techniques are also useful for describing the internal functions and logic of individual modules. Some of these are Nassi-Shneiderman charts, decision tables, and decision trees. If you want to read more about such methods, an excellent reference is *Structured Techniques for Computing* by James Martin and Carma McClure (Prentice-Hall, 1985).

## Putting it All Together

Let's see where we stand now. Our system has been thoroughly analyzed, and a structured specification was created using data flow diagrams. Our overview design has shown us a viable software solution to the problem, and the detail design step left us with a bunch of process narratives describing the internal functioning of each program module. We know the modules will fit together properly, because we continually referred to the data dictionary while writing the process narratives.

Now we need to think about assembling all of our modules into some logical whole. We already know what each module does, and we know the nature and structure of the data manipulated by each module. In keeping with our hierarchical approach to program design, we need to arrange the modules into some structure, so we can see who calls whom. A handy technique for showing the hierarchical connectivity of the modules in a program is the "structure chart," which we'll take a look at next time. In addition, we'll discuss some more characteristics of good modules and ideas to keep in mind about the relationships among different modules. Stay tuned. . . . ■

*After receiving a Ph.D. in organic chemistry, Karl Wiegers decided that it was more fun to practice programming without a license. He is now a software engineer in the Eastman Kodak Photographic Research Laboratories. He lives in Rochester, New York, with his wife, Chris, and the two cats required of all ST-Log authors.*

**FIGURE 2**
**PSEUDOCODE EXAMPLE**

```
BEGIN: Which_Reaction Procedure
IF first compound matches any first reaction_compound THEN
   IF other three compounds match other reaction compounds THEN
      DO
         get reaction number
         IF this reaction number is not already done THEN
            DO
               print "correct" message
               call UPSCORE procedure
            END DO
         ELSE print "already done" message
         END IF
      END DO
   ELSE
      IF this is the last reaction to check THEN
         DO
            print "incorrect reaction" message
            call DOWNSCORE procedure
         END DO
      END IF
   END IF
ELSE
   DO
      print "incorrect reaction" message
      call DOWNSCORE procedure
   END DO
END IF
END:  Which_Reaction Procedure
```

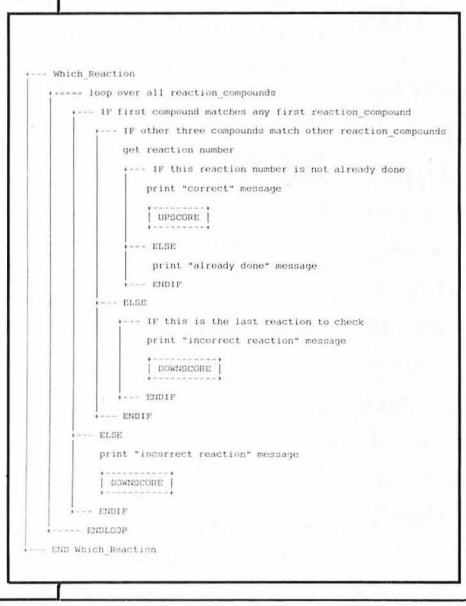
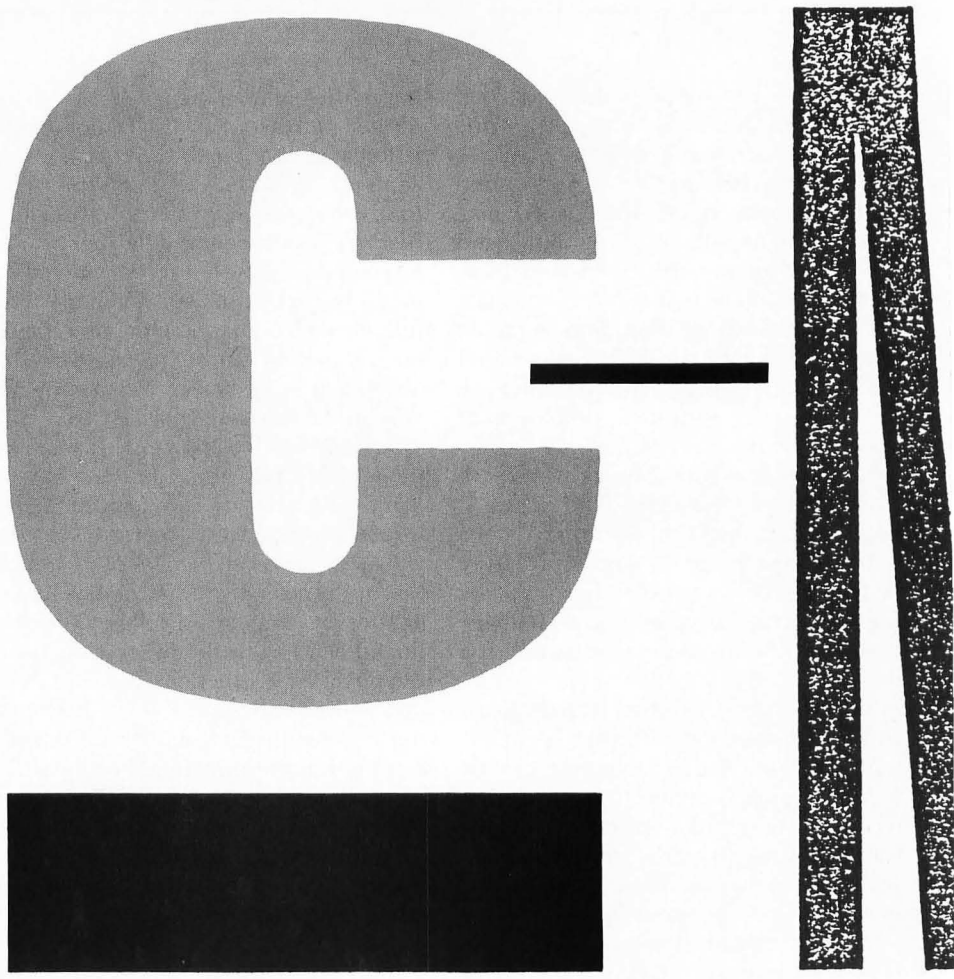



**FIGURE 3**
**ACTION DIAGRAM EXAMPLE**



**Certainly all of us have used GEM's various constructions such as windows and dialog boxes. When we use these things we don't pay much attention to what is going on. We just take it for granted that when we drag the lower right corner of a window with the mouse pointer the window will get larger, or when we grab its title bar we'll be able to move it about the screen.**

**What you may not realize is that these routines that control windows and dialog boxes and the other GEM constructions are actually "high-level" routines that call various other "lower-level" routines in the AES and VDI. We've touched on this subject before when we talked about the VDI and why those graphics routines were called "primitives" and when we learned that it's not a good idea to call VDI mouse functions if you're using AES functions that may also call the VDI mouse routines.**

**Specifically, what we'll be talking about this month are a few of the AES functions that are used by windows and dialog boxes. We're going to be "dropping down a level," as it were, from the very sophisticated window and dialog routines to some of the functions that these routines call to do their tricks.**

## The sample program

Listing 1 is this month's sample program. You should type it in and compile it before going any further. Note that the program was written using *Megamax C*. If you have a different compiler, you may have to make some slight changes to the program to get it to compile and run correctly.

When you run the program, a large rectangle will be drawn on the screen, and the program will then wait for input via the mouse. The large rectangle is a border within which all the program's activities will be contained.

Hold down the left mouse button and drag the mouse pointer down to the right. A box that expands and contracts with the movement of the mouse pointer will be drawn on the screen. When you release the mouse button, the final box will be filled in. In the lower right corner of the box will be a small button. By placing the mouse pointer over this button and holding down the left mouse button, you'll be able to change the size of the box by dragging on its corner. Note that, if you try to resize the box beyond the boundary we've set up, the program will ignore your request.

If you place the mouse pointer inside the box and hold down the left button, the mouse pointer will change into a hand that you can use to reposition the box anywhere on the screen, as long as the box stays within the border we've drawn. (As a matter of fact, the program won't allow you to drag the box outside of the border.)

To get out of the sample program and back to the Desktop, hold down the right mouse button.

## Deja vu

I'm sure you recognize all of the effects we're using in our sample program. We spend a lot of time on our STs moving and sizing boxes. These routines are the foundations upon which the more advanced abilities of GEM are built. Fortunately, these routines are available to us as GEM programmers, so that we can construct our own specialized, GEM-like routines.

All of the functions we're using to simulate GEM in this program are part of the AES Graphics Manager library. We've used a couple of these functions, like *graf_handle( )* and *graf_mouse( )*, in past

# MANSHIP

**BY CLAYTON WALNUM**

C-manships. We've also used most of the Graphics Manager's functions indirectly. For instance, when we studied dialog boxes, we talked about a function called *form_dial( )* that, among other things, allowed us to have an expanding or shrinking box displayed on the screen. The *form_dial( )* function performed some of its tricks by calling the *graf_growbox( )* and *graf_shrinkbox( )* functions found in the AES Graphics Manager. (Note that all the Graphics Manager functions start with *graf*.)

If we wish to draw an animated expanding box of our own, we just use the call:

```
graf_growbox ( start_x,
 start_y, start_w,
 start_h, end_x, end_y,
 end_w, end_h );
```

Here the first four arguments are the X coordinate, Y coordinate, width and height of the starting rectangle and the second four arguments are the X coordinate, Y coordinate, width and height of the final rectangle. This function will return a zero upon failure or a positive integer if successful.

Its complementary function, the one that draws an animated shrinking box, is called in the same way:

```
graf_shrinkbox ( start_x,
 start_y, start_w,
 start_h, end_x, end_y,
 end_w, end_h );
```

## Our program

In this month's sample program, we haven't used *graf_growbox()* or *graf_shrinkbox()*, but we have used many of the other functions available in the Graphics Manager library.

Look at the function called *do_box()*. Near the top you'll see a nested *while* loop. The first *while* is set up to repeat until we receive acceptable coordinates for the box the user wants to draw. The inner *while* loop forces the program to wait for a press of the left mouse button. We continually poll the mouse's state until we detect that the button has been pressed. The function call we use to check the mouse's state is:

```
graf_mkstate ( &mouse_x,
 &mouse_y, &mouse_but,
 &key_state );
```

Here *&mouse_x*, *&mouse_y*, *&mouse_but* and *&key_state* are the addresses of the integers that will receive the mouse's current X coordinate, the mouse's current Y coordinate, the mouse's current button state, and the state of the keyboard's Shift, Control and Alternate keys. The integer *mouse_but* will contain a 1 if the left button was pressed, a 2 if the right button was pressed and a 3 if both were pressed. The integer *key_state* will contain a 1 if the right Shift was pressed, a 2 if the left Shift was pressed, a 4 if the Control key was pressed, and an 8 if the Alternate key was pressed. For multiple key presses, we would just add the appropriate values together. (You remember how to handle

bit settings, right?)

When we detect that the left mouse button has been pressed, we get the mouse's coordinates and use them as the coordinates for the upper left corner of the box. The next step, then, is to allow the user to drag the mouse to outline the box that he wants. We do this with the call:

```
graf_rubberbox ( box_x,
 box_y, min_w, min_h,
 &box_w, &box_h );
```

Here *box__x* and *box__y* are the coordinates of the box's upper left corner, *min__w* and *min__h* are the box's minimum allowable size in pixels, and *&box__w* and *&box__h* are the addresses of integers where the final selected width and height of the box will be stored.

After our call to *graf__rubberbox()*, we'll have all the information we need to draw the box the user selected. But before we actually draw the box, we must check to make sure that the box will fit inside our boundary. In the *if* statement that checks this condition, you'll notice that we're using the values stored in *work__out[0]* and *work__out[1]*. The *work__out[ ]* array is one of our GEM global arrays, and its elements were filled in when we initialized the application program. Element 0 of this array contains the width of our device (in this case, the device is the screen, so it is measured in pixels), and element 1 contains the height of our device.

Once we've drawn the box, we enter another nested *while* loop. The outer loop checks for a program-exit condition, and the inner loop again polls the mouse. If the right mouse button is pressed, we exit the program. If the left mouse button is pressed, we have to check the location of the mouse, so that we know whether the user wants to move the box or size it.

If the user is holding down the mouse button while on the box's sizing button, we need to call *graf__rubberbox()* again to let the user choose the new size of the box. There are two complications. The first is something we've already handled before, and that is that we can't allow the size of the new box to exceed the boundary that we've set up.

The second problem arises when the user chooses to make the box smaller. In this case it isn't good enough to just redraw the box at its new size because we'll be leaving on the screen parts of the old box. To erase the leftovers, we first have to calculate their size and then redraw them in the background color. Of course, we could simplify matters by erasing the entire old box before we draw the new one, but that would make the program less pleasing to the eye. The entire resizing process is handled in our function *size__box()*.

If the user has pressed the left mouse button while within the box (but not on the box's sizing button), we have to allow the user to move the box to a new location. Our function *move__box()* illustrates how to do this.

We can get the new location of a box with the call:

```
graf_dragbox ( box_w,
 box_h, &box_x, &box_y,
 bound_x, bound_y, bound_w,
 bound_h, &end_x, &end_y );
```

Where the integers *box__w* and *box__h* are the box's width and height; *&box__x* and *&box__y* are the addresses of integers where the box's new X and Y coordinates will be stored; the integers *bound__x*, *bound__y*, *bound__w* and *bound__h* are the coordinates, width and height of the boundary within which the box must remain; and *&end__x* and *&end__y* are the addresses of integers where the box's new X and Y coordinates will be stored.

Once we get the coordinates of the new box, all we have to do is erase the old box and draw the new one.

## Some leftovers

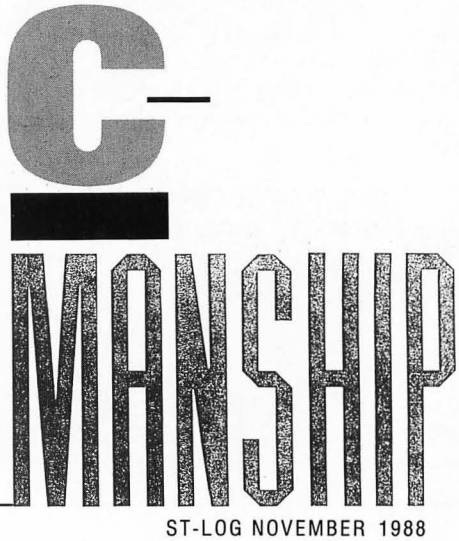
There are a couple of functions in the Graphics Manager library that we haven't looked at yet. One of them is a function that allows you to draw an animated box moving from one location to another. The call looks like this:

```
graf_movbox ( box_w,
 box_h, old_x, old_y,
 new_x, new_y );
```

Here, the integers *box__w* and *box__h* are the width and height of the box, the integers *old__x* and *old__y* are the current X and Y coordinates of the box, and the integers *new__x* and *new__y* are the final coordinates of the box. Note the spelling of the function call; it's different than the spelling in the Megamax manual. If you try to call the function using the manual's spelling, your program will not link properly because the linker won't be able to find the label. Anyway, this function is really of limited use; I can't think of any place where I've seen it in action.

Finally, the two remaining functions, *graf__slidebox()* and *graf__watchbox()* are used with object trees. The first is the function that allows sliders, such as those found in windows, to work; and the second allows us to track the mouse in and out of a particular rectangle while the mouse button is held down. These functions would be useful should we ever want to write our own custom dialog box (*form__do()*) routines.

This completes our tour of the AES Graphics Manager library (though we may get back to *graf__slidebox()* and *graf__watchbox()* at some time in the future). You should now have an even clearer idea of how some of GEM's routines work, and you should be able to construct many handy GEM-like routines with the information you've learned.





**Computer Garden**

**Wilkes-Barre & Scranton's Favorite Computer Store**

| | | |
|---|---|---|
| **Accolade** | **Intersect** | **Soft Logik** |
| Hardball.....$25 | Interlink.....$25 | Pub. Partner.....$60 |
| Pinball Wizard...$23 | **LC Tech.** | Pub. Prtnr Pro..$120 |
| Test Drive.....$25 | Stereotek kit..$139 | Font Disk 1or 2..$20 |
| **Antic** | **Megamax** | **Springboard** |
| Spectrum 512...$56 | Laser C.....$159 | Certificate Mkr..$33 |
| Cyberstudio.....$70 | **Michtron** | **SSI** |
| **Atari** | GFA Basic.....$39 | Wizard's Crown $25 |
| 520STFM.....$Call | GFA Compiler....$39 | Rings of Zilfin ...$25 |
| 1040ST.....$Call | GFA Companion$33 | Phantasie.....$25 |
| Mega-2 ST.....$Call | GFA Basic book$25 | Phantasie II.....$25 |
| Mega-4 ST.....$Call | **Microprose** | Phantasie III.....$25 |
| **Avant-Garde** | F-15 Strike Egl..$25 | War Game Con.$23 |
| PC-Ditto.....$Call | Gunship.....$33 | **Star** |
| **Avatex** | Silent Service...$25 | NX1000 Printer$169 |
| 1200e modem...$79 | **Microsoft** | Color version..$229 |
| 2400 modem...$169 | Microsoft Write $89 | Printer cable.....$15 |
| Modem cable....$15 | **Panasonic** | **Sublogic** |
| **Batt.Included** | 1080i-II Printer.$175 | Flight Simulator.$33 |
| DEGAS.....$49 | 1091i-II Printer.$195 | Scenery Disk 7..$15 |
| **DigitalVision** | Printer cover.....$9 | Scenery Dsk 11$15 |
| Computereyes$179 | Printer cable.....$15 | **Supra** |
| **Dr. T's** | **Practical Per.** | 2400 modem...$139 |
| KCS.....$189 | Monitor Master..$44 | Modem cable....$15 |
| The Copyist....$189 | Mouse Master ..$35 | **Timeworks** |
| MIDI Recording | **SeymorRadix** | Wordwriter .....$49 |
| Studio.....$26 | IMG-Scan.....$79 | Datamanager...$49 |
| **Epyx** | **Sierra** | Swiftcalc .....$49 |
| Impos. Mission II$25 | Space Quest....$33 | Partner .....$33 |
| **FTL** | Space Quest II..$33 | Desktop Publish$79 |
| Dungeonmaster$25 | King's Quest.....$33 | **Trio Eng.** |
| Sundog.....$25 | King's Quest II...$33 | Digispec.....$39 |
| **Future Sys.** | King's Quest III..$33 | Unispec.....$49 |
| GTS-100 drive $199 | Donald Duck.....$16 | **Unison World** |
| **ICD** | Police Quest.....$33 | Printmaster +....$25 |
| F20A-ST drive $669 | Liesure Suit .....$25 | FantasyArtGlry $20 |
| | Mother Goose ..$20 | Fonts&Borders $23 |

**Toll-free order line:**

**1-800-456-5689**

For information call 1-717-823-4025

**3% charge for VISA-MC-AMEX. Shipping, extra.**

**Computer Garden, 106 W. Carey St, Plains PA 18705**

CIRCLE #110 ON READER SERVICE CARD.

## C-Manship Listing 1 C

```
/*************************************************************/
/*                  C-manship, Listing 1                     */
/*                       ST-Log #25                          */
/*                Developed with Megamax C                   */
/*************************************************************/
#include <obdefs.h>
#include <gemdefs.h>

#define TRUE    1
#define FALSE   0
#define SOLID   1
#define PATTERN 2
#define LEFT    1
#define RIGHT   2

/* GEM arrays */
int work_in[11], work_out[57], contrl[12], intin[128],
    ptsin[128], intout[128], ptsout[128];

int handle,     /* Application handle. */
    dum;        /* Dummy storage.      */


/*************************************************************
* Main program.
*************************************************************/
main ()
{
   appl_init ();            /* Init application.          */
   open_vwork ();           /* Open virtual workstation.  */
   do_box ();               /* Go do our thing.           */
   v_clsvwk ( handle );     /* Close virtual workstation.*/
   appl_exit ();            /* Back to the desktop.       */
}


/*************************************************************
* do_box ()
*
* Calls screen setup function and handles the mouse,
* calling the appropriate box functions based on the
* mouse's coordinates and button state.
*************************************************************/
do_box ()
{
   int mouse_x,     /* Mouse X coordinate.      */
       mouse_y,     /* Mouse Y coordinate.      */
       mouse_but,   /* Mouse button state.      */
       box_x,       /* Selected box X coord.    */
       box_y,       /* Selected box Y coord.    */
       box_width,   /* Selected width of box.   */
       box_height,  /* Selected height of box.  */
       exit,        /* Program exit flag.       */
       coords_ok;   /* Proper coordinates flag.*/

   setup_scrn ();
   coords_ok = FALSE;
   graf_mouse ( ARROW, 0L );

   /* Wait for box coordinates within the boundary. */
   while ( !coords_ok ) {

      /* Poll for left button press. */
      mouse_but = 0;
      while ( mouse_but != LEFT )
         graf_mkstate ( &mouse_x, &mouse_y, &mouse_but, &dum );

      /* Get coordinates for the box. */
      box_x = mouse_x;
      box_y = mouse_y;
      graf_rubberbox ( box_x, box_y, 20, 20, &box_width, &box_height );

      /* Allow only a box whose size fits within the */
      /* boundary to be drawn.                       */
      if ( box_x > 20 && box_x + box_width < work_out[0]-21 &&
           box_y > 20 && box_y + box_height < work_out[1]-21 ) {
         draw_box ( box_x, box_y, box_width, box_height );
         coords_ok = TRUE;
      }
   }
   exit = FALSE;
   while ( !exit ) {
      mouse_but = 0;

      /* Wait for press of left or right mouse button. */
```

```
      while ( mouse_but != LEFT && mouse_but != RIGHT )
         graf_mkstate ( &mouse_x, &mouse_y, &mouse_but, &dum );

      if ( mouse_but == LEFT )

         /* If the mouse was on the sizing button, */
         /* allow the user to resize the box.      */
         if ( chose_size ( mouse_x, mouse_y, box_x, box_y,
                           box_width, box_height ) )
            size_box ( box_x, box_y, &box_width, &box_height );

         /* If the mouse was anywhere else in the */
         /* box, allow the user to move the box.  */
         else if ( chose_move ( mouse_x, mouse_y, box_x, box_y,
                                box_width, box_height ) )
            move_box ( &box_x, &box_y, box_width, box_height );

      if ( mouse_but == RIGHT )
         exit = TRUE;
   }
}


/*********************************************************
* draw_box ()
*
* Draws a shaded box with a button in the lower right
* corner.  The input is the X and Y coordinates of
* the box's upper left corner and its width and height.
*********************************************************/
draw_box ( x, y, w, h )
int x, y, w, h;
{
   int pxy[4];

   graf_mouse ( M_OFF, 0L );

   /* Draw the main body of the box. */
   vsf_interior ( handle, PATTERN );
   vsf_style ( handle, 5 );
   vsf_color ( handle, BLACK );
   pxy[0] = x;
   pxy[1] = y;
   pxy[2] = x + w - 1;
   pxy[3] = y + h - 1;
   v_bar ( handle, pxy );

   /* Draw the box's sizing button. */
   vsf_interior ( handle, SOLID );
   pxy[0] = x + w - 10;
   pxy[1] = y + h - 10;
   v_bar ( handle, pxy );

   graf_mouse ( M_ON, 0L );
}


/*********************************************************
* size_box ()
*
* Resizes a box.  The input is the X and Y coordinates
* of the box and pointers to its width and height.  The
* function returns the new width and height by way
* of the pointers, thus replacing the old values of
* the width and height.
*********************************************************/
size_box ( x, y, w, h )
int x, y, *w, *h;
{
   int old_w, old_h;
   int pxy[4];

   old_w = *w;
   old_h = *h;

   /* Get the new box size. */
   graf_rubberbox ( x, y, 20, 20, w, h );

   /* Don't allow the new box to exceed the boundary. */
   if ( x + *w > work_out[0]-20 | y + *h > work_out[1]-20 ) {
      *w = old_w;
      *h = old_h;
   }

   /* If the size is okay, draw the box. */
```

```
   else {
      draw_box ( x, y, *w, *h );

      /* Erase the leftover portions (if */
      /* any) of the old box.            */
      graf_mouse ( M_OFF, 0L );
      vsf_interior ( handle, SOLID );
      vsf_color ( handle, WHITE );
      if ( *w < old_w ) {
         pxy[0] = x + *w;
         pxy[1] = y;
         pxy[2] = x + old_w - 1;
         pxy[3] = y + old_h - 1;
         v_bar ( handle, pxy );
      }
      if ( *h < old_h ) {
         pxy[0] = x;
         pxy[1] = y + *h;
         pxy[2] = x + old_w - 1;
         pxy[3] = y + old_h - 1;
         v_bar ( handle, pxy );
      }
      graf_mouse ( M_ON, 0L );
   }
}


/*********************************************************
* move_box ()
*
* Repositions a box.  The input is a pointer to the
* box's X coord., a pointer to the box's Y coord., and
* the box's width and height.  The new X and Y
* coordinates are returned from the function by way of
* the pointers, thus replacing the old X and Y values.
*********************************************************/
move_box ( x, y, w, h )
int *x, *y, w, h;
{
   int old_x, old_y;
   int pxy[4];

   old_x = *x;
   old_y = *y;
   graf_mouse ( FLAT_HAND, 0L );

   /* Get new location for the box. */
   graf_dragbox ( w, h, *x, *y, 21, 21,
                  work_out[0]-41, work_out[1]-41, x, y );

   /* Erase the old box. */
   graf_mouse ( M_OFF, 0L );
   vsf_color ( handle, WHITE );
   vsf_interior ( handle, SOLID );
   pxy[0] = old_x;
   pxy[1] = old_y;
   pxy[2] = old_x + w - 1;
   pxy[3] = old_y + h - 1;
   v_bar ( handle, pxy );

   /* Draw the new box. */
   draw_box ( *x, *y, w, h );

   graf_mouse ( M_ON, 0L );
   graf_mouse ( ARROW, 0L );
}


/*********************************************************
* chose_size ()
*
* Returns a boolean value based on whether the mouse
* button was pressed while over the box's sizing
* button.  The input is the X and Y coordinates of
* the mouse, the X and Y coordinates of the box, and
* the width and height of the box.
*********************************************************/
chose_size ( mx, my, bx, by, bw, bh )
int mx, my, bx, by, bw, bh;
{
   if ( mx>bx+bw-10 && mx<bx+bw && my>by+bh-10 && my<by+bh )
      return ( TRUE );
   else
      return ( FALSE );
}
```

# MOVING?

## DON'T MISS A SINGLE ISSUE

Let us know your new address right away. Attach an old mailing label in the space provided below and print your new address where indicated.

Check the appropriate boxes below:

☐ New subscription. Please allow 4 to 8 weeks for your first copy to be mailed.

☐ Renewal subscription. Please include a current address label to insure prompt and proper extension.

☐ 1 year—$28.00. This rate limited to the U.S. and its possessions.

☐ Payment enclosed. ☐ Bill me.

P.O. BOX 16927, N. HOLLYWOOD, CA 91615

DO YOU HAVE A QUESTION ABOUT YOUR SUBSCRIPTION?

Name _____

Street Address _____

City _____ State _____ Zip _____

ATTACH LABEL HERE

(IF LABEL IS NOT HANDY, PRINT OLD ADDRESS IN THIS SPACE.)




```
/*********************************************************
* chose_move ()
*
* Returns a boolean value based on whether the mouse
* button was pressed while over an area of the box
* other than the sizing button.  The input is the X
* and Y coordinates of the mouse, the X and Y
* coordinates of the box, and the width and height of
* the box.
*********************************************************/
chose_move ( mx, my, bx, by, bw, bh )
int mx, my, bx, by, bw, bh;
{
   if ( mx>bx && mx<bx+bw && my>by && my<by+bh )
      return ( TRUE );
   else
      return ( FALSE );
}


/*********************************************************
* setup_scrn ()
*
* Prepares the screen by clearing the workstation and
* drawing a border.
*********************************************************/
setup_scrn ()
{
   int pxy[10];

   graf_mouse ( M_OFF, 0L );

   /* Erase the screen. */
   v_clrwk ( handle );

   /* Draw the border. */
   pxy[0] = 20;
   pxy[1] = 20;
   pxy[2] = work_out[0] - 20;
   pxy[3] = 20;
   pxy[4] = work_out[0] - 20;
   pxy[5] = work_out[1] - 20;
   pxy[6] = 20;
   pxy[7] = work_out[1] - 20;
   pxy[8] = 20;
   pxy[9] = 20;
   v_pline ( handle, 5, pxy );

   graf_mouse ( M_ON, 0L );
}


/*********************************************************
* open_vwork ()
* Opens a virtual workstation.
*********************************************************/
open_vwork ()
{
   int i;

   /* Get graphics handle, initialize the GEM arrays and open  */
   /* a virtual workstation.                                   */

   handle = graf_handle ( &dum, &dum, &dum, &dum);
   for ( i=0; i<10; work_in[i++] = 1 );
   work_in[10] = 2;
   v_opnvwk ( work_in, &handle, work_out );
}
```

END


# ST-U.S.E.

## THE USED PROGRAM EXCHANGE FOR YOUR ST

Trade Your Old Programs for Exciting New Titles

Buy Quality ST Programs at a Fraction of the Original price.

Over 250 Titles currently in stock
New Arrivals Daily

**NOW SELLING NEW SOFTWARE**

Call or write today for a free price list and membership info.

**ST-USE**
**314 Main Street**
**Great Barrington, MA 01230**
**(413) 528-4728 9 a.m. - 5 p.m. Eastern Time**
**MasterCharge and VISA Accepted**

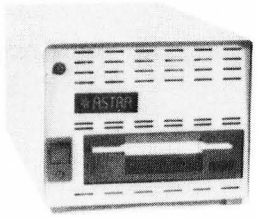
CIRCLE #111 ON READER SERVICE CARD.

# Astra News

2500-L So. Fairview, Santa Ana, CA. 92704 (714) 549-2141

## NOW THREE SERIES OF HARD DRIVES !

System HD+ Series | Home / Office Series | Studio Series



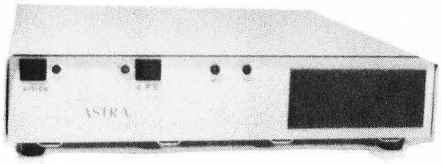

### THE "TANK"

The System HD+ has been recognized as extremely tough and reliable by hundreds of Atari ST users. It is built to exacting standards and scrupulously tested. Astra Systems is so confident of the quality of this unit we offer a limited one year warranty.

Originally offered as a 20 Megabyte hard drive with built-in 3 1/2" floppy, it now is also available in 30 and 40 Megabyte units with floppy.

Supplied with formatting, partitioning software, and backup program.

The floppy used in this unit is a precision drive with direct drive motor, and can be formatted with high density format programs.



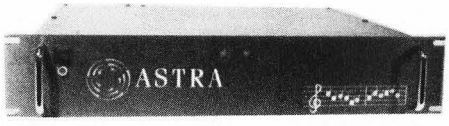
### THE EXPANDER

Internally expandable hard drives come either with or without precision 3 1/2" floppy drives.

Four AC outlets with full three line surge suppression are installed at the rear of the unit. One of these controls the CPU and the others are available for monitor, printer, etc. Two push button switches on the front control the CPU independently of other peripherals. EMI and RFI filtration is included.

Twenty, thirty, and forty megabyte units expandable to 120 megs.

All necessary hardware is already installed in original unit so addition of upgrade kits is fast and easy.




### RM 60/120

The RM 60 rack mount hard drive for the MIDI musician fits both permanent and portable racks.

Expandable from 60 to 120 Megabytes internally with the addition of the +60 kit. Or purchase it complete in the model RM 60/120.

Astra hard drives for the Atari MIDI musician have become the standard for the industry, and are being used by top professional groups worldwide. Our power supply is equipped for 120 and 240 volt operation by merely moving one wire. This makes performing in UK and Europe easier and safer.

**MAKE YOUR ATARI SING !**

**Astra BBS now on-line in PC Pursuit area ! (714) 546-5956**

## CALL FOR NEAREST DEALER

CIRCLE #112 ON READER SERVICE CARD.

# DATABASE DELPHI

by Andy Eddy

While the rest of this issue is devoted to good buys around the holiday, I'll take some time to look at one of the best buys in shareware. Reintroducing a familiar name, Darek Mihocka (found on DELPHI as DAREKM) has brought out an entirely new *ST Xformer.*

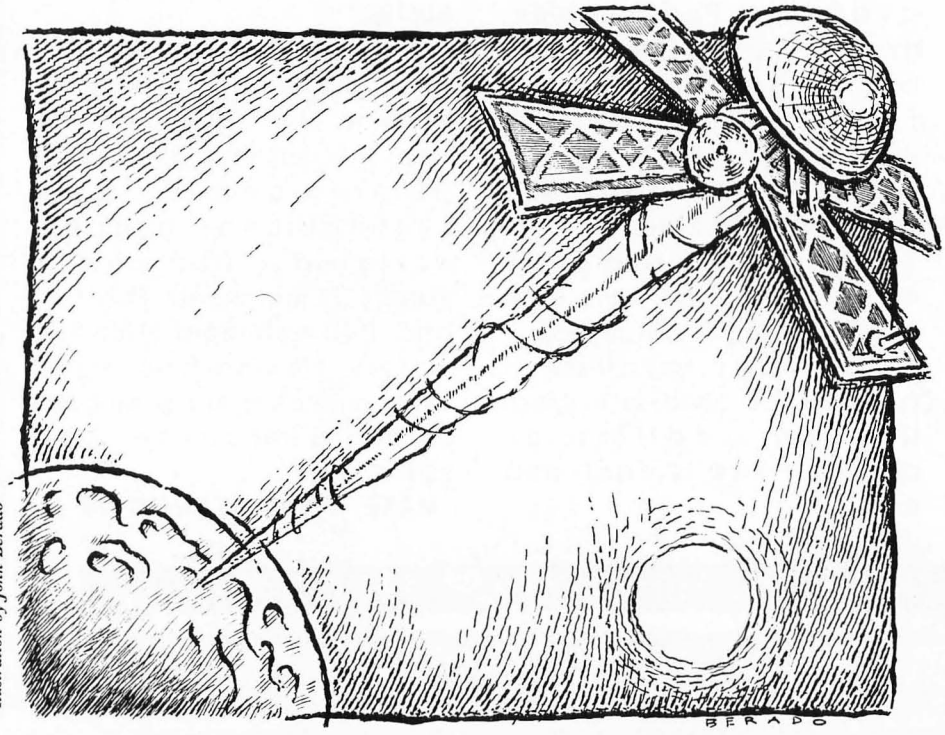



*Illustration by John Berado*

### More Than Meets the Eye

If you've been living in a cave for the last couple of years, you'll need some background. In 1986, Mihocka, an enterprising programmer from Canada, had the inkling to emulate the Atari 8-bit computers on the ST. Seeing that many of the ST owners cut their teeth on the 8-bit computers, this seemed like an enticing and unique proposition that would add to the number of computers that the ST could already mock, computers that include the IBM PC (via Avant Garde's *PC-ditto* program), the Macintosh (through Data Pacific's *Magic Sac* cartridge) and CP/M (with Atari's own software emulator).

To make a long story short, after a struggle, Atari allowed Darek to use their 8-bit operating-system code in the *Xformer*, provided he put the program into the public domain for others to see and possibly improve on. His initial effort appeared in the September 1987 issue of ST-Log.

That first program was bulky, requiring the user to keep track of multiple files (such as those containing the character set and operating system) to run the emulator. But, thankfully, Mihocka has used his time since then to slim down and consolidate all of the elements into one single program, one that is far easier to run. Further adding to the good news, he also has sped up the routines immensely, creating an emulator that is now closer to 50% the speed of an 8-bit machine and more compatible to boot. (Sorry for the pun, gang).

Mihocka is also selling advertising (remember, I said he was enterprising) for display from his constantly enhanced program. Strangely enough, this ensures that he will be bringing out new versions of the *Xformer*—he hopes for updates each month. For this reason, it's likely that the latest update will be found in the ST SIG databases. Any versions of *ST Xformer* can be easily found by typing "SEA XFORMER" (short for "SEARCH XFORMER") from the DBASES:App> prompt of the applications database. This will scan all the keywords for "XFORMER." You'll see something like this: [Figure 1]

This is certainly one of the more *interesting* shareware stories around, and the $20 that Mihocka is asking is only a pittance compared to the efforts that went into this epic. To make the future even more shocking, Mihocka claims to be getting closer to emulating the Apple II and Commodore 64 computers, also. Formally, he requires the go-ahead from the respective companies, which is looking unlikely at this writing. He has contacted both companies with no positive results. Keep your eyes on the databases for up-to-date information.

### Thanks For the Member-ies

If you want to discover more about the people whose company you share on DELPHI, you have a number of ways to get basics and background on them. Most likely, the first thing you'll want to do is find out the user's name with the Entry Log. When you first join DELPHI, you have the option of picking any name as your online persona. My original username was KIDX, which identified my own company, Kid X Enterprises. Others are similarly informative, such as REGENTWARE (Frank Cohen, Regent Software's president) and NEIL HARRIS (Neil Harris of Atari). Some will catch your eye for their humorous touch—MAX_*BEDROOM* gets my vote for the funniest ID, but FATONE was at one time a laugh producer.

To find out the person's real name (or at least, how they registered with the SIG when they joined), you can type "/ENT username," where "username" is the ID you are looking for. Typing "ENT ANALOG2" brings up my name and the time I was last on: [Figure 2]

The Entry Log also lets you expand your requests somewhat. Anything you type after the "/ENT" will be tested against *all* IDs in the SIG membership. For instance, typing "/ENT ANALOG" brings up all IDs beginning with ANALOG.

Lastly, the "/ENT" command is fairly global, meaning that you can type the command in at most any prompt to get the information you want. Keep in mind that the Entry Log is SIG-specific, so if you go to another SIG, the membership list will be different.

To take this member-information gathering further, you should take a trip to the Member Directory. This is where a SIG member can post an expanded profile. The profile can be as simple as providing a name and location, or it may include as much as a list of computers used, pet's names, occupations and more. It is up to the user to post what they want others to know, but the Member Directory offers a great way to get to know your fellow SIG attendees and let them know you.

If you haven't yet put a profile of yourself together, take the time to go to the Member Directory and compose one. From the Atari ST prompt, type "MEM" to get to there, then type "IAM" to access your description. If you haven't put one up yet, DELPHI will ask you for basic information. After that, you can select keywords that fit other aspects, by choosing preselected words or adding your own. As you can see, the Member Directory menu is very simple: [Figure 3]

This process makes it easier for all the faceless people on DELPHI to become a little closer and makes the whole system more neighborly. Take a few minutes to start or update your profile, so others will know you better.

### Can We Talk?

Lastly, the best way to get to know others and learn about current events in the Atari world is to join in on the weekly ST SIG real-time conference. Held every Tuesday, at 10 p.m. (EST), it lets users actually talk back and forth to each other. From the Atari ST prompt, type "CO" (for "CONFERENCE"), then "JOI WEEK" (to join the group called "Weekly Atari ST Meeting"). Hope to see you there.

Well, I'm off to get in some Christmas shopping. Till next month, C U online. . . . ■

**FIGURE NO. 1**

```
DBASES:App> sea xformer

Starting a new search.
XFORMER:  2 found.
DIRECTORY, READ, WIDEN, and NARROW will now operate on the
selected items.

DBASES:App> rea
Name: ST XFORMER II 6502 EMULATOR
Type: PROGRAM
Date: 30-JUN-1988 20:39 by DAREKM
Size: 166016 Count: 60

All new 6502 emulator. 100% faster and 100+% more compatible.
This ARC file includes the emulator, file transfer utilities,
Atari DOS 2.5, sample files, lots of documentation, and then
some! Requires 1 Meg of memory. Color monitor is suggested.

Keywords: HOME, XFORMER, EMULATOR, ATARI, 8BIT, COLOR

ACTION>
```

**FIGURE NO. 2**

```
FORUM> /ent analog2

Andy Eddy (ANALOG2) last on at 20-JUL-1988 23:14:26.
```

**FIGURE NO. 3**

```
Atari ST>What do you want to do? mem

MEMBER Directory Menu:

I-Am
Who-Is
List-Keywords
Browse
Search
Help
Exit
```

**ThetaTen** is an adventure simulation that features action, strategy and a three-dimensional playfield perspective. Originally a mining planet operated by the Intergalactic Federation, ThetaTen was abandoned centuries ago when its ore was depleted. Now a new rare compound has been discovered deep below the planet's surface.

There is one minor problem to be solved before mining on ThetaTen can resume. A droid colony of Saucerbots of unknown origin has taken over the abandoned mine shafts. The Federation is seeking volunteer pilots to man the Disrupter ships and smite the Saucerbots from the mine caverns. Of course, the mission will be extremely dangerous and most likely suicidal. But bounties of untold wealth await any who can survive, if only for a short time.

There are many different variables and options which will come into play during your mission. Following is a list of the major play factors on ThetaTen. Sometimes the information will be repeated so that you can get a good sense of how the variables interact with each other.

by David Bohlke

# THETATEN

## Disrupter ships

At the beginning of each mission, you will be given three Disrupter ships. For each $10,000 you earn, an additional ship will be awarded. The main portion of the video display is the front window of your ship. To the left, digital gauges will indicate the mine level you are at, the number of hits on Saucerbots you have achieved, the number of ships you have and your current earnings. To the right of your window screen are two variable meters which will register the amount of energy remaining in your ship and the amount of gold you have collected.

On the bottom left of your ship's display is a specially designed radar scanner, and the bottom right corner contains a mine map selector. A color-coded key to help you interpret the radar and map is on the bottom center line of the display. Your location on the map and radar will be shown in white, the Saucerbots' positions in yellow, the Saucerbots' home base in red, and the Energy Pod fix in green.

The ship's steering arrows are located on the bottom center panel of the display. To move forward in the caves, just position the mouse cursor over the arrow that is pointing upwards. For turning left or right, move the cursor over the left or right arrow. There are two keys labeled "W" and "M" to the left and right of the arrow panel. The keys are used for the Warp drive and a cave Map option and can be engaged by placing the cursor over them and pressing the right mouse key. You can pause or exit the program by pressing both mouse buttons at the same time.

## Mine size

Before play begins, an alert box will give you the option of selecting from three different mine dimensions. Each mine size is a different adventure with its own distinct strategies. A 12′ x 12′ mine is fairly crowded and hence will stimulate a lot of action. The 20′ x 20′ maze requires more move and location strategy to find the Energy Pod and home base. In the 28′ x 28′ shaft there will be plenty of room to explore, and it is almost always necessary to use the Map option to find the home base; and you will sometimes need the Warp option to get within striking distance.

Although play may seem abrupt in the various caves at times, a high score is achievable in all three with a little luck and a lot of cunning. Each new mine level is randomly generated when you destroy the Saucerbots' home base.

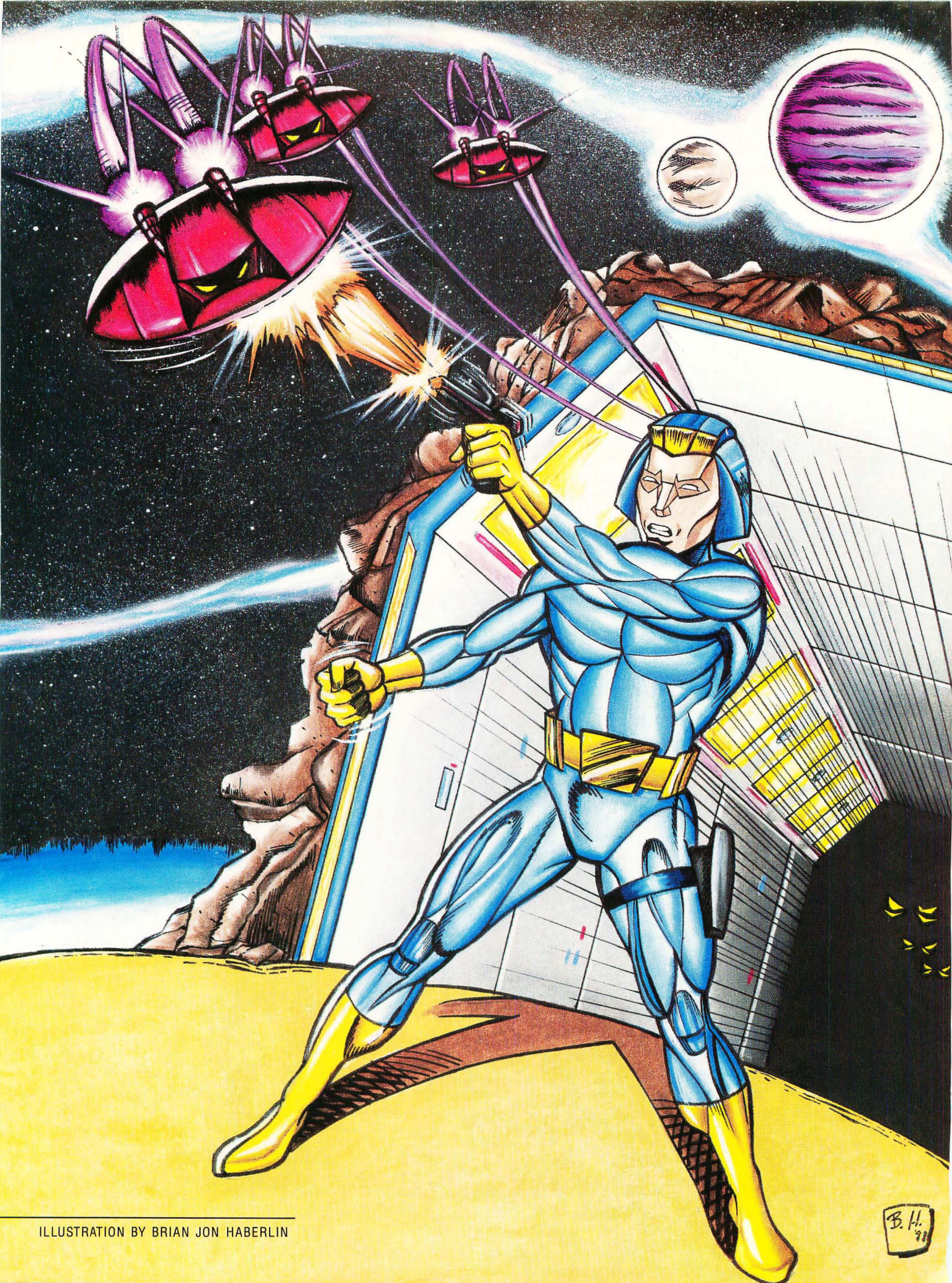


ILLUSTRATION BY BRIAN JON HABERLIN

## Disrupter

Each of your ships contains a wave disrupter beam with which you can destroy the Saucerbots and their home base. The disrupter uses 300 units of energy and can be fired by pressing the left mouse button. The beam is most effective at close distances; in fact, your chances of a hit decrease by about ten percent for each cave room between you and the Saucerbots. For each successful hit, you will be awarded 100 points times the cave level.

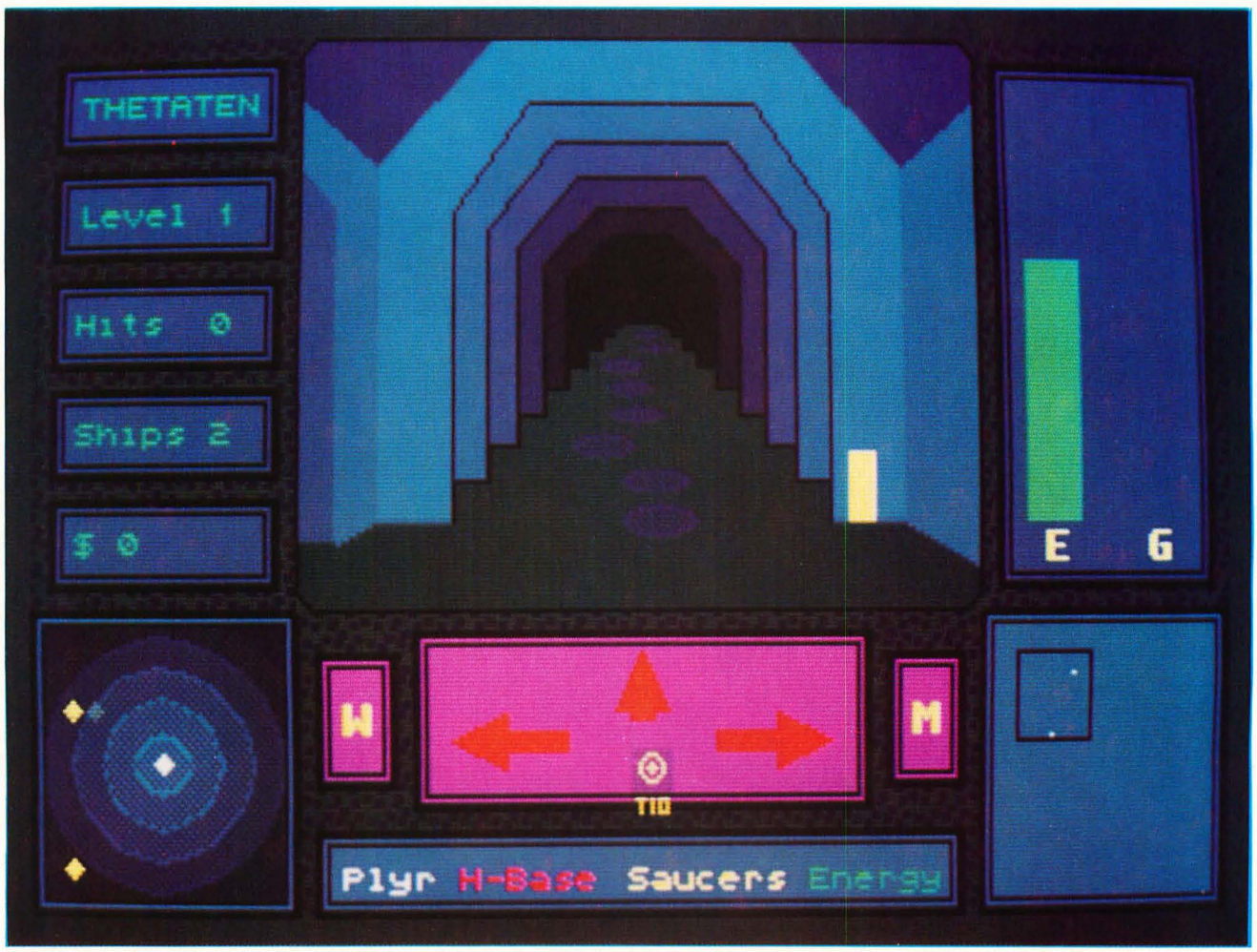
## Home base

The Saucerbots seem to operate around a central home base on each cave level. Their home base is a triangular-shaped power source that must be destroyed before you can advance down to the next cave level. Its destruction can by achieved by a hit from your disrupter, and this should be the primary focus of your operations.

## Saucerbots

It is believed the Saucerbots got their name from the fact that they are shaped like a flying saucer, and they patrol each cave level in a droid robotic pattern. The Saucerbots themselves cannot fire upon you, but instead will attempt to ram your Disrupter ship. This in itself will not destroy your ship, but it will drain excessive amounts of energy from your engines. When your energy level is depleted, your ship will be destroyed.

The Saucerbots have a cloaking device which will at times make them invisible on your window screen, but your radar and map will always have an accurate fix of their location. They always become invisible when they move from room to room within the mine, but occasionally reappear to use their sensor devices. Even though you may not be able to see the Saucerbots on your screen, your disrupter can still destroy them. So you will need to watch both your radar and window screen to locate them. The Saucerbots will viciously attempt to defend their home base, and their numbers will increase as you advance down to deeper mine levels.



## Energy

When play begins—and each time you lose a ship and use one of your remaining ships—you will have three thousand units of energy. The only way you can lose a ship is by depleting your energy, the level for which is indicated by the green energy bar on the top right of the display. This bar can display a maximum of three thousand energy units even though at times you may have more.

Extra energy units can be obtained by trading any gold bars you have accumulated. The trade is only possible when you are in a cave room that has the Energy Pods displayed. To execute the trade, just press the right mouse button. Each gold piece traded is worth one hundred energy units. The location of the Energy Pods is reflected on the Radar and on the Map option by a green bogey reflection. Once you trade your gold for energy, a new Energy pod will be placed randomly in the mine.

Energy is constantly being used to maintain your ship's functions; plus additional energy is needed to fire the Disrupter beam, to use the enhanced Map option, to engage the Warp move, and by your shields when you are hit by a Saucerbot.

## Gold

Gold bars are strewn throughout the various rooms of the mine caverns. You will collect some money for picking up the gold, but it is more important for you to accumulate the bars as they can later be traded for energy. When you enter a room that has a gold bar, press the right mouse button to pick it up. The amount of gold you have is displayed by a gold bar meter on the top right of the display. A maximum of 50 gold pieces can be shown on the meter, though you could possibly have more in your possession.

The number of gold pieces on each cave level is limited, so it is imperative that you locate and destroy the home base as soon as possible so you can advance to the next mine level. The only way you can obtain additional energy for your ship is by trading the gold in the mine room that has the energy pod.

## Radar

At times the Saucerbots can move with blinding speed. To keep track of any near your location you will have to keep a constant eye on the Radar. This instrument can sense the location of the Saucerbots, their home base and the energy pods within a five-room radius. The radar screen is always oriented in the direction you are facing and your location is the center of the screen.

Since the radar can determine positions through the mine walls, it is possible that an object may be just a couple of rooms away from your position; but you might have to transverse all the way around the mine shafts to reach it. Your main window screen can show objects up to ten rooms in front of you when you are facing a long mine corridor; so the Saucerbots and home base could be visible there first.

## Map

You have two different types of maps at your disposal, and both of them are always oriented with North to the top. The standard map that is always displayed shows only a rectangle the relative size of the mine with a small white dot on the inside to indicate your current position in the mine. When you lose a ship or use the Warp move, your last old location and your new mine location will be shown on the map.

If you become lost in the shafts or if you need an accurate fix on the home base and energy pods, you can right click the mouse when the cursor is over the *M* key to obtain an enhanced version of the map. This extra map will show the locations of all the mine shafts on your level and all the objects in the mine except for the gold. Using this advanced map will cost you 500 energy units, and you will need to study it quickly as it will be displayed for only about five seconds.

## Radon prints

In addition to your radar and maps, another aid in navigation is your ship's engines. Whenever you enter a mine room, the exhaust from your ship will leave a radon print on the cave floor. Your main window screen will show these prints, and you can utilize them to know if you are going in circles or when you are entering new rooms.

## Warp engines

At times you will become encircled by the Saucerbots and need a quick exit; or you may be in a larger mine and miles from the action and want a timely move. These are ideal occasions to engage your Warp engines by clicking the right mouse button when the cursor is on the *W* panel button. There is some danger, though, since the Warp drive has not been perfected; and your destination will be a random location. The use of the engines costs 300 energy units.

## Monies

Success in your mission will be reflected by the amount of money you earn. This sum is increased each time you pick up gold, hit a Saucerbot or destroy a home base. Each of these values increase as you progress deeper with successive mine levels. Also, when you destroy a home base, your earnings are increased by the amount of energy you have remaining. This can be a large sum, so if you have the patience and nerve you can collect gold and trade it for energy instead of hitting the home base early in each level.

There are many different scoring strategies on ThetaTen you can attempt. But instead of rambling over them, I think you'll enjoy the adventure more by discovering them yourself!

*David Bohlke teaches high school math and computer programming, and also coaches football and basketball. He lives with his wife and two children in the fifth home he has built. Since 1978 he's had about 70 articles and programs published.*

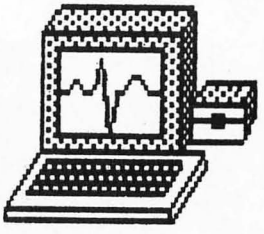


## Theta 10—Listing 1
## GFA Basic

```
If Xbios(4)<>0
  Alert 1,"ThetaTen ...|requires low resolution-|exit to desktop.",1,"OK",X
  End
Endif
@Initial
@Makeput
@Newgame
Mainplayloop: !.....................................
@Moverobot
@Radar
@Playermove
If Sc>=Bn
  @Bonus
Endif
If En<0
  B$="Ship LOST - Energy depleted"
  @Looselife
Endif
If Lv<1
  @Newgame
Endif
Goto Mainplayloop
Procedure Bonus !..................
  Bn=Bn+10000
  Deftext 6,0,0,6
  Text 100,120,"  BONUS  SHIP  "
  Lv=Lv+1
  @Prints
  For I=1 To 100
    Setcolor 0,Random(7),Random(7),Random(7)
    Wave 8,1,9,5000,2
  Next I
  Setcolor 0,2,2,2
Return
Procedure Newgame !.....................
  Ml=0
  Sc=0
  Ht=0
  Lv=3
  Gd=0
  En=3000
  Bn=10000
  A$="Click on Mine|size for next|Adventure..."
  Alert 2,A$,1,"12|20|28",Ms
  Nc=Ms*8+4
  Nr=Nc
  @Newlevel
  Defmouse Mous$
```

```
Return
Procedure Looselife !.......................
  Lv=Lv-1
  @Prints
  Do
    Px=Random(Nc)
    Py=Random(Nr)
    Exit If (M(Px,Py)=0 Or Int(M(Px,Py)/10)=2) And Abs(Px-Cx)>4 And Abs(Py-Cy)>4
  Loop
  S1$=""
  Sx(1)=0
  Defline 1,4,0,1
  For I=1 To 90
    Sound 1,4,8,4,0
    Wave 8,1,10,14444,0
    Deftext 6,0,0,4
    Text 80,128,B$
    Color Random(15)
    Line 160,65,71+Random(170),Random(120)
  Next I
  Wave 0,0
  Defline 1,1,0,0
  @Move
  If Lv>0
    En=3000
  Endif
Return
Procedure Playermove !.........................
  En=En-0.5*M1
  Z1=1
  Showm
  Pause 5
  Color 8
  Plot 260+Px,140+Py
  Mouse A,B,Z
  If Z=1 And Len(S1$)>10
    @Fire
Endif
If Z=2 And A>225 And A<245 And B>140 And B<170
  @Map
Endif
If Z=2 And A>75 And A<95 And B>140 And B<170
  Setcolor 0,7,7,0
  Deftext 6,0,0,6
  Text 100,120," WARP Move"
  Do
    Px=Random(Nr)
    Py=Random(Nc)
    Exit If M(Px,Py)=0 Or Int(M(Px,Py))=2
  Loop
  Pd=Random(4)
  S1$=""
  Sx(1)=0
  En=Int(En-300)
  @Move
  Setcolor 0,2,2,2
Endif
If Z=3
  Alert 2,"ThetaTen",2,"Exit|Cont",A
  If A=1
    End
  Endif
  Defmouse Mous$
Endif
If Z=2 And M(Px,Py)>8 And Int(M(Px,Py)/10)<>2 !pickup gold
  Gd=Gd+1
  M(Px,Py)=M(Px,Py)-10
  Defline 1,12
  Color 6
  If Gd<50
    Line 299,110,299,110-Gd*2
  Else
    Line 299,110,299,10
  Endif
  For I=1 To 10
    Sound 1,12,#I*10,1
  Next I
  Put 90,10,S1$
  Sc=Int(Sc+5*M1)
  @Prints
  Sound 1,0,0,0
Endif
If Z=2 And Px=Ex And Py=Ey ! get energy
  En=En+Gd*100
  Deftext 6,0,0,4
  A$=" Gold trade worth "+Str$(Gd*100)+" "
  Text 90,128,A$
  Wave 8,1,6,16666,100
  Gd=0
  @Prints
  Do
    Ex=Random(Nc)
    Ey=Random(Nr)
    Exit If M(Ex,Ey)=0 Or Int(M(Ex,Ey)/10)=2
```

(to page 74)

An incredible simulation

**Cardiac Arrest!**

with binder and manual, $69.
See discounted package price.

Cardiac Arrest! is a unique product. In this mathematically-based simulator, you interpret the history, on-screen EKG, lab data, and vital signs, then give treatment orders in plain English. While many computer users enjoy Cardiac Arrest! as a challenging medical adventure game, it's a sophisticated product used world-wide for ACLS (Advanced Cardiac Life Support) education. **IBM, Apple II+/c/e, Atari ST, Atari XL/E.**

***Antic: "impressive and amazingly complete"***
***ST World: "both highly educational and fun to play"***

We support our products. Updates will be available to users for $6 each when ACLS recommendations change. Our software is NOT copy-protected.

| | |
|---|---|
| Cardiac Arrest! | $69 |
| ACLS Protocols | $29 |
| EKG Teaching | $29 |
| CardioQuiz | $19 |
| Blood Gases | $24 |
| QuizPlus | $29 |
| Demo | $7 |

Ask about the four-disk ACLS Package (includes Cardiac Arrest!) for $109. Order direct!

**Mad Scientist Software**
2063 N. 820 W., Pleasant Grove, UT 84062
**Visa/MC orders call 801-785-3028**






CIRCLE #114 ON READER SERVICE CARD.

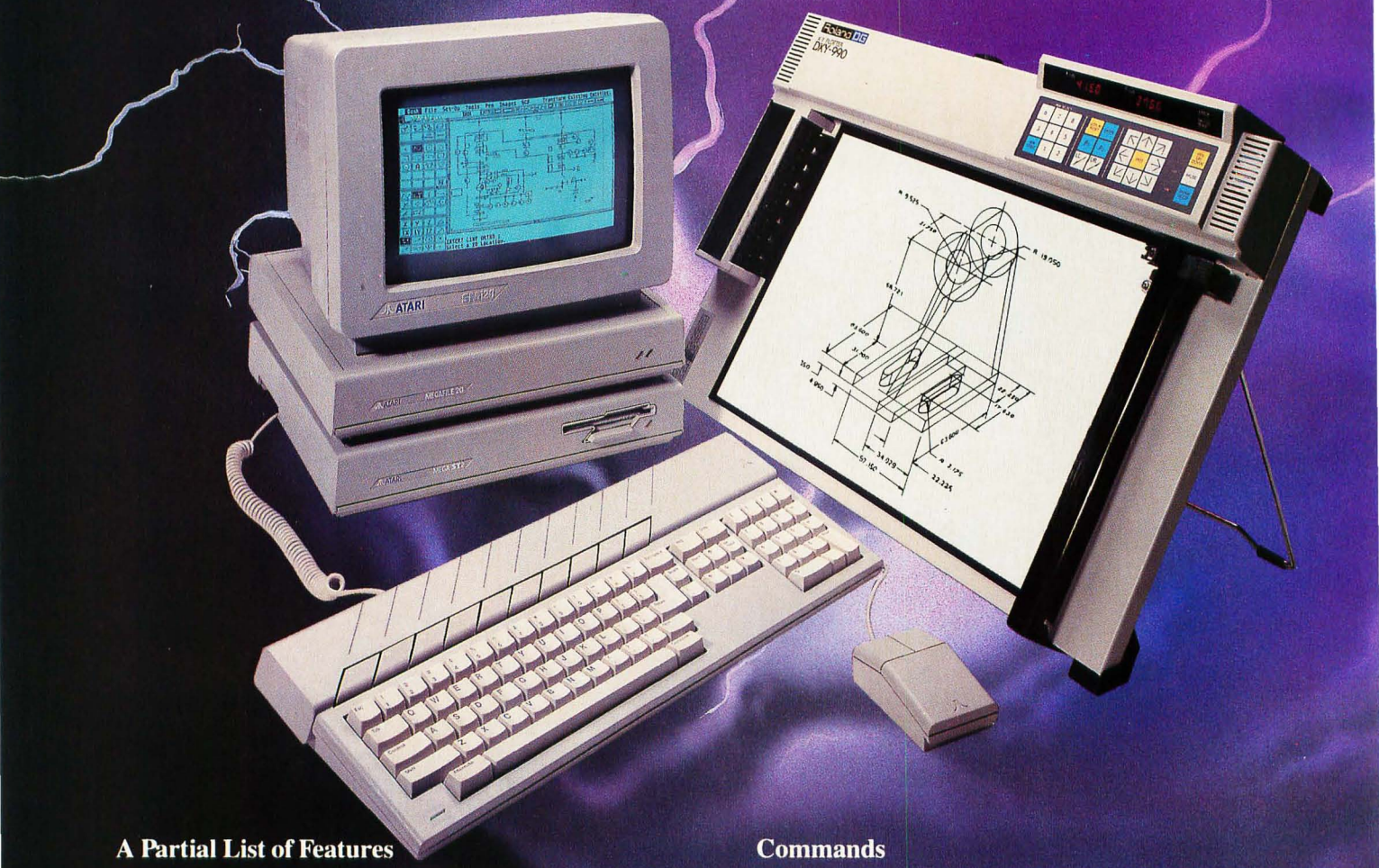
# NUMBER MAZE

BY SOL GUBER

Number Maze is a game that combines mathematical problems with maze-solving skills to make the rote learning of addition, subtraction, multiplication and division more fun. Number Maze's difficulty can be adjusted to make it an easy game for a young child, but it can be made difficult enough so that an adult can become lost in the maze.

R
THE GOAL OF THE GAME
IS TO FIND THE PATH FROM
THE HIGHLIGHTED NUMBER IN
THE TOP ROW TO THE
HIGHLIGHTED NUMBER IN
A BOTTOM ROW.
1
7
6
4
5
2
EDUCATION
LOW RESOLUTION
PHOTOGRAPHY: GARY BROD

# The Birth of




## A Partial List of Features

Fully interactive 2 dimensional & TRUE 3 dimensional capabilities
Multiple 3D views can be opened and modified at any time
A user can work in any combination of views with all views instantly updating at all times
Automatic generation of ANY orthographic view including user defined auxillary views
Entities can be selectively hidden in any view allowing easy generation of true orthographically sound views
Extremely user friendly
Full GEM interface, pull down menus, mouse or keyboard commands, dialog boxes and more.
256 Layers can be activated invidually or in groups
9 zoom modes allow magnification's of up to 1,000,000 times
The ability to overlay other programmes from within DynaCADD

## Dimensioning

Auto Dimensioning includes;
Mechanical and Architectural formats
Full 2D and 3D dimensioning is supported
Baseline, chaining, angular and linear dimensioning is supported
Automatic tolerancing in any of three different styles
Text orientation using any one of the three different systems (uni-directional, angled or aligned)

## Commands

Sophisticated command nesting allows the following partial list of commands to be accessed at any time:
Zoom in or out
Zoom a window
Scroll or "Pan" the page
Center the page on a point
Multiple 3 Dimensional dynamic rotations at any angular increment
Rotate any 3 Dimensional view to a predefined co-ordinate plane
Zoom a 3 Dimensional view in or out...

## Fonts

Full featured Vector Font Editor
Automatic proportional spacing can be activated or deactivated with the click of a mouse
Up to 16 extremely high resolution fonts can be active in any drawing with no need for repeated disk access

## Insertion

Insert POINTS, LINES, CIRCLES, ARCS, FILLETS, ELLIPSES, ELLEPTICAL ARCS, TEXT, BOX, POLYGON, POLYFIGURE and SUBFIGURES using a wide variety of modifiers

Atari and Mega ST are trademarks of Atari Corp. DynaCADD© is a trademark of Ditek International. Other computer and software names are trade names and/or trade marks of their respective manufacturers. All specifications are subject to change without notice.

# a New Breed

## Introducing DynaCADD™...a Professional CADD Solution at a Fraction of the Cost

DynaCADD is a 2D and *true* 3D Computer Aided Design and Drafting software solution that will turn your personal computer into a sophisticated and powerful CADD work-station. With electrical, mechanical, architectural or civil applications DynaCADD provides a total design and drafting solution. DynaCADD revises, designs and details drawings in 2D or true 3D, reads and writes the industry standard DXF file formats and provides compatibility with the new Desktop Publishing solution *Calamus*. DynaCADD proves itself invaluable from conception to output by offering an alternative solution to expensive, difficult to use 2D and 3D CADD systems. DynaCADD brings mainframe CADD capabilities to the CADD Professional at a fraction of the cost.

# DynaCADD™

Computer Aided Design and Drafting

## SPECIAL OFFER!!

For a limited time only
Save up to $150.00
off our introductory price of U.S. $695.00
Trade in your existing Atari ST CAD package and receive up to $150.00 in credit against the purchase of DynaCADD
Call us for details

### Information Commands

DynaCADD gives you the ability to:
Measure distances, angles and perimeters
Verify location and style
List database extents, drawing parameters...

### Entity Transformation

Translation between 2D or 3D positions, circular arrays, mirror, linear arrays, stretch, sweep, rescale, project, revolve, trim and divide
3 Dimensional entity transformation of any view into 2 Dimensional entities
Select entities for transformation & editing using; Digitize, Windows, Windows Out, View Windows or Last...
By entity color
By entity layer
By chaining with direction and much more

### Plotter Output

Both HPGL and DM/PL and compatible plotters are supported
Plots can be generated at a constant 1:1 ratio or a drawing can be automatically scaled to any degree
Plotting extents can be defined using:
The drawing page
The current extents
A definable plotting window
The database extents
Plotter and printer output can be directed through the serial port, parallel port or to a disk file (ie; i/o redirection)

### Printer Output

Laser Printers, draft and final mode
Epson and compatible printers are supported, both 8 and 24 pin
All drivers allow;
Quickplots, Final drafts utilizing the printers highest graphics mode, multi sheet prints, scaled and constant ratio prints

### Data Transfer

DynaCADD reads and writes both DXF Entity and DXF Drawing Files
DEF File Format is included to insure upward compatibility to all versions on all micro computers
DynaCADD allows compatibility with the new Desktop Publishing solution, Calamus

### System Requirements:

Atari 1040ST or Mega series, minimum 1 MByte of memory, 1 MByte disk drive and a Monochrome Monitor

### Commitment to the Future

A modular design structure provides the basis for continued upward growth of the DynaCADD solution. A strong commitment to research and development and a world wide support mechanism combined with a young experienced dynamic programming team, are your insurance that the DynaCADD package will remain on the leading edge of CADD technology. Upgrade modules currently under development include surface design and image design, both with the same easy to use graphic interface of the DynaCADD base module.

CIRCLE #113 ON READER SERVICE CARD.

To order and for more information please contact:

ISD Marketing, Inc. 2651 John Street, Unit #3, Markham, Ontario, Canada L3R 2W5
Tel: (416) 479-1880 Fax: (416) 479-1882

## Typing it in

Number Maze was written using TDI's Modula-2 programming language. You will require that software package to type the game from the supplied listings. If you don't have Modula-2, you may acquire the program by purchasing this month's disk version or by downloading it from the ST user's group on DELPHI.

Listing 1 is the Modula-2 source code for Number Maze. It should be typed in and compiled according to the instructions that came with your Modula-2 compiler. Listing 2 is an ST BASIC program that will create Number Maze's resource file. You must have the resource file in the same directory as the main program if the game is to run properly.

Load ST BASIC, type in Listing 2, and then save it to disk. Now use *ST-Check* found elsewhere in this issue to check your typing for errors. Once you have an error-free version of Listing 2, run it from ST BASIC and Number Maze's resource file, NUMBER.RSC, will be written to your disk.

## About Number Maze

The goal of the game is to find the path from the highlighted number in the top row to the highlighted number in a bottom row. The maze is made up of ten rows with ten columns of numbers. These numbers are calculated such that the solution to a particular problem will form a pathway through the maze.

To move around in the maze, you must solve problems using certain mathematical operations on specially selected numbers. In the lower right corner there are the numbers that will be used for the problems with plus and minus signs next to them, as well as multiplication and division signs. These numbers are used with the proper operation to find the path. From each number you can move to another number by performing the proper operation. You keep doing this until you finally reach the bottom highlighted number.

This may sound complicated but it is not. Let's say that the flashing number is 25 and the "plus" numbers are 3 and 7. Then if there is a 28 or 32 either up and down or left and right, you can point to it with the mouse and press the left button. You will hear a beep, and the chosen number will flash. The number and operation that is used to move to the next square may be picked randomly by the computer at the beginning of the game or you may wish to set the game's options yourself.

Since this is an educational game, it is set up to allow different levels of difficulty. There are two standard games. The first game uses only addition and subtraction for the operations, while the second uses multiplication and division operations as well. These games have a condition called "backwards." If you move to a number by adding two to it, then you can reverse back to that number by subtracting two from it. The same thing is true when you use multiplication and division. Being allowed to move backwards makes the solving of the maze easier, because if you make a mistake, you can move back and try again. In the standard games, the computer will randomly pick the numbers you have to use to move through the maze.

If you do not wish to play a standard game, you can choose how the game will be set up. All of the choices are made by using dialog boxes. The choices allow you to include multiplication and division operations. You can also choose the number to use in the operations, as well as whether to allow backwards movement or not.

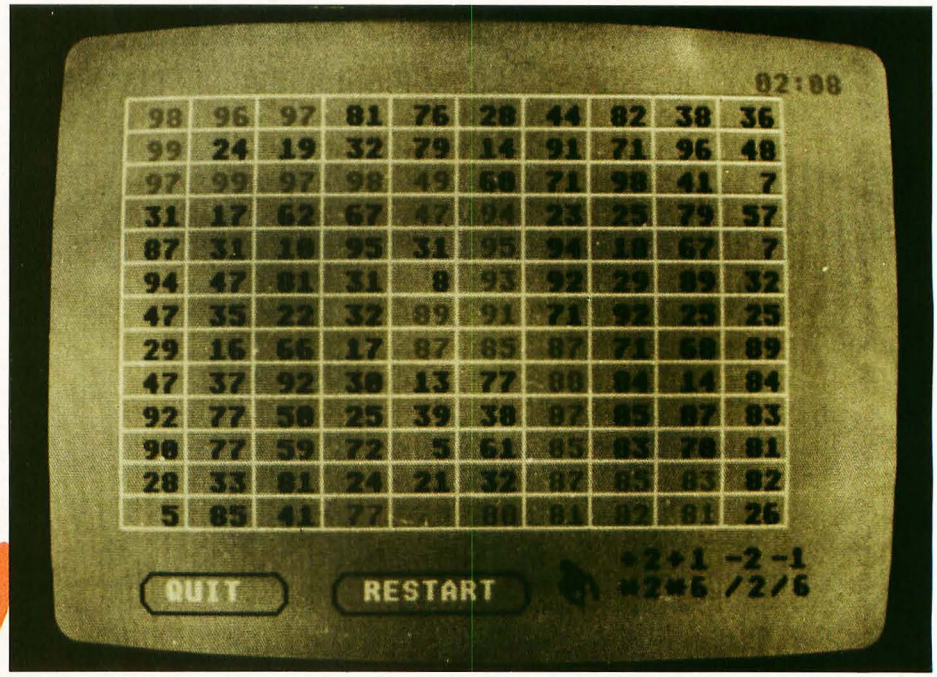
To move between lines of a dialog box, use the tab or the up and down arrow keys. When you have typed in your choices, click the OK button. Once all the game options are set, the game will begin.

When the game starts, there will be a flashing number on the screen. This number is the base and another number—either to the side, or above or below—is the proper move. Move the cursor to your choice and click the left mouse button. If your choice was correct, you'll hear a beep. If not, you'll hear a "burp," and you'll have to choose again.

There is no scoring in this game. In the upper-right corner there is a clock that shows you how long you have been playing. On the bottom of the screen there are two buttons that can be clicked. The RESTART button will restart the clock and give you the same maze again. The QUIT button will allow you to quit the game. After you click on the QUIT box, a dialog box will ask you if you wish to see the maze's solution. You can also choose to play another game. If you reach the end of the maze, the screen will sparkle for several seconds.

Number Maze teaches mathematics in a fun, risk-free environment. It is a non-competitive game for the whole family since its difficulty can be adjusted.

It combines maze-solving skills with fast arithmetic skills to act as a drill that is lots of fun. ■




*Sol Guber is a chemical engineer who fell in love with computing in school. He has been programming for more years than we can remember, and as a result, he is the proud father of a computer-literate daughter, Rebecca.*

## Number Maze
## Listing 1
## Modula-2

```
MODULE Numbermaze;

FROM AESApplications IMPORT ApplInitialise,ApplExit;
FROM AESGraphics IMPORT GrafHandle,GrafMouse,GrafMouseKeyboardState;
FROM VDIControls IMPORT ClearWorkstation,SetClipping,OpenVirtualWorkstation;
FROM RandomNumbers IMPORT Random;
FROM VDIOutputs IMPORT GraphicText,DrawRoundedBox,PolyLine;
FROM VDIAttribs IMPORT SetLineColour,SetGraphicTextColour,SetWritingMode;
FROM XBIOS IMPORT SetColour,GetResolution;
FROM Remaze IMPORT start,end,v,r1,w,h;
FROM BIOS IMPORT TimerCalibration;
FROM M2Conversions IMPORT ConvertInteger;
FROM GEMVDIbase IMPORT PxyArrayType,VDIWorkInType,VDIWorkOutType;
FROM NInit IMPORT fnumber,factor,Doit,DoAboutDialog;
FROM TextIO IMPORT WriteLn,Read,WriteString;
FROM GEMDOS IMPORT GetTime;
FROM Sounder IMPORT SoundOn,SoundOff,Sound;
FROM AESForms IMPORT FormAlert;

CONST width=10;
      height=14;
      wcell=28;hcell=12;

VAR End,Sol,Over,Quit : BOOLEAN;
   i,handle,Bx,By,oldspot,spot,k : INTEGER;
   numbers : ARRAY [0..600] OF INTEGER;
   oldsec,starttime,nowtime,min,sec: CARDINAL;
   a:ARRAY[0..4] OF CHAR;
   ch : CHAR;
   xy : PxyArrayType;
   k1: CARDINAL;
   c: ARRAY[0..5] OF CARDINAL;
   workin:VDIWorkInType;
   workout:VDIWorkOutType;

PROCEDURE Pauz(k : INTEGER);
VAR k1,j : INTEGER;
BEGIN
   FOR j := 0 TO k DO
       FOR k1 := 0 TO 200 DO END;
   END;
END Pauz;

PROCEDURE Beep;
BEGIN
   Sound(0,245,10,0,0); Pauz(400); Sound(0,0,0,0,0);
END Beep;

PROCEDURE Makemaze;
VAR i,j,k : INTEGER;
BEGIN
  ClearWorkstation(handle);
  SetClipping(handle,0,xy);DEC(end,width+1);
  FOR i:=0 TO height*(width+1) DO numbers[i]:=0;END;
  i:=start; j:=INTEGER(Random(98))+1;numbers[i]:=j;
  WHILE i<>end DO
    IF v[i]=2 THEN INC(i,width+1);
      ELSIF v[i]=4 THEN DEC(i,width+1);
      ELSIF v[i]=3 THEN INC(i);
      ELSIF v[i]=1 THEN DEC(i);
    END;
    j:=Getnumber(j);
    numbers[i]:=j;
  END;
  FOR i:=0 TO height*(width+1) DO
    IF numbers[i] = 0 THEN
      numbers[i]:=INTEGER(Random(98))+1;
    END;
  END;
END Makemaze;

PROCEDURE Getnumber(j: INTEGER):INTEGER;
VAR k,j1 : INTEGER;
BEGIN
  REPEAT j1:=0;
   k := INTEGER(Random(LONGCARD(fnumber+1)));
   IF k<4 THEN j1:=j+factor[k];
     ELSIF k<6 THEN j1:=j*factor[k];
     ELSE IF (j MOD factor[k])=0 THEN j1 := j DIV factor[k];END;
   END;
   UNTIL ((j1>0) AND (j1<100));
   RETURN(j1);
END Getnumber;

PROCEDURE Putit(spot,num : INTEGER);
```

```
VAR a : ARRAY [0..4] OF CHAR;
    i,j : INTEGER;
BEGIN
   i:=spot MOD (width+1);j:= spot DIV (width+1);
   IF i=0 THEN RETURN;END;
   ConvertInteger(num,3,a);
   GraphicText(handle,(wcell*i)-15,j*hcell+8,a)
END Putit;

PROCEDURE Makescreen;
VAR  i : INTEGER;
BEGIN
  i:=SetGraphicTextColour(handle,2);Makegrid;
  FOR i:= width+1 TO height*(width+1) DO
    Putit(i,numbers[i]);
  END;
END Makescreen;

PROCEDURE Makegrid;
VAR i,j : INTEGER;
BEGIN
   i := SetLineColour(handle,4);
   xy[0]:=11;xy[1]:=10;xy[2]:=291;xy[3]:=10;
   FOR i:=1 TO 14 DO
      PolyLine(handle,2,xy);
      INC(xy[1],hcell);INC(xy[3],hcell);
   END;
   xy[0]:=11;xy[1]:=10;xy[2]:=11;xy[3]:=165;
   FOR i:=1 TO 11 DO
      PolyLine(handle,2,xy);
      INC(xy[0],wcell);INC(xy[2],wcell);
   END;
END Makegrid;

PROCEDURE Recolor(spot: INTEGER);
VAR  i : INTEGER;
BEGIN
  GrafMouse(256,NIL);
  i:=SetGraphicTextColour(handle,5);
  Putit(spot,numbers[spot]);
  i:=SetGraphicTextColour(handle,2);
  GrafMouse(257,NIL);
END Recolor;

PROCEDURE Makeboxes;
VAR
    i : INTEGER;
BEGIN
  i := SetLineColour(handle,3);
  i := SetGraphicTextColour(handle,4);
  xy[0]:=20;xy[1]:=182;xy[2]:=80;xy[3]:=196;
  DrawRoundedBox(handle,xy);
  GraphicText(handle,30,191,"QUIT");
  xy[0]:=100;xy[2]:=180;
  DrawRoundedBox(handle,xy);
  GraphicText(handle,112,191,"RESTART");
END Makeboxes;

PROCEDURE Settimer;
BEGIN
  GrafMouse(256,NIL);
   GetTime(nowtime);
   sec:=nowtime MOD 100;
   IF sec<>oldsec THEN oldsec:=sec;
   i := SetGraphicTextColour(handle,0);
   GraphicText(handle,280,8,a);
      IF a[4]<>"8" THEN INC(a[4],2);
         ELSE a[4]:="0";
         IF a[3]<>"5" THEN INC(a[3]);
           ELSE a[3]:="0";
           IF a[1]<>"9" THEN INC(a[1]);
              ELSE a[1]:="0";INC(a[0]);
           END;
         END;
       END;
    i := SetGraphicTextColour(handle,5);
    GraphicText(handle,280,8,a);
    END;
  GrafMouse(257,NIL);
END Settimer;

PROCEDURE S1;
BEGIN
  GrafMouse(256,NIL);
  ClearWorkstation(handle);
```

```
  Makescreen;
  Recolor(start);Recolor(end);
  Makefactors;  Makeboxes;GrafMouse(257,NIL);
  GetTime(starttime);
  a:="00:00";  oldsec:=starttime MOD 100;
  GraphicText(handle,280,8,a);
  oldspot:=start;
END S1;

PROCEDURE Start;
BEGIN
  Doit;  r1;
  Makemaze;S1;
END Start;

PROCEDURE Makefactors;
VAR af: ARRAY [0..7],[0..1] OF CHAR;
    i : INTEGER;
BEGIN
  FOR i:=0 TO 7 DO
    ConvertInteger(factor[i],1,af[i]);
  END;
  GraphicText(handle,220,180,"+");  GraphicText(handle,230,180,af[0]);
  GraphicText(handle,240,180,"+");  GraphicText(handle,250,180,af[1]);
  GraphicText(handle,265,180,af[2]);
  GraphicText(handle,285,180,af[3]);
  IF fnumber>4 THEN
  GraphicText(handle,220,190,"*");  GraphicText(handle,230,190,af[4]);
  GraphicText(handle,240,190,"*");  GraphicText(handle,250,190,af[5]);
  GraphicText(handle,265,190,"/");  GraphicText(handle,275,190,af[6]);
  GraphicText(handle,285,190,"/");  GraphicText(handle,295,190,af[7]);
  END;
END Makefactors;

PROCEDURE Goodmove(): BOOLEAN;
VAR i: INTEGER;
BEGIN
   IF By> 180 THEN
      IF Bx>210 THEN RETURN (FALSE);
      ELSIF Bx>100 THEN Over:=TRUE;RETURN (TRUE);
      ELSE Quit:=TRUE;RETURN TRUE;
      END;
   END;
   spot:=((Bx+15) DIV wcell)+(width+1)*((By-11) DIV hcell)+width+1;
   IF (ABS(spot-oldspot)=1) OR (ABS(spot-oldspot)=width+1) THEN
     FOR i:=0 TO 3 DO
       IF (numbers[spot]-numbers[oldspot])=factor[i] THEN RETURN (TRUE);
       END;
     END;
     IF fnumber>4  THEN
       FOR i:=4 TO 5 DO
         IF ((numbers[spot] DIV factor[i])=numbers[oldspot])
         AND ((numbers[spot] MOD factor[i])=0)  THEN
         RETURN (TRUE);
         END;
       END;
       FOR i:=6 TO 7 DO
         IF (numbers[spot]*factor[i])=numbers[oldspot] THEN RETURN (TRUE);
         END;
       END;
     END;
   END;
   RETURN (FALSE);
END Goodmove;

PROCEDURE Solution;
VAR i : INTEGER;
BEGIN
  GrafMouse(256,NIL);
  ClearWorkstation(handle);
  SetClipping(handle,0,xy);
  Makescreen;Makegrid;Makefactors;
  Recolor(start);Recolor(end);
  i:=start;
  WHILE i<>end DO
    IF v[i]=2 THEN INC(i,width+1);
      ELSIF v[i]=4 THEN DEC(i,width+1);
      ELSIF v[i]=3 THEN INC(i);
      ELSIF v[i]=1 THEN DEC(i);
    END;
    Recolor(i);Flicker(i);Flicker(i);Beep;
  END;
  GrafMouse(257,NIL);
END Solution;
```

*(to page 70)*

■ **by Bob Retelle**

The Wizard has charged you with the quest to recover his Firestaff and restore order and balance to the world. You've carefully chosen your party of four mortal champions, armed them and trained them. Now it's time to enter the dungeon and face whatever may lie in wait for you on the path to your destiny!

Last month we gave a brief overview of *Dungeon Master*, some tips on choosing a party of champions and hints on feeding them and training them in the skills they'll need to survive in the dungeon. We also presented some basic puzzle-solving hints. This month, we'll go over using magic, as well as some of the techniques you'll need to use in dealing with the hordes of nasty creatures that are just waiting for a tasty meal of champions for breakfast.

We might as well start with the number one rule for encounters with monsters: *Stay away from their mouths!* Whether the monster attacks with a sword, with razor sharp teeth or bloodcurdling shrieks, the rule is the same. Except for a few monsters who can attack from a distance with fireballs and magic, they can't hurt you if they can't hit you! Even the most chivalrous of champions should not be above whacking the Dragon from behind, especially when the alternative is being roasted alive by his bad breath.

Of course, your success in following this rule depends a great deal on how fast the monsters are and how much room you have to maneuver when you encounter them. Some creatures just seem to sit there and let you hack at them, while others are so fast that it will require good reflexes to get in a shot or two of your own. Even the slowest monsters will hit you though, so this brings us to the corollary to the number one rule: *Don't just stand still and hack away!* If you just go "toe to toe" with a creature, no matter how slow it is, you'll take a lot of unnecessary damage to your players. While it may not kill them, this damage must be repaired at the expense of time and magic. The time needed to heal an injured champion will also use up some of your finite food supply, so try to avoid getting anyone needlessly hurt.

There are two ways of dealing with monsters that are especially successful. The first is what's become known as the "Dungeon Master Two-Step." This will only work in an area that's at least two by two spaces, not in a narrow corridor. Essentially what you do is move sideways and turn quickly to face the creature from its side. You hack away until it turns around to face you again, and then you repeat the maneuver.

Most of the monsters in the dungeon can be handled this way, from the Purple Worms to the Dragon. It requires a little practice to get the rhythm right, and you should use the keyboard cursor arrow keys to do the moving. The keyboard is faster than trying to click on the movement arrows on the screen with the mouse, and it also allows you to get your weapon ready with the mouse while you're turning to face the monster with the keys. Most importantly, this method keeps you out of the danger area in front of the monster's mouth.

The other fighting method is what might be called the "Strategic Retreat." This is especially effective with the slower monsters, like the "Rockpiles" or "Rock Squids," as some call them, and has the advantage of working in narrow corridors. Before trying this, be sure that you have a fairly long, clear corridor behind you. You definitely don't want to back up into another monster or a dead end! Facing the creature from one move away, ready your weapon with the mouse. Then using the cursor keys on the keyboard, quickly move forward, hit the monster, and then move back away before the monster can hit you.

Eventually the monster will move forward toward you, so you'll need to retreat a step from it. Repeat the attack, moving up, hitting, and moving back, backing down the corridor until the creature is killed. You may end up backtracking a bit using this method, but again, it keeps you away from the monster's mouth for the most part, while still letting you attack. You'll probably still take some hits from the creature, but they'll be far fewer than if you just stood there hacking away at each other.

With any fighting method, and with most of the monsters you'll encounter, you should try to make the most of the opportunities you'll have to hit the monsters at a distance. In other words, throw whatever you might have handy at them! The more throwing or shooting experience your champions get, the more they'll advance in ninja levels, which determines their skills with these "range weapons." This is why it's very important to have everyone in the party, but especially the two in the back, throw whatever they can, whenever they can for practice.

While it might seem to slow things down, it's good to set one of the champions in back to be leader and have them throw old Scrolls, burnt out torches, items of clothing or anything else that's handy, out in front of the party as they move down the

# ANCIENT

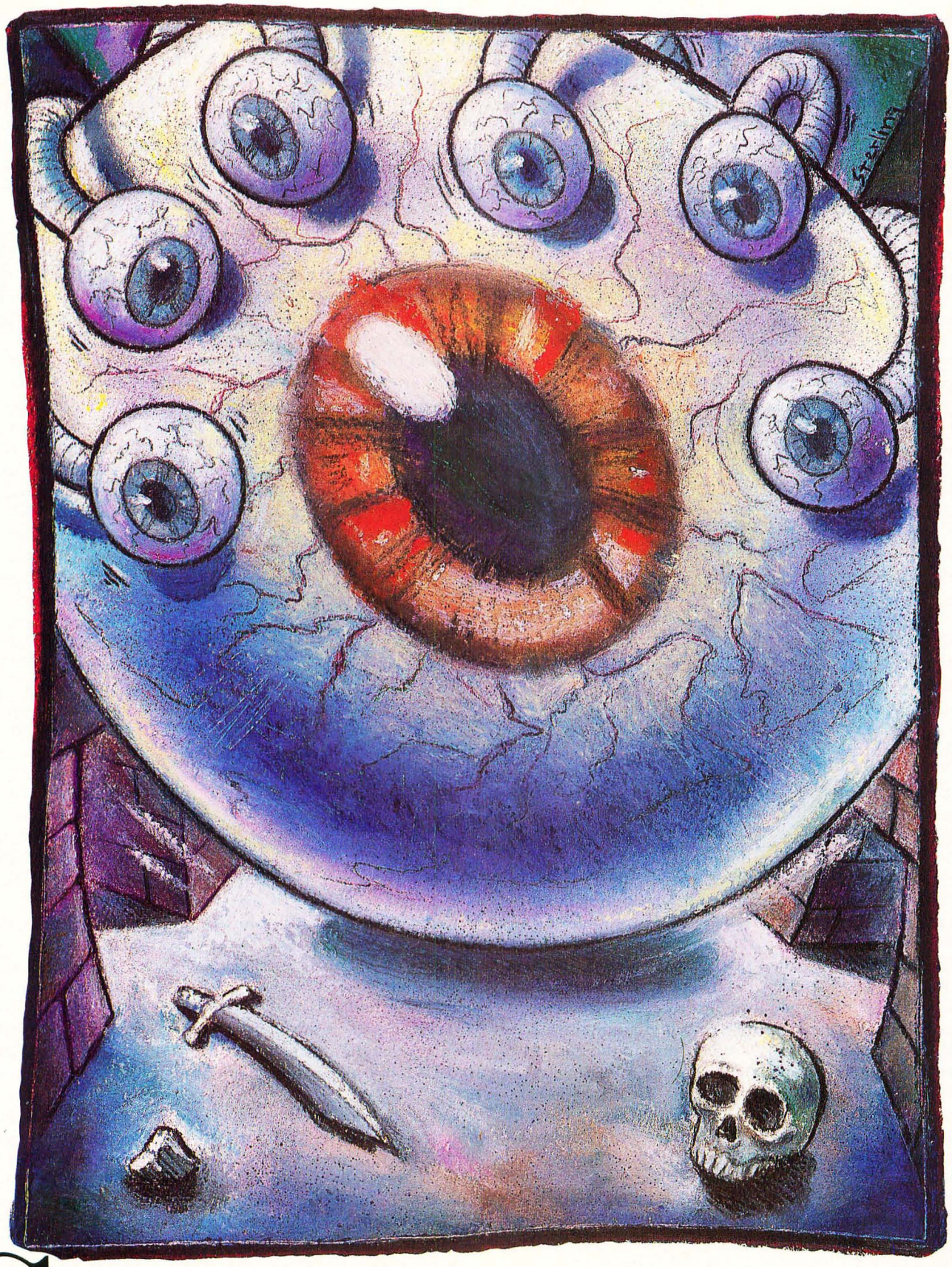


*Illustration by Steve Sterling.*

# CORRIDORS

**Part 2 · A Guide to Dungeon Master**

corridors. Their ninja levels will advance fairly quickly, which will help greatly during encounters with monsters. As the one doing the throwing tires, and as their stamina begins to drop, you can trade off the throwing duties with another character by making them the leader.

In the beginning of the game, while your magic users' skills are still fairly undeveloped, you can have the front two champions ready their swords or axes, while the rear two have throwing stars or daggers ready to throw. Even arrows can be thrown and will inflict damage on the monsters. Every bit of damage you can cause before the monster gets into range to hit you means just that much less chance of your party being injured. You can throw boots and shields, and even screamer slices at the creatures. In fact, it's rather satisfying to kill a Screamer by throwing screamer slices at it!

Once a battle is over, be sure to go around and collect your thrown weapons. Sometimes you may throw a weapon at a creature, and it will stick in it, so that when the creature is finally killed, that weapon will fall to the floor there. Don't overlook a grey throwing star on the grey floor!

That brings up another hint: Listen carefully when a monster is killed. You may hear the telltale clink of an object hitting the floor. Some creatures may be carrying things that you might find useful, like coins or keys. Don't overlook the slightest detail!

Ironically, killing the Rock Monsters will provide you with small rocks that you can use as weapons, either throwing them by hand, or as ammunition for the sling that you will find. The correct way to use a weapon like a sling or a bow, which requires a separate supply of ammunition, is to hold the weapon in the Champion's "action" hand, and hold a rock or an arrow in the other hand. The rest of your ammunition should be put in the "quiver" on that character's inventory screen, and the weapon will be reloaded automatically as it is fired. There shouldn't be any other items in the quiver because they may interfere with the automatic reloading.

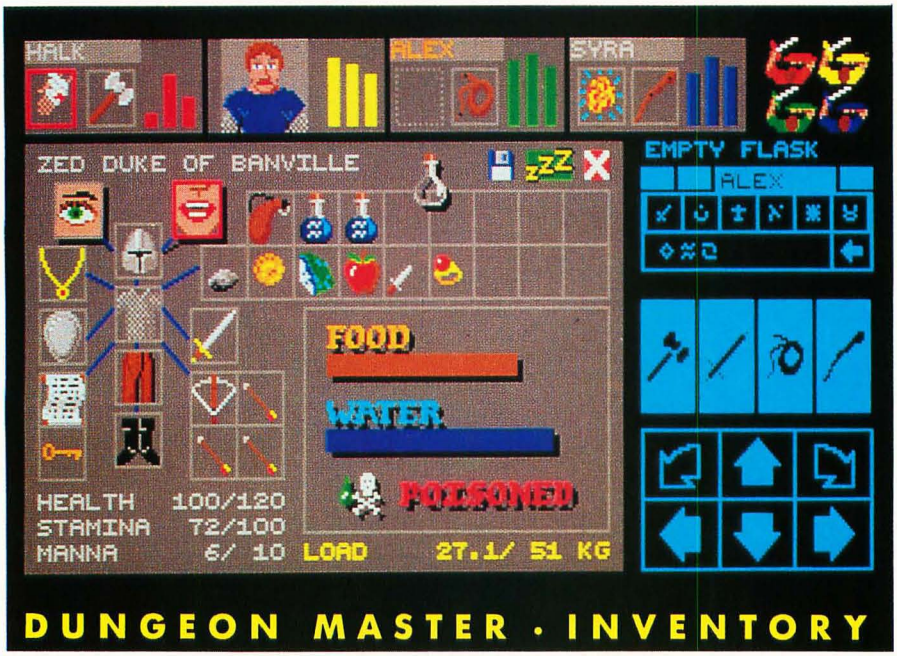
This brings up two important facts. The first is that a champion can only fire five shots before you have to manually reload the quiver, and secondly, that character can't hold anything else, like a torch, in his hands while he is using this kind of weapon.

Sometimes during a fight, especially if you are doing a lot of maneuvering around a monster, you may find a weapon that you had thrown before. Don't hesitate to grab it and throw it again. Every little bit helps, or in this case, hurts!

There will come a time when your magic users' skills have advanced to the point where their fireball and lightning spells are more effective than throwing stones at the monsters, so don't be afraid to discard a weapon when its usefulness seems to be diminishing. Throwing rocks or daggers at Mummies or Screamers on the first few levels can be quite effective, but will hardly be noticed by the Giant Rats or Scorpions several levels down. As you progress, you'll find weapons that are much more effective than the ones you are carrying. Replace the throwing stars and sling with crossbows and speedbows as you encounter them.

Try to keep your character's loads as light as possible by carrying only the most effective weapons. With only a few exceptions, the weapons in Dungeon Master don't wear out or get broken, so you don't have to worry about carrying spares.

When you find an item in the dungeon, take the time to examine it carefully. Some things may have offensive or defensive properties which may not be immediately obvious. By holding an object in a character's action hand, you'll be able to see from the Action menu whether that object has any of these properties. A blank space in the position that normally shows the player's weapon means the item is useless as a weapon. A loaf of bread, for example, wouldn't do you much good in a fight, but something which does have useful properties will show up as an icon in the Action menu. By clicking on this icon, you'll be able to see what powers the item has.



DUNGEON MASTER · INVENTORY

If you do find special weapons or magical items, be careful not to waste them, as these kinds of things usually have a limited number of uses, and they may come in handy later on when the monsters begin to get *really* nasty!

You should be aware that every time you swing a weapon, or cast a spell, it will take a certain amount of time for your characters to recover from the effort. As they improve their skills with weapons, more options will become available to them; for example, they can swing, chop or melee with some weapons. Swinging a sword is not as effective as chopping, while the almost uncontrolled attack of a melee is even more effective against a monster. However, it takes a lot longer to recover from a melee attack, during which time that character can't do anything at all. You'll find that it may be better to simply chop at the monsters repeatedly.

Watch the number that shows how many points of damage your attack is doing to the monster, and use that to help you decide whether or not to use the highest level attack. Also be aware that the effect of an attack is determined not only by the type of weapon, but by the strength and dexterity of your character. This is another reason to keep practicing for ninja levels, as they help increase your dexterity.

Another thing to watch is the time it takes to recover from casting a magical spell. If one of your party casts a fireball spell for example, he'll have to rest for a while before he can take up a weapon and join in the fight. For that reason, it may be best to have only the back two champions casting magical spells,

while the front two have their weapons at the ready. There's nothing worse than having your people getting hit by monsters while they're powerless to do anything to defend themselves.

One thing in the dungeon which may not look like a weapon, but which can be immensely useful is the typical, ordinary door. Not only are the doors useful to hide behind while your characters regain their health and magical mana, but they can also be closed on a monster's head (or whatever), causing them damage. Most of the monsters are fast enough, and smart enough, to move out from under the doors after being hit once or twice, but the added damage may be enough to make a difference in killing them. Most of them will also come back for more, so you can stand next to an open door and keep closing it on the monster while you hit it with your weapons and magic. This works extremely well against the slow moving Rockpile Monsters, which can't move out from under the door very quickly. Unfortunately, killing a creature with a door doesn't advance any of your character's skills, but on the other hand, it just might keep them alive.

Be careful when you're using a door as a weapon if you're also hacking away with an axe or a sword. If the door closes just as you're swinging the weapon in your hand, you may shatter the door, and suddenly come face to face with the monster behind it!

Some monsters may not be stopped by a door and cannot be hit with your normal weapons. These "Non-material Beings" need to be handled either with magic or with special weapons. You'll find a scroll which gives a spell to weaken them, which may be enough to kill them by itself. Also, the "dispell" function of some wands and staffs can be used against them effectively.

Probably the most effective weapon though, is the Vorpal blade. This unusual-looking sword can be found on the Riddle room level. There are two of these weapons, but one of them is hidden extremely well. It is in a hidden corridor which is opened with a wall switch, but the switch itself is hidden by something that is so ordinary looking that by this time you've probably stopped investigating them. The Vorpal blade is not very effective when used against a normal monster, but don't make the mistake of discarding it. You'll need at least one of them later on.

Because of its magical properties, using the Vorpal blade will give you wizard level experience too. In some areas, further down in the dungeon, you may find it helpful to hold normal weapons in your front two champions' action hands and keep the Vorpal blades in their other hands so that you can make a fast change of weapons without having to go to each character's inventory screen. The game speeds up when it doesn't have to display the animated graphics of the normal view, and the monsters can hit you several times while you're choosing a different weapon. You can also have the champions in the back row hold weapons for the other characters in their ready hands.

When fighting particularly nasty monsters deep in the dungeon, another tactic is to keep healing potions in the character's free hands. That way you can quickly grab one on the main screen, hit the function key which corresponds to the player who's in trouble, and have them gulp the potion down, while still in a fight. Again, going to the inventory screen will give the monsters a chance to get in a few extra hits, so be careful how you use this technique. It's good to try to quickly retreat a few steps before you switch screens to give you a little extra time.

One important thing to remember is that you don't have to kill *every* monster in the dungeon to win the game. There are a few creatures which have items that you can use, but in most cases it won't matter if you duck down a flight of stairs without standing and fighting every last monster on a level. In fact, there are places in the dungeon where the best course of action is to simply lighten your load and run past the monsters until you get to a more defensible position and can rest and heal your party.

Of course, not all fighting is done with material weapons. A low-level, beginning wizard may not be able to do much with his magical powers other than keeping the corridors well-lit, but with practice will come the power to do more spectacular things. Throwing fire and lightning at monsters is a *lot* more effective than throwing daggers and arrows. Your fighters' strength and agility with weapons will serve you well in the beginning of the game, but it's your characters' wizardly abilities which will get you through most of the end of the game. This is why perhaps the most important training for your champions is in these magical abilities.

Each of the champions has a certain maximum amount of magical mana power. This maximum can be increased through the practicing of magic spells. Every time you cast a spell, whether or not it is successful, you are given credit for trying. When you achieve the next wizard or priest level, your mana maximum goes up. If you don't keep your characters busy casting spells though, even when it doesn't appear to be necessary, they won't advance to the levels where they can do some *real* damage to the monsters when it's needed.

If you notice that a character's mana has reached its maximum, have them cast a light spell, even if it's light already. Not only will this extend the amount of time that the dungeon stays lit, but it will give them a small amount of experience toward their next wizard level. It will reduce their total mana too, allowing them to accumulate more. There's nothing quite so wasteful of magic as not using it! A wizard or priest who walks around

*(to page 92)*

# CHRISTMAS

## ST HOLIDAY GIFT GUIDE

by
Arthur
Leyenberger

It's that time of the year again. Time for sugar-plum fairies, chestnuts roasting on an open fire, dreaming of a white Christmas, sleigh bells ding-ding-dingaling-ing, and, of course, holiday wish-lists. It's also the time of year when ST-Log puts together a mega-page, star-studded, no-holds-barred holiday gift-giving guide. If you have read the last few episodes you know that each year there are more and more products for the Atari ST computer and its owner. This year is no different as there is a plethora of new products for the ST, as well as plenty of solid performers from previous years.

Of course, not every ST-related product ever made can be mentioned, and space prohibits even mentioning all of the good products I use or know about. My apologies in advance if I leave out your favorite one. However, this list of products represents the best of the best of products that will enhance your ST computing.

To save you the hassle of visiting every computer store in town and then having to actually tell someone what you would like for a gift (how tacky), here is a compilation of goodies for the Atari user. Some of the products I will mention by name, having actually tested each one of them. Other items will be mentioned in general with perhaps a couple of suggested brand names. A list of the manufacturers and their addresses can be found at the end of the article.

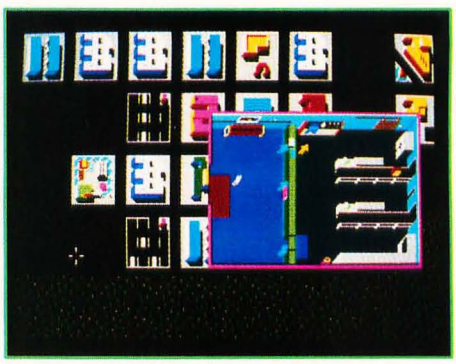
**CLOCKWISE FROM ABOVE:**

Bubble Ghost • From Accolade . . . . . $35

Flight Simulator II • By SubLOGIC . . . . . $50

Sundog: Frozen Legacy • From FTL Systems . . . . $40

Time Bandit • From Michtron . . . . . $40



## Games

It may sound surprising but some of the best games are also educational as well. One of the best games that falls into this category is *Flight Simulator II* by SubLOGIC. This is the most complete flight simulation program for the ST and sells for $50. FS II is an excellent simulation of flying a single-engine plane. The flight manuals that accompany the game are the most extensive I have seen for a home computer. Not only will you learn how to fly with this program but you will also have fun doing it. SubLOGIC also has about a dozen scenery disks for the program that provide regional airports, landmarks and other information that makes flying the ST more fun.

There are a few games for the ST that, although they have been around for awhile, still represent some of the best ones available. One of the best games for the Atari ST computer and one that really takes advantage of the stunning graphics capability of the machine is *The Pawn* from Firebird. This $45 game is a graphic text adventure that is immensely playable due to its plot, humor and visual impact.

Another excellent game is *Time Bandit* from Michtron. It costs $40 and is super. It is an arcade, text adventure and shoot-'em-up game all rolled into one. It remains one of the best ST games to date.

*Sundog: Frozen Legacy* from FTL Systems is still another great ST game. As a science-fiction adventure game with fantastic color graphic screens, this $40 program would please any ST user. If you are an adventure game fan, you'll love Sundog because of its very complete world and interesting story line. Any three of these games—Pawn, Time Bandit and Sundog—would make excellent gifts.

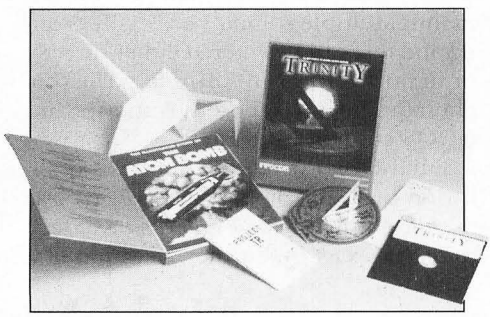
One of my alltime favorites is Mindscape's *Balance of Power.* This game allows computer users to make superpower decisions as they play the role of either the President of the United States or General Secretary of the Soviet Union. The player's two-fold goal is to complete eight years in office without initiating a nuclear conflict and to accumulate more prestige points than the opposing superpower. In order to win world prestige, diplomatic tools such as military aid, covert destabilization, treaties, military advisors and troops are available to influence friendly and unfriendly nations.

Written by onetime Atari game designer Chris Crawford, Balance of Power has received critical acclaim from the press and thousands of Macintosh and IBM PC users. You will recall that Crawford's earlier work for the 8-bit Atari computer, *Eastern Front*, was also a tour de force in its time. Balance of Power retails for $50.

Infocom ranks as the undisputed leader in text adventure games. Their entire catalog is available for the ST, in many categories such as science fiction, fantasy and adventure. Each title is labeled with one of the following grades: introductory, standard, advanced and expert. The grades are based on the difficulty level of the game, although all titles require some degree of puzzle solving and are written in the spirit of fun.

My long-time favorite Infocom text adventure has been *Planetfall* because it contains a combination of adventure, science fiction and humor. *Stationfall* is a sequel that is equally as challenging and fun. A good choice for the novice text adventurer is *Seastalker.* It offers a good challenge and like all Infocom games, is a quality product.

Although it's difficult to select only a few favorites from among all of the excellent Infocom titles, another title I like is *Trinity.* As a cross between *The Twilight Zone* and *Alice in Wonderland*, this adventure leads you into an alternate universe where magic and physics coexist and every atomic explosion that has ever occurred is inexplicably connected. The chilling climax of the story takes place in the New Mexican desert on July 16, 1945, where you'll arrive minutes before the most fateful experiment of all time: the world's first atomic explosion, codenamed Trinity.




Every ST owner should have at least one Infocom game in their software library. List prices of these text adventures range from $40 to $60 each, and there are literally dozens to choose from.

There are several more recent games that also get high marks. One of the most popular games for the ST is *Dungeon Master* by FTL Software. It is a graphics adventure that combines superior action, a sense of mystery, even apprehension as you battle your opponents in the quest to retrieve the Firestaff and defeat Lord Chaos.

Space doesn't permit a thorough detailing of the game and storyline, but take it from me and thousands of satisfied adventurers; this is one of the top games currently available for the ST. By the way, if adventure gaming is not your bag, give this game a look anyway. You may be surprised at how such a well-implemented example of the genre might pique your interest. Dungeon Master retails for $40 and would make a fine gift.

Epyx has a neat game which is sure to capture your interest. It is called *Tower Toppler* and sells for $40. In Tower Toppler, eight dark and deadly towers have risen from the ocean depths on the planet Nebulus. Players must destroy them by setting off destruction mechanisms at the top of each tower. Unfortunately for the player, these towers are well guarded by deadly rolling boulders, flying phantoms, flashing blockades and other obstacles. Players can fire snowball guns to freeze or destroy enemies or ride special elevators to detour the long and hazardous climb, and extra points can be gained by catching fish between the towers. The graphics and 3-D effects in this game are excellent.

A new Accolade title is *Bubble Ghost* ($35), a clever and imaginative game in which you direct a bubble-blowing ghost through 36 hazardous chambers. The going gets tense as the fragile bubble comes dangerously close to walls, burning candles, knives, pins and an assortment of other obstacles. Fans located throughout the chambers generate turbulence and monsters occasionally try to sabotage your ghostly efforts.

*Lords of Conquest* by Electronic Arts has taken computer users by storm. It is available on a variety of machines and the ST version sells for $20. Lords of Conquest can be compared to the board game, *Risk.* It is a classic strategy game in which the action takes place on a world map. Up to four players can play at once, and each opponent chooses home territories, then tries to protect his holdings while conquering territories belonging to other players.

## Application software

Word processing is the most frequently used application program on any computer. It's no different with the ST, and there are several excellent word-processing programs to choose from. No

one would disagree that the most sophisticated word processor for the ST is *WordPerfect* by WordPerfect Corp. This $400 program provides all of the normal functions one would expect, such as block move, search/replace, headers/footers, column printing (two kinds), spelling checks, a thesaurus and, golly, the list is almost endless.

In addition to the normal functions, a power writer would be in word heaven using WordPerfect. Such advanced features as automatic backups, paragraph numbering, outlining, automatic hyphenation, multiple undo levels, multiple on-screen windows (up to four) footnoting/endnoting, indexing and table of contents generation are available. If the price scares you, WordPerfect can typically be bought for about $225, and if you are a student (and can prove it) a special price of $100 exists.

The only down side to WordPerfect is the amount of time required to fully use its power. Plan to spend a good deal of time with the 600 pages of documentation and the excellent tutorial sections. All in all, if you need the power, WordPerfect is the best word processor currently available for the ST.

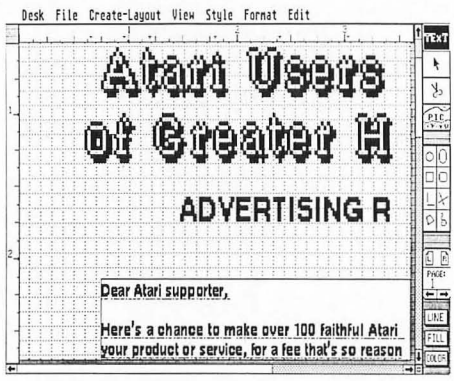
If your word-processing needs are a little more modest, a couple of other programs are more than adequate. *Word Writer* by Timeworks is another good word processor. It too is a GEM-based program that offers multiple windows, headers, footers and on-screen display of text styles. Word Writer also offers a thesaurus and spelling checker. The spelling checker provides multiple personal dictionaries and can check an entire document or individual words as you type.

Word Writer sells for $80 and is easy to learn, thanks to the drop-down menus with equivalent key commands. In addition to being a stand-alone word processor, Word Writer interfaces with other Timeworks products such as *Data Manager*, their database program, and *Swiftcalc*, their spreadsheet program. Text files from *1st Word* can be imported and printer drivers are provided for a variety of printers.

The third word processor of choice is *Regent Word 2* by Regent Software. This word processor is a fairly simple GEM-based program which allows only one document window to be open at a time. The program automatically reformats text as you type, offers a spelling checker and has a built-in word counter.

Regent Word 2 also supports double-column printing (it was the first to do so). It also has a multiple margin command that lets you easily create indents and outdents. Regent Word 2 sells for $80.

Desktop publishing is a natural application for the ST, given its 68000 processor and plenty of memory. By combining word processing, page layout and drawing into one program, you can easily design, compose and paste up the contents of a printed page for forms, newsletters, charts, etc. You normally see exactly what you will get on the screen before it is printed. One of the two examples of this type of program is *Publishing Partner* from SoftLogik Corp.




**PUBLISHING PARTNER • FROM** SoftLogic . . . . . $80

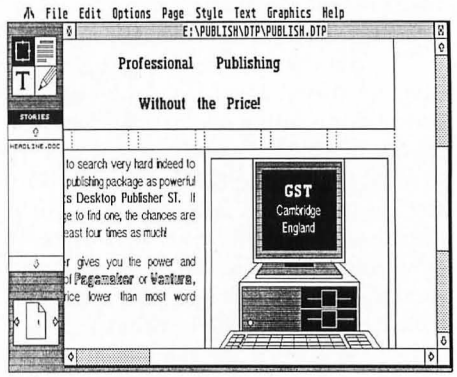
With Publishing Partner, you can create up to a 99-page document on a 1040ST and about 27 pages on a 520ST. Type fonts can be as small as 6 points or as large as 144 points in half-point increments. Multiple columns are easily created and text can be entered either directly or imported from an ASCII file. The program can output to Epson, Postscript and GDOS supported printers.

Publishing Partner is a full GEM application that lets you load any *NEOChrome* or *DEGAS* picture and enlarge or reduce them for exact fit. Further, a section of a picture can be copied and then pasted anywhere in your document. Several drawing tools such as circles, boxes, lines, etc. can be used from within the program. Different line types and line widths can be specified and any of 48 different fill patterns can be used. Publishing Partner sells for $80.

*Publishing Partner Professional* ($200), also from SoftLogik, can be thought of as a next generation ST desktop publishing program. The program supports variable zoom ratios, so that you can focus your work on any part of the page. Fonts can be scaled using a measure of either picas or inches, there is a built-in spelling checker and text can be rotated in one-degree increments. The program can load files from *Easy Draw*, *DEGAS Elite* or any other image-file format.

The other popular desktop publishing program is *Desktop Publisher ST* by Timeworks. It is a full-featured desktop publishing program for the ST computer which includes fully integrated word processing, page layout, typesetting and graphics functions all in one package. The program is easy to use and quite powerful. Some of the major features of the program include a full GEM interface with pull-down menus, icons, scroll bars and dialog boxes, flexible page layout to let you overlap, reposition and resize your text, columns and graphics, built-in fonts that range in sizes from 7 to 72 points and high-quality output to a dot matrix or laser printer.

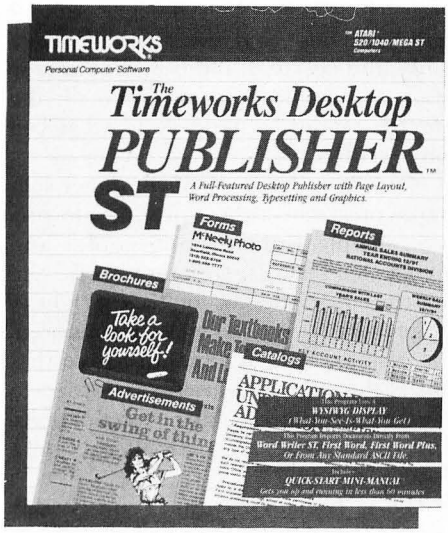
Text can be imported from *1st Word Plus*, *Word Writer ST* or any ASCII file so the program can work with existing word processors. Graphic files can be imported from DEGAS, NEOChrome and Easy Draw file formats. Further, you can view, edit and layout pages in actual, double or half-size windows. Publisher ST sells for $130. It may not be the most powerful program of its type, but is clearly the easiest to use.




**DESKTOP PUBLISHER ST • BY** Timeworks . . . . $130

Timeworks also has a complete line of desktop-publishing accessory packages

that work with Publisher ST. These packages include three graphics and illustration packs, two font packages and one package with design and layout ideas for all types of business, school and personal




documents. Each accessory package sells for $40 and is supported by the Timeworks full-time customer technical support team to registered users.

One of the most popular database programs for the ST is *Regent Base II*, a GEM-based product from Regent Software. Its predecessor, *Regent Base*, was popular no doubt due to the program's dual identity: it was both an easy-to-use, mouse-driven database program and a feature-laden relational database program/language.

However, Regent Base II is designed for the power user. It competes head on, and quite well, with PC database programs such as *dBASE III* and as such, offers the ST user a database-programming language with power and flexibility. With that degree of power comes a certain amount of work necessary to operate the program. A user must design and use a form, then do some programming in order to create a database, as there is no menu-driven way to access records. Regent Base II sells for $150.

*dBMAN* from Versasoft Corp. ($250) is definitely in the major leagues of database management software. At one time a version was marketed by Atari but the confusion has ended and the latest version comes from Versasoft itself. One of the main virtues of dBMAN is its compatibility with dBASE III and *dBASE III Plus*, both topflight PC database programs. As with the MS-DOS products, dBMAN is not for the casual user. But if you need a high-powered database program, look no further.

Spreadsheets are another category of application software for the ST. And there are a couple of spreadsheet programs which should be on anybody's holiday list. *E-Z Calc* from Computer Palace is a good and easy-to-use spreadsheet program that lists for $70. It is GEM-based and requires less memory than other similar programs so there is more room for your formulas and data.

Some of its features include: a 300-column by 999-row worksheet matrix, a built-in 10-key calculator, on-line help windows, a built-in sort routine, the ability to have up to 10 function-key macros, a split-screen capability, a notepad and graphing. The graphing is especially nice because it can be performed immediately from the worksheet just by selecting a drop-down menu command.

Another spreadsheet, *Swiftcalc* by Timeworks, can be used by itself or interfaced with the their *Data Manager ST* and *Word Writer ST* programs. Swiftcalc features a maximum worksheet size of 8200 rows and 256 columns, the ability to print the spreadsheet normally or sideways, a selection of graphic formats such as pie charts, vertical bar charts, scatter diagrams and line diagrams, built-in mathematical as well as financial functions and full support of the GEM interface. In addition, on-line help and sample spreadsheets are provided. Swiftcalc has excellent documentation and sells for $80.

## Graphics

*DEGAS Elite* is one of the best values in ST graphics software. The program allows you to paint in any of the three ST graphics modes and save your files to disk. In fact, the file format used by DEGAS Elite has become one of the ST standards that is used by other programs.

DEGAS Elite (see page 57) contains a multitude of features. These include: the use of eight multiple work screens, the ability to cut and paste all or parts of these screens to each other or to disk, the ability to create and use clip art, block operations such as stretch, rotate, horizontal or vertical skewing and distortion. Of course, the neat features involve color animation. Complete control of the direction, speed, colors and other aspects of the animation is at the user's command. DEGAS Elite retails for $80 and is distributed by Electronic Arts.

If you use any of the ST graphics programs such as DEGAS or NEOchrome, you may be interested in an animation program that makes your artwork come to life. Called *Make It Move*, this $50 program from Michtron is really more of an easy-to-use slide sequencing and manipulation program than an animation program. Nonetheless, it is great for such tasks as creating video titles, making presentations and putting a polish on your collection of ST graphic images.

The program is mouse driven and doesn't require any special programming skills. Features include screen wipes in any of four directions, fades, and quick cuts, each with user specified durations. Further, objects may be zoomed, panned, hidden and moved.

*Printmaster Plus* from Unison World is another graphics program that allows you to be creative. With it, you can easily create calendars, fliers, stationery, banners, invitations, signs and greeting cards with many types of printers. The program is easy to use because it is menu-based, and it allows you to preview your design before you print it and permits you to save your graphic to disk. In addition, it will work with add-on font and graphic disks. Printmaster Plus lists for $40.

Still another excellent graphics program is *Art and Film Director* by Epyx. This $80 package includes *Art Director*, a full-featured paint program that uses all of the power of the Atari ST to create dazzling works of art. Menus and icons appear on-screen which allow you to choose from a variety of shapes, lines and colors from the palette and perform such actions as stretch, bend, bulge, spin and rescale, which can be used to enhance the pictures.

*Film Director* then uses true cel animation to transform artwork into stunning graphical presentations. It's easy to automate many of the repetitious steps required by traditional types of animation. The program also includes a library of music and sound effects to create just the right ambience.

SUNDOG · FROZEN LEGACY · DUNGEON MASTER · TEMPUS

## Utility programs

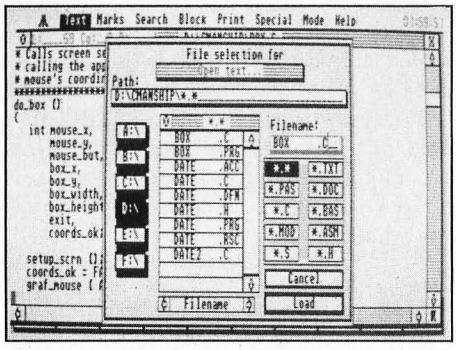
There are hundreds of products made for the Atari ST computer. But some of them are the kind that will be used over and over. They have value and staying power. One category of software that is always useful is utility programs. Here are some suggestions for these types of products.

Eidersoft is a British company that has recently begun to market ST programs in the United States. Their products are top-notch, and two that are particularly useful are *Flash-Bak* and *Flash-Cache.* These two programs are packaged together and provide hard-disk backup and disk-caching functions. Based upon my own experience, Flash-Bak is the fastest hard-disk backup program for the ST. The program is GEM-based, can use two floppy drives alternately for backup and allows the user complete control over all aspects of operation such as verification, encryption, data compression, etc. Further, Flash-Bak can selectively backup files by all, several or single partitions, files used that session, date stamp and wild card match.

Flash-Cache is the RAM cache utility that holds a part of the most recently accessed part of the hard disk in RAM. This has the practical effect of speeding up disk intensive operations such as program loading/saving, program compilation and data manipulation. Caches can be any size to suit your system. Flash-Cache performs one very important extra function which is to allow the "folder heap" (the area of memory where folder information is stored) to be enlarged, thereby avoiding the infamous Atari TOS "40-folder syndrome." Flash-Bak and Flash-Cache together retail for $80 and are well worth the price if you have a hard-disk drive.

*Tempus* is another fine product from Eidersoft. It is a GEM-based text editor for programmers rather than a true word processor. It offers just about every feature you would expect in a top-of-the-line, quality product plus a few more. The most outstanding feature of this product is its speed—which happens to be blindingly fast. Compared to a word processor like *1st Word,* Tempus is from four to ten times faster in loading files, scrolling the document from top to bottom and searching and replacing on a single character. Compared to another text editor such as *MicroEMACS,* Tempus is from one and a half to five times faster for the same operations.

Other features of Tempus include medium- and high-resolution support, mouse or keyboard operation, up to four files on screen at once, auto indentation for structured programming, online help




**TEMPUS • FROM** Eidersoft . . . . . $50

menus, 20 programmable function keys and much more. A particularly useful feature for programmers is the editor's ability to automatically create a string cross reference list, with line and column references. Once the search string is specified, the table is created and subsequent clicks on the right mouse button instantly move the cursor to the next string match in the document. Tempus retails for $50 and is by far the best text editor currently available for the ST.

If you use an ST computer to write, you need a good spelling checker program. The best stand-alone spelling checker currently available for the Atari ST is *Thunder!* Originally from Batteries Included and now distributed by Electronic Arts, Thunder! is a serious desktop accessory that really is three programs in one: a real-time, 50,000-word spelling checker, a word expander and corrector and a writing analysis tool.

For $40 you get two versions of the spelling checker: one to be used as a desktop accessory, available anytime from within a true GEM program; and another that is a stand-alone program that can be used with any file. It can be used to check files created by non-GEM programs, as well as checking an entire file that was created by a GEM program.

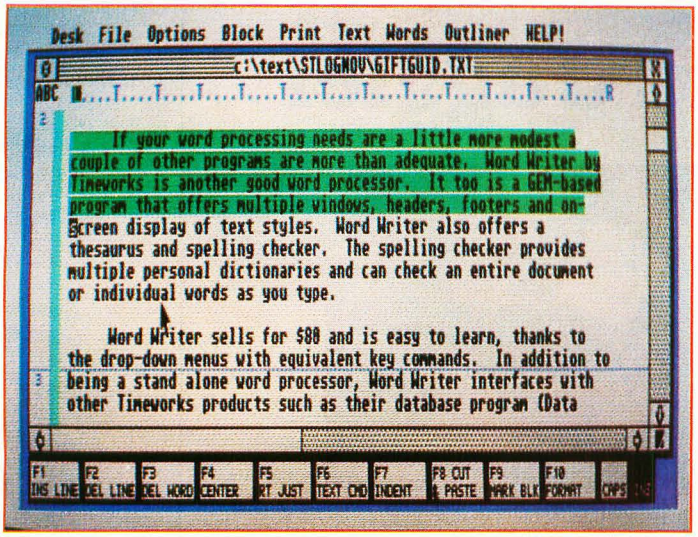
The word expansion feature allows you to define ahead of time how specific strings of letters or characters should be expanded. For example, if you type your name a lot, you can use the expansion feature to define your initials to mean your entire name. Then whenever you type your initials, your entire name is typed. The writing analysis tools consist of statistics such as character, syllable, word and sentence count and two types of readability indices that indicate how many years of schooling are required for the average reader to understand what you have written.

Many manufacturers of computer software copy-protect their products to prevent people from making copies and giving them away or reselling them. Under the copyright law, you have a right to make copies to use in the event your original disk no longer functions. Note that this is the *only* right to copy afforded to you under the law. Making copies of disks, for any purpose, is strictly illegal and a Federal offense.

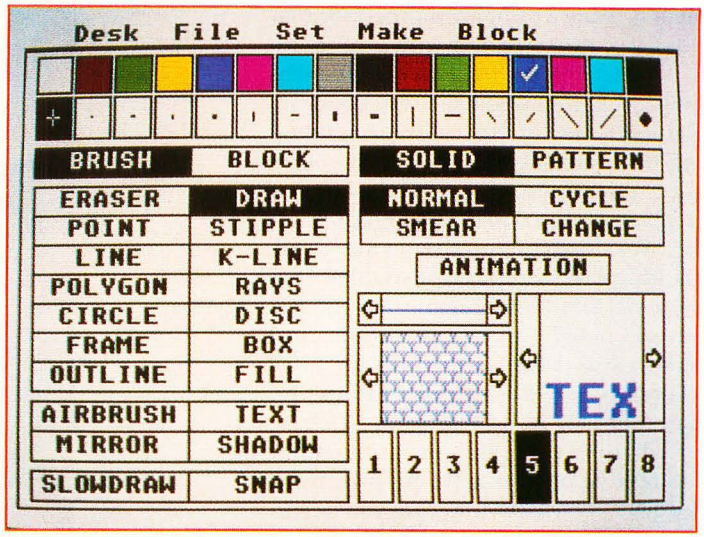
The ST backup program I consistently use is Central Point Software's *Copy II ST.* The program is designed for making *archival* copies only for your *own* personal use and can work with one or two disk drives, either single or double sided. In addition, Copy II ST provides a fast sector copier and a bit copier utility for making "carbon copies" of disks. It is easy to use, completely mouse driven and sells for $40.

Michtron has two utility programs that are worth considering to either give or receive. One of their titles is a utility called *Cornerman*—a multiple desk accessory. It gives you 10 separate functions under one accessory name, including a complete ASCII reference table, with decimal, hexadecimal, character and mnemonic information for all 256 ASCII codes, a 16-digit calculator containing binary, octal, decimal and hex modes, three summing memories, printing tape display, a notepad with full editing, word wrap and automatic date and time stamp, a phone dialer with auto-dial capability, a phone log which automatically transfers information from the dialer, a fifteen puzzle game, two clocks, one digital and one analog, a complete setup module for customizing dialer, RS-232, clock, calculator and window position parameters, a print utility, and a DOS window for use with Michtron's DOS Shell. All this for a list

BALANCE OF POWER • DEGAS ELITE • REGENT WORD 2 •




**WORDWRITER • BY** Timeworks .....$80




**DEGAS ELITE • DISTRIBUTED BY** Electronic Arts .....$80

price of $50.

The other Michtron program is called *ALT*. This is a $30 program that allows you to redefine your keyboard and convert whole strings of tedious typing into single keystrokes. Actually, the key combinations Alt-A through Alt-Z and Alt-0 through Alt-9 can be replaced by often used text phrases, program commands or any other string up to 60 characters.

If you have been waiting for the quintessential desktop accessory cartridge for the ST, *DeskCart!* from Quantum Microsystems Inc. (QMI) may end your search. Desk-Cart! contains a battery backed up real-time clock and a plethora of desktop accessories on one cartridge, all of which consumes a meager 75K of precious RAM.

The 14 accessory programs include a calendar good to the year 2040, an ap-


Magnetic Images™

CLIP ART !
For ATARI ST™
*Over 100 high resolution*
DEGAS *images on most disks.*

NEW!
Disk# 7
Antiques
Sea Life
Gambling
Nautical
Knights

NEW!
Disk # 8
All Christmas
Graphics !

$19.95 per disk

Disk 1 : Computer, Office, Music, School, Travel, Trans.
Disk 2 : Business, Sports, Animals, Party, Religious
Disk 3 : Food, Borders, Medicine, Old West, Newsletter
Disk 4 : Hands, Seasons, Pirates, Tools, Personal, America
Disk 5 : Theater, Corners, Zoo, Menu, Outdoor
Disk 6 : Adman's Special: Computer Products

Magnetic Images Co.
P.O. Box 17422, Phoenix, AZ 85011 (602) 265-7849
(Add $2.50 P & H per order)

CIRCLE #117 ON READER SERVICE CARD.

ProCopy ST BACKUP UTILITY

You can't backup your software because copy protection locks you out. **ProCopy** is the key!

- Protects against the accidental loss of expensive software
- Works with all Atari STs
- Copies both S/S & D/S disks
- Use with 1 or 2 disk drives
- Not copy protected
- **FREE** shipping and handling
- **TOLL-FREE** telephone number
- Updates available to registered owners
- Orders shipped same day
- Disk analyze function included

Dealer Inquiries Welcome

VISA MasterCard and C.O.D. orders

Call (800) 843-1223

$34.95

Send check for $34.95 (overseas add $2.00 for air mail) to:

PROCO PRODUCTS
P.O. BOX 665, CHEPACHET, RHODE ISLAND 02814 USA
(401) 568-8459

Available in Europe

THE MOVING FINGER CO.
Building 2
Shamrock Quay
Southampton, SO1-1QL
England
Tel. 0703-229041

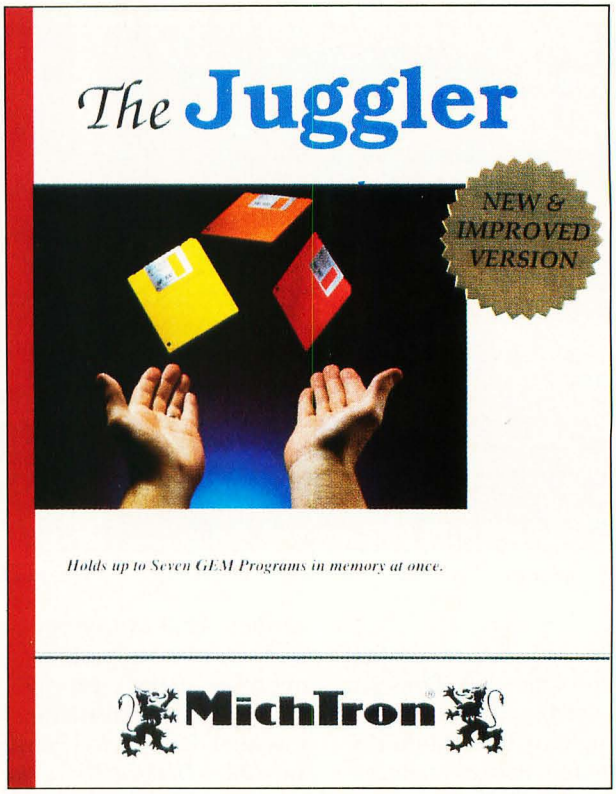
TECH-SOFT
COMPUTER WHOLESALE
324 Stirling Highway
Claremont
Western Australia 6010
Tel. 09-385-1885

CIRCLE #118 ON READER SERVICE CARD.

pointment book with alarm, a notebook which is really a mini-word processor that allows you to create, edit and save multiple 12-page notebook files, a card file that allows nine lines of data, a very good calculator, a typewriter that allows you to use the ST to address envelopes or print other short, quick pieces, an address book, a VT-52 terminal emulator, keyboard macros, a RAMdisk of any size on any drive, disk utility functions, print spooler, control panel similar in function to the STs control panel, a screen dump and memory test. Desk-Cart! retails for $100.

There is one other type of utility program that may be of interest for the advanced user: programs that simulate a multitasking operating system (which the ST does not have) by allowing you to run two programs at once in the memory of the computer. *Juggler/Juggler II* ($50) from Michtron permits you to load up to seven GEM-based or TOS programs into the ST, each into a specific section of memory. Once the programs are loaded, you can "switch" from one to another.

Another similar but more feature-laden program is *Revolver* ($50) from Intersect Software. Revolver can also switch between various applications that reside in the ST's memory. Revolver can also switch between GEM or TOS programs and can operate in any screen-resolution mode. The program offers a host of disk utilities and other functions as well.




**THE JUGGLER • FROM** Michtron . . . . . .$50

LORDS OF CONQUEST • WORD PERFECT • DATA MANAGER

## More goodies

Books and magazine subscriptions also make excellent gifts. Probably the most prolific ST book publisher is Abacus Books. Most of their titles sell for under $20. Here are a couple of their most useful titles.

*ST Internals* is a well-organized, useful compilation of technical ST information. A clear description is given for such ST "parts" as the mouse, keyboard, 68000 processor, custom chips, I/O ports (RS-232, parallel, cartridge, DMA, floppy disk, MIDI and video) and operating system. In addition, this volume contains information about GEMDOS, the operating system and graphics, as well as the BIOS (BASIC Input/Output System).

Another Abacus book is *ST GEM Programmer's Reference*, volume three in the Abacus series of ST books. Here you'll find detailed information on GEM with examples written in C and in which the 68000 assembly language is presented. An overview of such topics as VDI, AES, GDOS and GIOS is included. In addition, material on programming in GEM, with explanations of using the editor, C compiler, assembler and linker of the development system are provided.

Abacus also has a book called *Atari ST Graphics and Sound*. This book teaches you how to create graphics and use the built-in sound facilities of the Atari ST. Examples are written in BASIC, C, Logo and Modula-2 so there is something for every type of programmer.

*ST Tricks and Tips* covers such topics as using GEM from BASIC, combining BASIC and machine language, creating a RAMdisk and print spooler, automatically starting TOS applications and much more. If you would like to learn more about programming your Atari ST computer, this and the other two new Abacus books can help you. All three books have sample programs and various tips for the new or expert programmer.

Another Abacus book is called *ST BASIC to C*. This is an ideal book if you already know and can program in BASIC but want to learn how to program in C. This book compares BASIC programs and their C equivalents so that you can make the transition easily and rapidly.

There are a number of books that are quite good from other publishers as well. One of the largest ST software companies, Michtron, has several excellent titles that you may want on your ST library shelf. One book, called *GFA BASIC Programmer's Reference Guide, Vol. 1* ($30), is written by George Miller and contains valuable information for any GFA BASIC programmer or would-be programmer. GFA BASIC is fast becoming the BASIC language of choice for the ST and this book explains the language in detail and provides more information than is available in the manual.

*Designing the User Interface: Strategies for Effective Human-Computer Interaction* is a serious work that discusses the do's and don'ts of designing a good user interface for programs. Although it is a text book,

the author, Ben Shneiderman, does an excellent job of presenting the topic in a readable and knowledgeable fashion. *Designing the User Interface* sells for $40 and is published by Addison-Wesley.

If you want to participate in the world of Atari ST computing, one of the best ways to do so is through the DELPHI telecommunications service. DELPHI is a full-service, on-line communication and information network. The Atari User's Group on DELPHI consists of two forums. There is an 8-bit forum which is run by our sister publication, ANALOG Computing. The ST Forum is run by the editors and staff of ST-Log.

The two forums provide a host of services and features. You can send and receive messages from and to other Atari 8-bit and ST users worldwide in the Forum. The database areas include thousands of free programs that can be downloaded, including the programs presented each month in ANALOG Computing and ST-Log. The conference feature allows you to meet "face to face" electronically with other Atari users. Information on how to sign up for DELPHI can be found in this magazine in the "Database DELPHI" column.

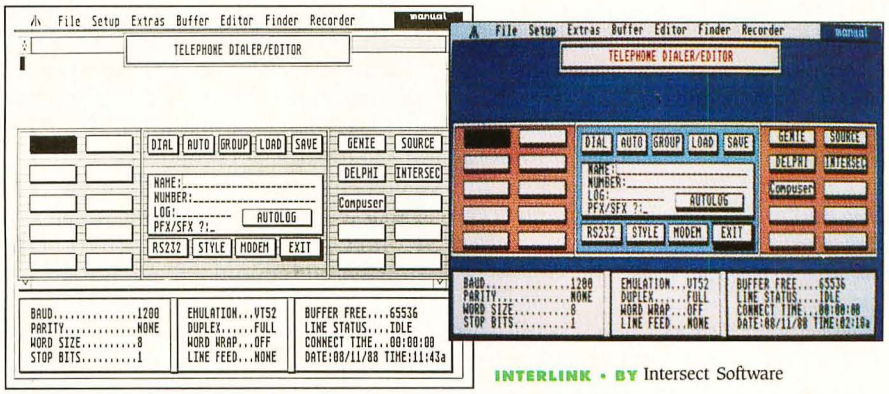
Best of all, access charges average as low as ten cents per minute from most parts of the country, and there is no extra charge for high-speed 1200- or 2400-baud access.

Another popular information service is CompuServe. A good way to start using this service is by means of the *CompuServe Starter Kit*. For about $40 you receive five free hours of connect time and a thorough manual. Of course you will need a modem and there are several good ones to choose from.

One of the best modems around for the price is the Atari SX212. It is a 1200-baud modem that easily lets your ST communicate via telephone line with other computers. The SX212 has auto-dial and auto-answer features as well. The Atari SX212 can be purchased for under $100.

Another excellent modem choice, albeit slightly more expensive, is the Supra 2400. This is a fully Hayes-compatible 2400-baud modem that features auto-dial and auto-answer capabilities. Configurations are set via commands from the keyboard instead of by using DIP switches. The Supra 2400 has a list price of $180.

You will also need a terminal program for your ST, and there are a couple worth recommending. One of the best is *Interlink* by Intersect Software. This program offers an enhanced type-ahead buffer that allows you to create and edit text on the screen before it is sent. In addition, you can capture your entire online session, (Autolog) and the process of saving that information occurs automatically.




**INTERLINK • BY** Intersect Software

Interlink has too many features to describe here in detail. It offers setup dialogs for signing on to information services, a keystroke capture and recording feature (macros), the ability to temporarily hop out of the program to execute other commands or to look at files, a 99-line history, background downloading and much more.

One of my favorite ST terminal programs is *ST-Talk* from Quantum Microsystems Inc. (QMI). This non-GEM-based program works flawlessly and is a real bargain at only $18. If you want to be able to access information services or bulletin boards and easily upload and download files, ST-Talk is an inexpensive alternative.

## Generic gifts

There are many generic gifts that are useful to an ST computer user. One of the best gifts you could give or receive is a membership to an Atari User Group. There are many fine groups around the country, and their memberships typically cost about $20. These groups have monthly meetings, publish newsletters and often have libraries of public domain software. In addition, user groups provide one of the best sources of information about using your ST and have very knowledgeable people who are always willing to help out the other guy.

One of the best user group publications in the country is published by the Washington Area Atari Computer Enthusiasts (WAACE). Called *Current Notes*, this tome continues to amaze me every month in both its size and content. The newsletter has a glossy cover and is as professional-looking and written as anyone has a right to expect from a semi-pro publication. A ten-issue subscription costs $20 and can be obtained by sending a check payable to: Editor, *Current Notes*, 122 North Johnson Road, Sterling, Virginia 22170. Whether you read it for the content or want to see an example of a high quality user group publication, *Current Notes* won't disappoint you.

Regardless of which Atari ST computer you own, there is always the question of what to do with your mouse when it's not being used. One solution is to get a *Mouse Pocket* from Kensington Microware. This $10 gizmo keeps your mouse handy and out of the way until needed. It attaches easily to the side of your desk or monitor with the supplied adhesive strips and is as attractive as it is useful. Kensington also makes a mouse cleaning kit that includes enough supplies to clean your favorite mouse for a year. The $25 kit also includes the mouse pocket.

Another useful item that improves your mousing around a is a mouse pad. These pads are typically inexpensive, increase mouse traction and come in a variety of colors to suit any decor. American Covers is just one company that makes this type of product. They call it the *Mouse Mat*,

• SWIFTCALC • DATA MANAGER ST • WORD WRITER ST •

and it sells for under $10.

As you use your Atari ST, you begin to accumulate disks. Unless you consciously decide how to organize all of it, you will soon find yourself drowning in a sea of magnetized plastic. There are a number of companies that sell 3-1/2-inch disk holders. They typically cost anywhere from $6 to $30.

I personally like the *Flip 'N File* (Innovative Concepts) flip-up tray. It lists for $19.95 and is useful for keeping your computer work area tidy. There are other companies that also make the same type of product. Just be sure that the one you buy will not spill disks when it is full and that it is easy to grab any particular disk.

There are a handful of other items that would be welcomed by any Atari ST user. Disks, printer paper and ribbons or even a printer or monitor stand would all be useful. If you need colored ribbons, Gemini has red, green, blue, brown and purple ribbons to fit a variety of dot-matrix printers. These ribbons sell for $8 each and are available for Epson, Okidata and Prowriter printers. (The Panasonic printer ribbon is $10.) These colored ribbons are especially useful with graphics programs such as *Print Master* from Unison World.

One problem with using an ST has to do with the fact that the ST (or any computer for that matter) can transmit its output faster than a printer can accept it. The result is that the computer is tied up for as long as it takes the printer to print the output.

You can remedy this problem by using a printer buffer. This device simply connects between the ST and your printer. It allows the computer to get back to work while the buffer continues to transmit data to the printer as fast as it can take it. One such buffer is made by Practical Peripherals and is called the *Microbuffer*. It comes in either 32K or 64K versions and works as advertised. The buffer sells for a street price of about $150 to $200.

There might be better ways to spend $300, but there is no better color monitor than the Atari SC1224. And, if you happen to have both a monochrome and color monitors for your ST, you will certainly need *Monitor Master* by Practical Solutions, which allows you to connect a monochrome, RGB and composite monitor to your ST with a separate RCA audio out jack. Although the composite signal is only available on STs with a RF modulator, the audio is available on all machines. Monitor Master sells for $55.

Practical Solution has another nifty product called *Mouse Master*. If you have a 1040ST, you know that it is difficult to get at the joystick ports underneath the computer in order to attach a mouse or joystick. That's where Mouse Master comes in. It plugs into the joystick ports beneath the computer and allows you to easily hook up the mouse or joysticks. You can also leave both a mouse and joystick attached and switch from one to another. I use a 520ST upgraded to one megabyte and still use the Mouse Master because it is so convenient. Mouse Master requires no separate power supply and sells for $40.

Your computer and peripheral equipment are at the mercy of the power company and Mother Nature. The power company sometimes supplies voltage that is either too high or too low. Temporary power surges or spikes can seriously damage your hardware as can undervoltage which might occur during a brownout. Lightning storms can also compromise your equipment. Although telephone and power lines are designed to prevent lightning from traveling along the wires and into your home, it occasionally can happen.

To get protection from these potential catastrophes, you need a surge suppresser, which is a device that is inserted between the AC outlet and your computer. By limiting extra-high or extra-low voltages, it protects your computer's electronic components from being fried. These products come in a variety of shapes and sizes, but one company that offers not only a complete line of products but ones that have been tested to work as advertised is Panamax.

Panamax makes a variety of different products that include power-line conditioning, telephone-line protection, multiple outlet strips and brownout (undervoltage) protection. Some models have on/off switches, circuit breakers, alarms and other features to help you manage your power protection needs. Panamax's models range in price from $69 to $149.

## For the ST user who has everything

One of the major upgrades an ST user can make to his or her system is to buy a hard disk. There are currently two hard disks available for the ST that I can recommend. One is a 20-megabyte unit from Supra that retails for $699 and is available from either the factory or retailers. All Supra ST hard disks connect to the ST's DMA port and come with a boot program.

Another noteworthy hard disk is made by ICD. Designed to fit under your monitor, the ICD F20-A ST hard disk provides 20 megabytes of storage and innovative features like a built-in clock with battery backup, adjustable legs for positioning the monitor and providing cable clearance, and the ability to daisy-chain additional DMA devices. The F20-A ST retails for $700 and ICD offers other models with capacities up to 50 megabytes.

Here's an unusual but useful product: the X-10 system. It is used to remotely turn AC devices on and off, either directly or via a timer. Assorted modules control such things as lights, appliances and other electrical devices by means of commands sent through the AC wiring in your house. The X-10 System is used with a product called the *X-10 Powerhouse* which is connected to your Atari ST computer, programmed to control your various lamps and such and left working even after disconnecting it from the computer.

The X-10 Powerhouse is a computer peripheral that is attached to the RS-232 port of the ST. The unit is self-powered and, once programmed, can be disconnected from the computer thus freeing that port for other uses. It is available from DAK for about $20. (Order the IBM version #4410 and throw the disk away.)

You will also need Michtron's program, *Echo*, to go with the Powerhouse. It costs $40, was created especially for the Powerhouse and ST computer and allows you to use the X-10 system to change the status of up to 256 electrical devices at up to 128 different times of the week. *Echo* is a GEM application so all inputs are entered via the mouse, and any desktop accessories are always available.

Lamp and appliance modules sell for

PRINTMASTER PLUS • ART AND FILM DIRECTOR • TRINITY

$10 to $15 and are available from Sears, Radio Shack, mail order and electronics specialty stores. In addition, replacement wall switches and outlets that look and work like ordinary fixtures, are available for under $15. The X-10 Powerhouse, Echo and a couple of lamp or appliance modules make a neat package for the ST.

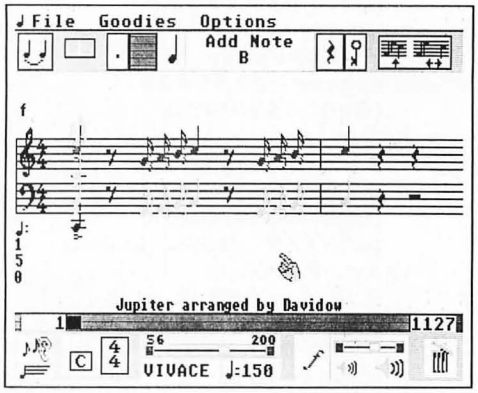
Digital Vision was the first to develop and market a video digitizer for the 8-bit Ataris. Digital Vision has a video digitizer for the ST, called *Computereyes*, which includes both hardware and software and supports all of the graphic capabilities of the ST. The hardware interfaces easily to any source of standard NTSC color or black and white composite video. These sources include video cameras, VCRs, video laser discs and other computers. All capture and display functions are mouse controlled under GEM, and images may be captured in either monochrome or full color.

The Computereyes software performs automatic calibration of brightness, contrast and color balance. Once the image has been captured, brightness, color content and contrast can be easily adjusted to suit your needs. Further, the images saved by Computereyes are compatible with NEOchrome, DEGAS, DEGAS Elite and other graphic programs. Computereyes ST retails for $250 and is a quality product.

One of the least expensive and most rewarding ways to get involved with music/computer combination is to obtain an instrument like the Casio CZ-101 Digital Synthesizer. This mini-keyboard can now be obtained at discount houses for under $200. The CZ-101 is an eight-voice polyphonic digital synthesizer with 16 factory preset "patches," 16 internal patch memories and the capability for another 16 patches on a removeable RAM cartridge. The supplied patches range from trumpet, electric piano and organ voicings to far out sounds that you have only heard in your imagination.

Because the ST already has MIDI capability built in, you can easily turn your computer into a multi-track tape recorder by buying the right software. Currently a number of companies make MIDI programs for the ST. The *Music Studio 88* from Audio Light and *ST Music Box* from Xlent Software are just two of the currently available programs. The combination of the Casio keyboard, the ST computer and a MIDI program gives you tremendous musical capability.

What differentiates the various ST




**MUSIC STUDIO 88 • FROM** AudioLight

MIDI software is the extent to which you can manipulate the music once it has been stored. Another difference in the programs is the way the music is stored initially. Some MIDI programs store the musical notes as you play the keyboard. Other programs require you to enter the notes individually with the mouse but allow you to play back the music through the MIDI keyboard.

*The Orchestrator* from Intersect Software is a music composition and entertainment system for the ST that incorporates the full GEM interface for ease of use. Compositions can be played back either through the sound chips in the ST computer or through a MIDI-compatible instrument like the Casio CZ-101. Music is entered using the mouse and standard musical notation rather than via real-time musical keyboard entry. A built-in editor allows you to edit any of the three ST voices independently, rearrange compositions via cut and paste features and save songs as files. The Orchestrator is more of an entertainment product rather than a MIDI-instrument controller program and sells for $50.

Finally, here's a product for the ST user who wants a printer with the power of a laser printer at the price of a high-end dot-matrix: the HP DeskJet. This printer lists for $1,000 but is available at a street price of about $700.

What's so amazing about this printer is that the output is virtually indistinguishable from laser printed output. The printer can support up to 300 dpi (dots per inch) text just like a good laser printer. Draft mode is rated at 240 cps (characters per second), and letter quality is said to be 120 cps (about two pages per minute). The actual throughput speed will depend on the type of output (text or graphics) and the software that you are using.

The HP DeskJet can emulate an Epson printer by means of a $75 ROM cartridge. The ink cartridges cost about $20 apiece, and it has the support of Hewlett-Packard's one-year warranty and toll-free help lines.

• TOWER TOPPLER • PUBLISHING PARTNER

**That wraps up this year's list of gift ideas for the Atari ST. Remember, it is better to give than to receive, but if you must receive, this list of ST products should provide plenty of ideas. Also, it wouldn't hurt to leave this article open in a strategic place in order to better get what's on your holiday wish list.** ■

# Companies **MENTIONED IN THIS ARTICLE:**

ABACUS
**P.O. Box 7211**
**Grand Rapids, MI 49510**
**(616) 241-5510**

ACCOLADE
**550 S. Winchester Blvd.**
**Suite 200**
**San Jose, CA 95128**
**(408) 296-8400**

ADDISON-WESLEY
**Reading, MA 01867**
**(617) 944-3700**

AMERICAN COVERS, INC.
**P.O. Box 1796**
**Sandy, UT 84091**
**(801) 566-3100**

AUDIO LIGHT, INC.
**20 South Santa Cruz Ave.**
**Los Gatos, CA 95031**
**(408) 395-0838**

CENTRAL POINT SOFTWARE
**9700 SW Capitol Highway**
**Suite 100**
**Portland, OR 97219**
**(503) 244-5782**

COMPUSERVE COMMUNICATIONS
**5000 Arlington Center Blvd.**
**Columbus, OH 43220**
**(614) 457-0802**

COMPUTER PALACE
**710 McKinley**
**Eugene, OR 97402**
**(800) 452-8013**

DELPHI
**3 Blackstone Street**
**Cambridge, MA 02139**
**(800) 544-4005**
**(617) 491-3393 (in MA)**

EIDERSOFT USA, INC.
**P.O. Box 288**
**Burgettstown, PA 15021**
**(412) 947-3739**

ELECTRONIC ARTS
**1820 Gateway Drive**
**San Mateo, CA 94404**
**(417) 571-7171**

EPYX, INC.
**600 Galveston Drive**
**Redwood City, CA 94063**
**(415) 366-0606**

FTL SOFTWARE
**P.O. Box 112489**
**San Diego, CA 92111**
**(619) 453-5711**

GEMINI ENTERPRISES
**Dept. L**
**86 Ridgedale Ave.**
**Cedar Knolls, NJ 07927**
**(201) 267-0988**

ICD, INC.
**1220 Rock Street**
**Rockford, IL 61101**
**(815) 968-2228**

INFOCOM, INC.
**125 Cambridge Park Drive**
**Cambridge, MA 02140**
**(800) 262-6868**

INNOVATIVE CONCEPTS, INC.
**2284 Ringwood Ave.**
**San Jose, CA 95131**

INTERSECT SOFTWARE
**2828 Clark Road, Suite 10**
**Sarasota, FL 34231**
**(813) 923-8774**


Public Domain Software
Over **575** Disks Available for the ST
$4.00 Each

***Christmas Special***
Buy 6 Disks get 1 FREE
Buy 10 Disks get 2 FREE
Buy 20 Disks get 5 FREE

Utilities, Games, Magic Sac, MIDI, Music, Applications, Clip Art, Educational, Graphics
*24 Hour Shipping Telephone Support*
*Free Catalog Updates*

**Call or Write for FREE Catalog**
**(800) 622-7942**

***Clip Master***

10 Screens per disk
**$19.95 per disk**
*FREE* Bonus Disk with Purchase
*Dealer Inquires Welcome*

Disk 1 : Animals, Christian, Folks, Food, Home, Music, Plants
Disk 2 : Americana, Patriotic, US Map, Outlines of all 50 States
Disk 3 : Arrows, Designs, Kid Stuff, Signs, Symbols, Christmas
Disk 4 : Animals, School, Thanksgiving, Transportation & more

Clip Art for Desktop Publishing Programs

| | | | | | |
|---|---|---|---|---|---|
| Dungeon Master | $26.95 | Omnires | $25.95 | Spectrum 512 | $49.95 |
| DM Hint Book | $9.95 | Turbo ST | $37.95 | Labelmaster Elite | $29.95 |
| Oids | $22.95 | Procopy | $24.95 | Tune Up | $32.95 |
| Typhoon Thompson | $24.95 | Neodesk | $19.95 | Mouse Master | $32.95 |
| GFA Basic | $39.95 | Flash | $19.95 | Monitor Master | $39.95 |
| GFA Basic Book | $29.95 | Shadow | $22.95 | Helpful Hints (Book) | $16.95 |
| GFA Reboot Camp | $17.95 | Interlink ST | $29.95 | Supra 2400 Modem | $149.95 |
| Publisher ST | $89.95 | Degas Elite | $45.95 | **Call for More** | |

VISA
BRE Software
352 W. Bedford, Suite 104
Fresno, CA 93711
(209) 432-2159 in CA
MasterCard

CIRCLE #119 ON READER SERVICE CARD.

**CircuitMaker**

CircuitMaker is a professional full featured program that enables you to design, construct and test an unlimited variety of digital circuits. Using CircuitMaker, you eliminate the need to purchase breadboards, integrated circuits, wire and power supplies. CircuitMaker allows you to design and test your digital circuits with just a few clicks of the mouse!

CircuitMaker is designed for the professional as well as the student that is just learning about digital logic. CircuitMaker is a must for your electronic projects!

**Only $79.95**

iliad Software Inc.
P.O. Box 1144
495 West 920 North
Orem, Utah 84057
(801) 226-3270
Office hours 10:00AM-6:00PM MST

CIRCLE #120 ON READER SERVICE CARD.

KENSINGTON MICROWARE, LTD.
**251 Park Avenue**
**New York, NY 10010**
**(212) 475-5200**

MICHTRON
**576 S. Telegraph**
**Pontiac, MI 48053**
**(313) 334-5700**

MIGRAPH, INC.
**720 S. 333 St. (201)**
**Federal Way, WA 98003**
**(206) 838-4677**

MINDSCAPE
**3444 Dundee Rd.**
**Northbrook, IL 60062**
**(312) 480-7667**

PANAMAX
**150 Mitchell Blvd.**
**San Rafael, CA 94903**
**(800) 472-5555**

PRACTICAL PERIPHERALS
**31245 La Baya Drive**
**Westlake Village, CA 91362**
**(818) 991-8200**

PRACTICAL SOLUTIONS, INC.
**1930 E. Grant Rd.**
**Tuscon, AZ 85719**
**(602) 884-9612**

QUANTUM MICROSYSTEMS, INC.
**P.O. Box 179**
**Liverpool, NY 13088**
**(315) 451-7747**

RAINBIRD
**3885 Bohannon Drive**
**Menlo Park, CA 94025**
**(415) 322-0412**

REGENT SOFTWARE
**P.O. Box 14628**
**Long Beach, CA 90803**
**(213) 439-9664**

SOFTLOGIK CORP.
**11131F South Towne Square**
**St. Louis, MO 63123**
**(314) 894-8608**

SUBLOGIC
**713 Edgebrook Drive**
**Champaign, IL 61820**
**(217) 359-8482**

SUPRA CORP.
**1133 Commercial Way**
**Albany, OR 97321**
**(503) 967-9075**

TIMEWORKS
**444 Lake Cook Rd.**
**Deerfield, IL 60015**
**(312) 948-9200**

UNISON WORLD
**2150 Shattuck Avenue**
**Suite 902**
**Berkeley, CA 94704**
**(415) 848-6666**

WORDPERFECT CORP.
**288 West Center St.**
**Orem, UT 84057**
**(801) 225-5000**

XLENT SOFTWARE
**P.O. Box 5228**
**Springfield, VA 22150**


# for ATARI ST's and MEGA's

## MEMORY upgrades:

Solderless "plug in" installation, 1 year warranty
520ST – expand to 1, 2.5 or 4 MB on ONE board – prices start at $129 for the 0K version – or go to
1 Megabyte only, socketed, 0 K $ 79
1040/520STfm – upgrade to 2.5 and 4 MB, fully socketed 0 K board $149.
For all our memory upgrades: on board CLOCK module only $30 including software!

## For more detailed catalog contact:

tech-specialities Co.
1022 Hodgkins, Houston, TX 77032
☎ (713) 590-2068 and 590-3738

We ship COD or prepaid, sorry, no credit cards!
Shipping/Handling on memory upgrades $ 5
on Hard Drive Kits – $10/no drive – $20/w. dr.
Texas residents add 8% state sales tax.

## EXPANDABLE Hard Drive Kits:

1. 10" x 6.8" x 15", full SCSI interface with DMA through – 150 W PC power supply with fan – room for up to 5 half ht. drives – mounts on floor, under desk or on desktop – can supply power to 520ST and disk drives with optional cable set.
with 40 MB full height 30 ms drive $745
No Drive...install your own $385
2. MEGA footprint, 3.8" high, full SCSI/DMA–through interface, room and power for 3 half height or 1 each full/half height 5 1/4" drive, with fan.
with 40 MB half height 3.5" – 47 ms drive $695
with 10 MB 5–1/4" drive $395
3. 4.5" wide x 6" high x 13" deep, full SCSI/DMA–through – ready for 2 half ht. or 1 full height.
with 20 MB 1/2 height $485
No Drive...install your own $249

Atari 520ST, 1040St, 520STfm and MEGA are trademarks of ATARI Corp.

# STPlus•STPlus•STPlus•STPlus

## P.O. 1197, Berkeley, Ca. 94701

We all want the ST to grow, so let's BUY MORE SOFTWARE so the ST grows! You'll find that STPlus cares about you and your ST more than anyone else that's why we put the ST in our name, through thick and thin we'll be here when you need us and we ship *fast!*

### BUSINESS

| | |
|---|---|
| DBMan 4.0 | 175.00 |
| Datamanager | 56.00 |
| Superbase | 104.95 |
| Trimbase | 69.95 |
| Phasar | 63.95 |
| Zoomracks 2 | 84.95 |
| Base 2 | 42.95 |
| The Informer | 69.95 |
| Wordperfect | 189.95 |
| 1st Word Plus | 69.95 |
| Word Up! | 64.95 |
| Best Accounting | 279.95 |
| Equal Plus | 139.95 |
| Inventory Mgr. | 69.95 |
| Rolobase Plus | 63.95 |
| Logistix Spread | 104.95 |
| Microlawyer | 49.95 |
| Payroll Master | 69.95 |
| Construction EST. | 35.00 |
| Microsoft Write | 94.95 |
| Datatrieve | 35.00 |
| STOneWrite | 48.95 |
| VIP GEM | 104.95 |
| DacEasy Payroll | 48.00 |
| DacEasy Acctg | 52.00 |
| WordWriter ST | 56.00 |
| SwiftCalc | 56.00 |
| EZ Calc by Royal | 48.95 |
| Analyze Spread | 25.95 |
| Final Word | 99.95 |
| PublishingPartner | 140.00 |
| T-works Publisher | 89.95 |
| EZData Base | 48.95 |
| Chart Pak | 35.00 |
| Compute Roots | 27.95 |
| Thunder NEW! | 28.95 |
| Habawriter 2 | 48.95 |
| Text Pro | 35.00 |
| Becker Text | 62.95 |
| Expert Opinion AI | 59.95 |
| Time Link | 35.00 |
| Partner ST | 48.95 |
| Labelmaster Elite | 35.00 |
| ST Accounts | 149.00 |
| The Juggler | 35.00 |
| Max Pack | 35.00 |
| Stuff | 27.95 |
| Flash 1.5 | 21.00 |
| Omni Res | 27.95 |
| Turbo ST(~blitter) | 35.00 |
| Signum *technical word processor* | 249.95 |
| SBT DLedger | 195.00 |
| SBT DPayables | 195.00 |
| SBT DInvoices | 195.00 |
| SBT DMenu | 49.95 |
| Neo Desk | 27.95 |
| Sales Pro | 69.95 |
| Mail Manager | 39.95 |
| Mighty Mail | 35.00 |
| First Word 1.6 | 14.00 |

### GRAPHICS

| | |
|---|---|
| Degas Elite | 41.95 |
| CAD 3D 2.0 | 63.95 |
| Cyber Paint | 49.00 |
| Quantum 4096 | 27.95 |
| Adv Art Studio | 26.00 |
| Spectrum 512 | 49.00 |
| EzDraw&Superch | 104.95 |
| Canon Scanner | 1040.0 |
| GFA Artist 1000cl | 55.95 |
| Drafix 1 | 139.95 |
| *General Symbols* | 105.00 |
| Elec, or Arch, Sym | 105.00 |
| Athena 2 | 69.95 |
| Circui tMaker | 55.95 |

### CLIPART

| | |
|---|---|
| Warriors(720) | 14.95 |
| Outdoor(720) | 14.95 |
| Buildings(720) | 14.95 |
| Victorian(720) | 14.95 |
| Etchings(720) | 14.95 |
| People (720k) | 14.95 |
| Politics(720k) | 14.95 |
| Religion(720) | 14.95 |
| Holidays(720) | 14.95 |
| Ad Art (720k) | 14.95 |
| Vehicles(720) | 14.95 |
| Boats (720k) | 14.95 |
| Planes (720k | 14.95 |
| All (9.2 meg) | 99.95 |

### GAMES

| | |
|---|---|
| Gunship | 35.00 |
| Shadowgate | 35.00 |
| Uninvited | 35.00 |
| Mouse Quest | 14.00 |
| Slaygon | 27.95 |
| Barbarian | 27.95 |
| Obliterator | 27.95 |
| Gauntlet | 35.00 |
| Dark Castle | 27.95 |
| F-15 Strike Eagle | 27.95 |
| Star Trek-Rebel U | 27.95 |
| Questron II | 35.00 |
| Lock-On | 27.95 |
| Carrier Command | 32.50 |

### MUSIC

| | |
|---|---|
| Passport Master Tracks | 280.00 |
| MasterTracks Jr. | 104.95 |
| Midisoft Studio | 69.95 |
| Hybrid Arts Smpte Track | 499.95 |
| Sync Track | 299.95 |
| EZ Track Plus | 48.95 |
| Midiscore | call |
| EZ Score Plus | 104.95 |
| DX-Android | 139.95 |
| CZ-Android | 69.95 |
| Gen-Patch | 104.95 |
| Dr. T's KCSequencer | 199.95 |
| KCS 1,6 w/PVG | 289.95 |
| MIDI rec studio | 56.00 |
| Copyist level 1 | 75.95 |
| Copyist level 2 | 185.95 |
| Copy3-Postscript | 299.95 |

Just like you, we here at STPlus 1 ve the ST and know its the most power for the price. To reward you loyal STUSERS starting with this ad we will give every one thousandth purchaser a hundred dollars credit, and the ten thousandth purchaser will get a 10 meg Supra floppy.

*The ST's power is unrestrained with one of these-100 megs=$1100*

RULES: *Have your customer number or credit card ready. Purchase as often as you like. We're your computer supermarket and we're ready to fulfill your dreams but we're not an information service. We ship right away and its your part to know what you want. Don't be cheap, at these prices you can splurge!*

We're out there on the front lines making the ST happen for you. The ST is our specialty and thanks to your purchasing power there are about 2000 titles for the ST. I think STUSERS are the most loyal, and appreciative, supportive users there are. Remember: your software dollars make the STUSER BASE strong.

### HARDWARE

| | |
|---|---|
| 20 Meg ICD | 649.95 |
| 20 Meg Supra & cloc | 599.95 |
| 30 Meg Supra | 749.95 |
| 60 meg Supra | 1249.95 |
| 33 Meg Tulin | 699.95 |
| 51 Meg Tulin | 839.95 |
| 60 Meg BMS RRL | 1039.00 |
| 20 Meg SH205 | 639.95 |
| 250 Meg | 3250.0 |
| 10 Meg Floppy | 849.95 |
| AST PS LASER | 3350.00 |
| Canon Scanner | 1040.00 |
| IMG Scanner | 90.00 |
| ComputereyesMon | 120.00 |
| Supra 2400 modem | 159.95 |
| Atari SX212 modem | 79.95 |

### PROGRAMMING

| | |
|---|---|
| GFA Basic | 56.00 |
| GFA Book | 35.00 |
| GFA Compiler | 56.00 |
| Mark Williams "C" | 125.00 |
| Laser "C" | 159.95 |
| Cambridge Lisp | 139.95 |
| RAID | 27.95 |
| Fast Editor | 35.00 |
| Alice Pascal | 69.95 |
| OSS Pascal | 59.95 |
| Fortran 77 GEM | 139.95 |
| BCPL | 104.95 |
| Modula 2 dev. kit | 104.95 |
| Assempro | 48.95 |
| Fast Basic | 56.95 |
| True Basic | 69.95 |

### EDUCATIONAL

| | |
|---|---|
| Arakis Series | 14.00 |
| Unicorn Series | 27-35 |
| True Basic Stuff | 69.95 |

*Summer 520 STFM Special*

*$529 Mono*

*$739 Color*

*Your Art Scanned $10 per page 75 to 300 dpi*

### GAMES

| | |
|---|---|
| Tanglewood | 27.95 |
| Test Drive | 35.00 |
| Chessmastr2000 | 32.95 |
| StarGliderbw&cl | 32.95 |
| Hunt for Red Oct | 35.00 |
| Police Quest | 35.00 |
| Aliants | 24.95 |
| Alien Fire | 35.00 |
| Santa Paravia | 21.00 |
| Lurking Horror | 27.95 |
| Star Fleet 1 | 39.95 |
| Empire | 39.95 |
| Liesure Suit Larry | 27.95 |
| Gridiron | 35.00 |
| Dungeon Master | 27.95 |
| Flight Simulator | 35.00 |
| Trailblazer | 27.95 |
| ••••SPECIALS•••• | |
| Jewel of Darknss | 19.95 |
| Silicon Dreams | 19.95 |
| Cardiac Arrest | 48.95 |

### The Best European Games

| | |
|---|---|
| I Ball (neat,fast) | 19.95 |
| RanaRama(d&d) | 29.95 |
| Warlock'sQuest | 29.95 |
| The Flintstones | 29.95 |
| Trivial Pursuit | 29.95 |
| The Enforcer | 19.95 |
| Seconds Out | 29.95 |
| Scruples(board) | 29.95 |
| Livingstone | 29.95 |
| Battle Ships | 29.95 |
| Outrun(fast cars) | 29.95 |
| Crazy Cars | 29.95 |
| Tetris (from USSR) | 29.95 |
| Screaming Wings | 29.95 |
| Spiotfire | 29.95 |
| Blue War | 29.95 |
| Star Quake | 29.95 |
| Enduro Racer | 29.95 |
| BMX Simulator | 29.95 |
| Arkanoids | 29.95 |

**Are you a gamer?** How about joining our game of the month club? $10 gets you the hottest new title at an extra 5% off & you can return it for 75% credit. Plus you'll be eligible each purchase to win as #1000 or #10,000. Call us and specify adventure or arcade. Get started this month with WIZBALL$9.75

ONE NEW NUMBER **800-759-1110** Prices subject to change without notice.

We ship ANYWHERE! $4.00 min S&H. No 1040's or Megas mail order. Hand delivery only, List plus $100.

CIRCLE #123 ON READER SERVICE CARD.

# STEP 1

## OF MICE AND MEGABYTES

## PART 1 · THE INITIAL TREK

by Maurice Molyneaux

Last month's topic was designing computer game graphics. This time out we're going to stick to a graphically-oriented subject (as it were), but the key difference is that the graphics in question were created not for display on a computer, but on a more common medium: videotape.

At the June '88 CES, Epyx Inc. was showing off its *Art & Film Director* software package (which should have shipped by now). A videotape was used to demonstrate the capabilities of this package: a 10-minute computer-generated "cartoon." The videotape was created, animated and directed by yours truly (with added assistance from Randy McClanahan, Mrs. Andy Morrison and Vincent Reynolds). I thought it would be valuable to relate the history here, so those of you interested in creating computer animation might benefit from my experience.

Please note that this discussion is not going to be merely a blow-by-blow description of animation or video techniques. Rather, I will be outlining the history of the project (including the project that spurred it), goals, results *and* techniques. Hopefully such background will give you an idea of the process of making computer-generated videos.

But first, a little background: Art & Film Director (AFD from now on when referring to *both* programs, or Art or Film when referring to one or the other) is a paint and animation software package. Art is a full-featured, bit-mapped, low-resolution (16-color) paint program which allows up to 16 workscreens in memory at once (if you have one meg or more RAM), and up to eight distinct palettes per picture.

Film animates graphics created with Art (or imported from other formats) and is the closest thing to a true "cel" animation system as I've yet seen on a personal computer. The AFD package sold by Epyx contains *both* programs (which really do work best together). Somewhere you may have read that both Mirrorsoft and Pharma Data Systems (PDS) in Europe sell Art and Film. As of this writing, they sell older and less refined versions of the programs, and they package them separately. The package sold by Epyx contains updated and improved models of both programs. All versions of the software were produced by Novotrade Software in Budapest, Hungary.

And, yes, at one time these programs were to have been sold by Broderbund. For various reasons that never happened, and the programs found their home at Epyx.

### Warp One

In August of 1986 I found myself frustrated at the complete lack of any good animation software for the ST. My local ST dealer informed me that in one of his catalogs he had seen a listing for an upcoming ST animation program. He made a phone call and got in contact with Stephen Friedman—the American representative for Novotrade Software—and told him that I wrote for ANALOG Computing/ST-Log, and that I was interested in seeing the software. Mr. Friedman and I chatted, and he agreed to send me some demo disks. After that, and a visit to his office the following October, he decided to send me advance (pre-release) copies of the programs, which at that time were in the process of being updated and improved (by the Hungarians) for American release (this under Broderbund).

In the course of our discussions, Mr. Friedman had made it clear that he would like some of my input on game ideas and design. As a longtime *Star Raiders* player who always wanted more than that game had to give, I decided to try my hand at designing the ultimate action space-combat game. Star Raiders was a graphics-oriented adaptation of the old mainframe *Star Trek* game, so I decided to go to the source. A 3-D Star Trek space combat game it was to be. I reasoned that since it was a known property, it would have instant identification with users. While the game concept is too complex to detail here, suffice it to say at the lowest level it would be about as complex as Star Raiders, but at the top levels it would make that game look simple (and easy).

Once I had the idea down (it just fell together in one sitting), I felt that paperwork alone would not sell such a game. Neither would mere mock-up screens. Nope, I wanted prospective clients to see what the game would look like.

Using Art and Film I would create an animated demo of the game. But no simple demo was this to be! In the end it would consist of over a dozen animation sequences and run several minutes in length. The demo would begin with a simulation of the game's titles (Figure 1),

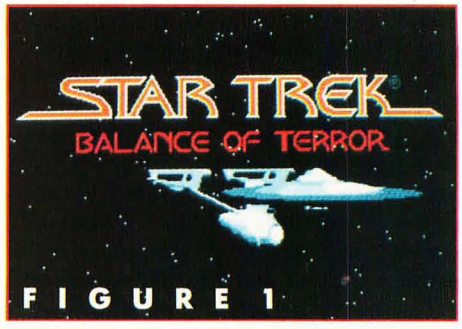



FIGURE 1

then show the player's ship in the act of cruising through space, warping here and there, fighting Romulan warships, limping to spacedock for repairs, sending a security team to clear out an invaded dock, and finally the player's ship being destroyed by a hostile starship in a heated exchange of phaser blasts and photon torpedoes! In effect, it was like watching someone play (and lose) the game.

The primary view in the game was over the helm on the *Enterprise* bridge, looking at the main viewing screen. There, tactical projections and visuals would appear. (Forward, port, starboard and aft views could be called up, and weapons could be fired in the selected direction.) The biggest challenge visually (besides designing a screen that was both functional gamewise and recognizably the *USS Enterprise* bridge) was to create starships and space docks that looked good. Unlike the ships in Star Raiders, which you only see from one view, the ships in this game would be seen at many angles (front, back, side, three-quarters) and at varying sizes.

I wanted the ships to look realistic, so I used *CAD-3D* to build three-dimensional models of them. I generated pictures of each vessel at all necessary angles and saved these images as *DEGAS* low-resolution screens. These pictures were then converted to Art format, resized, cleaned up and detailed—adding highlights, spotlights, windows, etc. Figure 2 shows an actual shape-table page for the demo, featuring a Federation starship (from myriad angles and in myriad sizes), a spacedock, as well as phaser blasts and explosions.

For the game, I created Enterprise-Reliant- (*Star Trek II*), and Grissom-type (*Star Trek III*) Federation starships, as well as a spacedock (*Star Trek III* and *IV*), an asteroid base and a Romulan Bird of Prey (traditional, 1966 model, a la the episode "Balance of Terror"). Since the demo featured a dock-and-repair sequence *inside* a spacedock, I also built 3-D models of a shuttle craft and a Work Bee (small construction/repair vehicles seen in the first movie).

The Work Bees, though their appearance is brief, have the most detailing of any of the ships in the game. They feature flashing running lights, and they roll as they fly towards the *Enterprise*. In fact, when one passes slowly by the viewer, you can read the number on its side and even see the silhouette of the pilot through the window! The space-dock sequence also features another starship in for repairs and a little space-suited man who waves to signal that your ship is repaired and ready to go. (The dock interior, Bee, Reliant class starship and man all appear in Figure 3.)

Research was not tough, but it did take time. For various tactical displays I studied some of the tactical projections used in the first Trek film and animated nearly identical ones for the demo. To build the Grissom-class starship, I had to step frame-by-frame through a video of *Star Trek III*, trying to determine the size, shape and positions of the various parts of the ship. I sketched and studied, replaying one shot

FIGURE 2

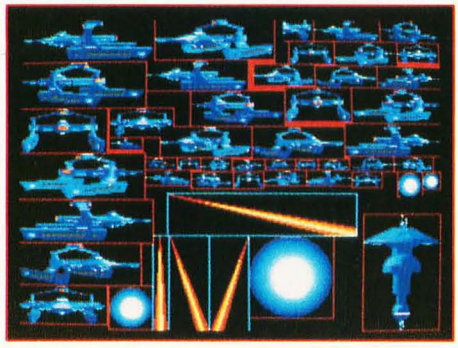


FIGURE 3

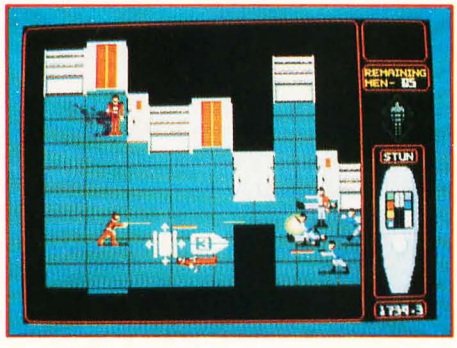



FIGURE 4

over and over and over. After an hour or so of this, I was able to go to CAD-3D and build the ship. (Ironically, after all this work it ended up being the one ship not used in the final demo!)

Additional research was done through magazines and books, taking note of logos, designs, etc. I even bought a videotape of "Balance of Terror" (after which the game was named) just to study up on the Romulans (who were to be the antagonists). The research, I felt, was necessary, because if this was to be a *Star Trek* game, it needed to have the flavor of the show, from the concept all the way through to the design. (If you're going to show a Romulan ship, I reasoned, it had better move, act and look like a Romulan ship, or the *Star Trek* fans will *know* it's wrong.)

I think this kind of research is appropriate in many kinds of game design—and in videos too. Sometimes, the limitations of a subject can at first seem a burden, but most times I've found that you can incorporate those limitations as part of your project and use them to ground your concept in reality—or at least the "reality" of the subject you are working with.

For example, using Romulans instead of the ubiquitous Klingons at first seemed a pain. The Romulans, as shown in the series, lived by very strict codes, and their motivations were quite different than that of the Klingons. In a game you could get away with having Klingons want only marauding, but Romulans are more coldly calculating. They had to have a strategy that was consistent with their values as shown in the series. It took me a little thinking, but in the end I did manage to find a strategy that worked. In fact, it made for a much tighter and interesting concept, because it made strategic sense from the Romulan point of view.

Animating the game demo was no cakewalk. The earliest versions of Film allowed the use of only two screens of shape data, which caused colossal limitations. The background for most scenes in the game was the aforementioned bridge. If drawn normally, it would have taken one entire page of shape data, leaving me with only one other page in which to store all the images of enemy ships, explosions and things such as pieces of bridge readouts, etc. This would not work, so in the end I had to create bridge building blocks (which fit on a single screen), pieces that I would assemble on a Film "stage" to make a full-screen background. Once that problem was licked, it was time to tackle

the actual animation.

The ships and weapons were relatively easy to animate. (In particular, I had great fun designing and animating the photon torpedoes.) In addition to phaser beams, et al., I animated some scenes which took place on a spacedock (Figure 4), with *Enterprise* security guards in battle with invading Romulans. (I know, I know, Romulans don't take captives, but there *was* a good reason for their invasion in the game.) The arrival and departure of the security guards gave me an opportunity to simulate the transporter effect. I managed to make a nice sparkle and dissolve (and the reverse) effect that looked very much like the effect used in the old TV series.

Unfortunately, these graphic goodies were amongst the least seen items in the demo. The bridge scenes were a nightmare. Not only did I have to animate moving star fields on the viewer (ever try to simulate warp drive by manipulating individual stars?), but I also had to constantly update all the visible control panels and displays. Frame by frame I had to update the tracking system, the astrogator, chronometer, various ship's status readouts, etc. After a few days of animating zooms through space, you get real sick of animating scores of instruments!

Since the demo was quite complex, I was forced to videotape the thing in order to achieve the desired effect. Just playing the animation sequences wasn't enough. This gave me some (later much-needed) background in creating and taping ST animation.

## Video woes

One of the most complex parts of the demo was the title animation. As it was a Star Trek game—and as a kid I was something of a Trekker—I was determined to be true to the concept and details (hence all my references and research). In fact, I took this so far as to make the titles a computerized duplication of the titles of the old TV show! The *Enterprise* would *whoosh!* out from the distance, titles and credits appearing in her wake. (Figure 1 is a composite of two images some forty frames apart. The title doesn't actually appear until after the ship has left the screen.)

This wasn't too hard to do (animation-wise). The trouble was that I wanted the old Star Trek theme to play in the background. (I have a record of the original music—the game would have had programmed music.) Therefore, I had to adjust my animation so that everything was synchronized to the music. At the proper points in the music the *Enterprise* would zing by, just like on TV. I had to play the music time and time again, adjusting the timing by deleting a frame here, adding a frame there.

I had thought to just determine the timing on the music, break this down into frames-per-second and calculate on which frame what should appear. Well, I quickly learned that the more things I had moving on the screen, the slower the computer ran. Thus, when space was blank, the frames zinged by at the appointed speed, but when the *Enterprise* appeared, it slowed down a little. And the bigger the ship, the slower the speed. This eliminated all chance of solving the timing problem mathematically. Hence I was forced to play the music again and again and adjust it all manually.

**The limitations of a subject can at first seem a burden, but most times I've found that you can incorporate those limitations as part of your project and use them to ground your concept in reality.**

(A small aside here: As I have researched and worked with animation in the intervening 20 months, I have learned that timing sound to animation is one of the most imprecise of sciences. Sometimes you will get a sound to start precisely where it should, but discover to your horror that it *seems* wrong. According to the book *Disney Animation—The Illusion of Life* (Frank Thomas & Ollie Johnson, Abbeville Press, 1981) this problem occurs quite frequently in traditional animation as well. There seems to be no hard and fast rule as to how to apply sound. It must be timed to the specific action being shown, either right on the frame where it occurs, or before or after it! Wherever it works best. This sounds like nonsense but it is true!)

When it came time to commit all the animation and graphics to tape, the fun began. My trusty old 520ST (upgraded to one meg of RAM) is one of the old summer of '85 STs that were not equipped with an RF modulator—meaning I couldn't get a composite or RF signal out of the machine to send into a videotape deck. (At that time, there were no RGB to composite converter boxes available, and I didn't want to videotape the screen using a camera.) This small logistical problem was solved by borrowing an RF-equipped 520ST from some friends of mine and using the RF (TV) output. (This would work only on this one project because later versions of AFD allow use of RAM beyond 512K, and there is no way a 520 sans memory upgrade could play any animations created using more than two screens of shape data.)

The animation was taped by loading one sequence at a time into Film, playing it while the VCR was recording, pausing the VCR at the end of the sequence, loading the next one, etc. The VCR in use was a five-head deck where one of the heads was an effects head. When the tape was paused, the machine would back-up the tape about a half-second so that no speed change or other video "bumps" would occur.

All this would normally have made taping easy. However, the warp-drive effect I had designed had to be created (for technical reasons) using Art and using a lot of color value changing (to simulate the "tunnel-of-light" effect seen in the first film). So, every time the ship shot into warp, I had to quit Film, run an Art slideshow, tape a couple of seconds of this effect and jump back into Film. And I had to do this quickly enough so that the video deck wouldn't hit the end of its pause timer and unpause itself (easy now, but at the time I didn't have a hard disk!).

The biggest shock I received was seeing for the first time the tremendous difference between my SC1224 RGB monitor's image and the same picture displayed on my composite monitor! *Yech!* It was awful! Colors were completely and utterly wrong. Before committing anything to tape I had to go back and adjust almost all of the colors on every animation. The most unpleasant surprise came in the spacedock sequence, where medium gray on the RGB became light gray on the composite and where the difference be-

tween dark blue and medium blue was utterly lost! If you intend to tape computer graphics and animation, I strongly suggest checking everything on a composite monitor or color TV long before you prepare to go to tape.

Once I had recorded two copies of the animation, it was time to add the sound. Film supports some sound and music, therefore the animations themselves already included a great many sound effects (phaser blasts, etc.), and these had been recorded on the videotape.

The video deck I used could record two separate soundtracks and allowed audio to be dubbed over the tracks after the video was recorded. The sounds in the animation were recorded on one track and all overdubbed sounds on the other. (Overdubbing means recording a "new" soundtrack onto an existing piece of film or video.) This permitted special dubbed sounds to come in without wiping out the noises in the animation proper. An audio cassette had been prepared, containing all the necessary sound for dubbing. This included the Star Trek theme music from the Trek soundtrack record (The Cage) and a series of photon torpedo and warp-drive sound effects culled from a videotape of *Star Trek—The Motion Picture.*

APL.68000

$99

A HIGHLY OPTIMIZED ASSEMBLER BASED APL INTERPRETER FOR FAST AND POWERFUL PROGRAMS. FEATURES A COMPLETE INTERFACE TO THE ATARI ST ENVIRONMENT WITH PULL-DOWN MENUS, DIALOG AND ALERT BOXES, AND GRAPHICS FACILITIES.

Order direct for $99 + $7 shipping, $10 Canada.
VISA/MC/AMEX + 4% NJ res + 6% sales tax.

SPENCER
ORGANIZATION, INC.
P.O. Box 248 Westwood, N.J. 07675
(201) 666-6011

CIRCLE #115 ON READER SERVICE CARD.

Dubbing the sound was not easy. It is surprising how noticeable being a quarter of a second off can be. It was especially difficult to time the warp-drive sound effect, because it was a thrum and a racing sound followed by a *bang*. The bang had to hit precisely on time with an on-screen flash. On average it took six tries to get the sound synched properly.

## How useful?

Alas, nothing ever came of that game. Simon & Schuster (S&S), who have the software rights to Star Trek, were not interested. Having seen the Star Trek game they *did* release for the ST, I only have to heave a sigh. While it's not a bad game, it doesn't have much pep, and their drawings of the *Enterprise* are awful—but I digress.

How useful is creating a demo like this? Well, while it did not sell my game concept, it certainly showed the people at S&S exactly what was being proposed to them. Even if you do not intend to use such a video to sell an idea, it can still be a useful tool in designing software. It gives you an opportunity to see your designs on screen, looking as they would if you were actually to use them. Furthermore, if you have a number of people working on the project, it gives all of you a reference as to what the project might end up looking like. If nothing else, you'll quickly learn that not everyone will like the idea as presented, and you can proceed from there, eliminating serious problems early on.

I believe this kind of proposal can be a worthwhile tool for selling a concept. My mistake was designing a game around a property that only one company can sell (S&S alone has rights to produce Star Trek games for personal computers). Hopefully one of you developers will someday (or may have already) use such an animated demo to sell a software concept. It's an exciting way to present an idea.

Of course, that's not to forget animating something like this for its own sake. Making cartoons is fun too. (More on that next issue.)

I am still quite proud of that demo. Whenever I show it people are always excited and ask "Where can I get that game?" While it's too bad the game never sold, I did nonetheless profit from it. I learned a lot in the process of creating the demo. First off, and most of all, I learned how to push the then limited-to-two-pages-of-shape-data version of Film to its limits, and many of the techniques I had to develop out of necessity gave me an edge in pulling off some complex tricks with later, more powerful versions of the program.

## Off to see the wizard

Back to the time before S&S passed on my Star Trek game proposal: Once the master tape of the Trek game demo was completed, copies were made, and I undertook a journey to Silicon Valley to present the demo (and the 16-page proposal) to Stephen Friedman, who would then pitch it to S&S. He was expecting me to bring some animations that he would tape; he did not expect me to show up with videotapes of a complete and self-contained demo animation!

Anyway, he sent one tape and the proposal off to S&S, but he also took a copy of the tape to Broderbund, to show them what kinds of things people could do with Art and Film. He was hoping to push them into getting in gear and setting a real release date for the programs. Broderbund turned around and hit him with a question: How much would I charge to produce a videotape for them to promote Art and Film?

**Next issue, we'll talk about the making of the Art & Film Director sales video, and the creation of a cartoon character by the name of *Megabit Mouse*™.** ■

STEP 1 END

*When not writing articles for ST-Log, Maurice Molyneaux designs game graphics, consults for software companies and creates animated cartoon productions using microcomputers. Despite a ridiculously French name, he claims to have been born in Vicenza, Italy, and denies vicious rumors that he eats escargot and calamari while computing. He is the creator and director of the Art and Film Director sales video for Epyx—a 10-minute fully animated cartoon demonstration created entirely with ST systems. His DELPHI username is MAURICEM.*

# The reviews are in . . .

"'A Best Buy' I'm impressed"
David H. Ahl, Atari Explorer, Nov-Dec 1987

"If you've got an Atari, you probably need this program."
Jerry Pournell, Byte Magazine, October 1987

"pc-ditto is a winner."
Charlie Young, ST World, July 1987

"This is the product we have been looking for."
Donna Wesolowski, ST Informer, August 1987

"This truly incredible software emulator really works."
Mike Gibbons, Current Notes, September 1987

---

## NOW! RUN THESE IBM PROGRAMS ON YOUR ATARI ST.

| | | | |
|---|---|---|---|
| Lotus 1-2-3 | Flight Simulator | Framework | Symphony |
| Enable | Ability | DESQview | Q&A |
| Sidekick | Superkey | Norton Utilities | dBase II, III, III+ |
| Crosstalk IV | Carbon Copy | Chart-Master | Print Shop |
| EasyCAD | DAC Easy Accounting | BPI Accounting | Turbo Pascal |
| GW Basic | Managing Your Money | Silvia Porter's | pfs:Professional File |

**And Hundreds More!**

---

pc-ditto is a software-only utility which taps the power of our Atari St to imitate an IBM PC XT. No extra hardware is required (an optional 5.25-inch drive may be required for 5.25-inch disks). All your IBM disks will work "out-of-the-box".

**pc-ditto features include:**

- All ST models supported (520, 1040, & Mega)
- up to 703K usable memory (1040 & Mega)
- not copy-protected -- installable on hard disk
- imitates IBM monochrome and IBM color graphics adapters
- access to hard disk, if hard disk used
- optionally boots DOS from hard disk
- parallel and serial ports fully supported
- supports 3.5-inch 720K format and 360K single-sided formats
- supports optional 5.25-inch 40-track drives

**System requirements:**

- IBM PC-DOS or Compaq MS-DOS version 3.2 or above recommended
- optional 5.25-inch drive is required to use 5.25-inch disks
- 3.5-inch 720K DOS disks require a double-sided drive (Atari SF314 or equivalent)

*See pc-ditto today at an Atari dealer near you, or write for free information!*

**$89.95**

**pc-ditto**
by
Avant-Garde Systems
381 Pablo Point Drive
Jacksonville, FL 32225
(904) 221-2904

Avant-Garde Systems, 381 Pablo Point Dr.
Jacksonville, Florida 32225 (904) 221-2904
Yes! Please send information on pc-ditto.
Name_____
Address_____
City_____ State_____ Zip_____

CIRCLE #116 ON READER SERVICE CARD.

(from page 47)

```
PROCEDURE Burp;
BEGIN
   Sound(0,685,10,0,0); Pauz(350); Sound(0,0,0,0,0);
END Burp;

PROCEDURE Flicker(sp:INTEGER);
BEGIN
  i:=SetGraphicTextColour(handle,0);
  Putit(sp,numbers[sp]);Pauz(100);
  i:=SetGraphicTextColour(handle,5);
  Putit(sp,numbers[sp]);Pauz(150);
END Flicker;

PROCEDURE Sparkle;
VAR i,k,oc,m : INTEGER;
BEGIN
  GrafMouse(256,NIL);
   FOR k:=0 TO 150 DO
      oc:=(k MOD 5)+1;
      FOR i:=1 TO 5 DO
        INC(oc); IF oc>5 THEN oc:=1;END;
        m:=SetColour(i,c[oc]);
      END;  Pauz(45);
   END;
   oc:=0;
      FOR i:=1 TO 5 DO
        INC(oc) ; m:=SetColour(i,c[oc]);  END;
  GrafMouse(257,NIL);
END Sparkle;

PROCEDURE Moveit (sp : INTEGER);
BEGIN
  GrafMouse(256,NIL);
  Recolor(sp);
  GrafMouse(257,NIL);
END Moveit;

PROCEDURE Number;
BEGIN
  w:= width;h:=height;
  Over:=FALSE;Quit:=FALSE;Sol:=FALSE;
  ClearWorkstation(handle);i:=SetWritingMode(handle,1);
  Start; GrafMouse(257,NIL); Pauz(3000);
  i := SoundOn();SoundOff(i);
  LOOP
    Settimer;
    GrafMouseKeyboardState(Bx,By,k,i);
    IF k=1 THEN  k:=0;
       IF Goodmove() THEN  Beep;Pauz(150);Moveit(oldspot);Moveit(spot);
           oldspot:=spot;
       ELSE Burp;
       END;
    END;
    IF Over THEN S1;Over:=FALSE;  END;
    IF Quit THEN Quit:=FALSE;
       GrafMouse(256,NIL);
       i:= DoAboutDialog(9); GrafMouse(257,NIL);
        IF i=5 THEN Solution;END;
    RETURN;END;
    Flicker(oldspot);
    IF oldspot=end THEN Sparkle;RETURN;END;
  END;
END Number;

PROCEDURE AA;
BEGIN
  i:= ApplInitialise();
  i:=GetResolution();
  IF i<>0 THEN
   k1:=FormAlert(2,"[3][Game looks better in LOW Res][Quit|Continue]");
   IF k1=1 THEN RETURN;END;
  END;
  handle:=GrafHandle(i,i,i,i);
  FOR i:=0 TO 9 DO workin[i]:=1;END;workin[10]:=2;
  OpenVirtualWorkstation(workin,handle,workout);
  c[1]:=070H;c[2]:=777H;c[3]:=724H;c[4]:=070H;c[5]:=750H;
  k1:=SetColour(5,750H);  k1:=SetColour(0,515H);
  k1:=SetColour(1,070H);  k1:=SetColour(3,724H);
  k1:=SetColour(4,057H);
  LOOP
    Number;  GrafMouse(256,NIL);
    ClearWorkstation(handle);WriteLn;
    WriteString("Do You wish to play again?");WriteLn;
    Read (ch);GrafMouse(257,NIL);
    IF CAP(ch)<>"Y" THEN EXIT;END;
    END;
  END AA;

  BEGIN
    AA;  ApplExit;
  END Numbermaze.
```

## Number Maze—Listing 2

```
100 filename$="a:\NUMBER.RSC"
110 fullw 2:clearw 2:gotoxy 0,0:print
"creating file..."
120 option base 0
125 dim a%(16000):def seg=1:v$=""
130 p=varptr(a%(0)):bptr=p+1
140 for i%=1 to 3092
150 read v$:code%=val("&H"+v$)
160 poke p, code%:print ".";
170 p=p+1
180 next
190 bsave filename$,bptr,3092
200 print "file written":end
1000 data 00,00,05,5C,03,64,03,64,03,6
4,03,64,00,24,03,64
1010 data 03,64,0B,EC,00,46,00,0A,00,1
2,00,00,00,00,00,00
1020 data 00,00,0C,14,53,6F,6C,76,65,2
0,61,20,6D,61,7A,65
1030 data 20,75,73,69,6E,67,20,6E,75,6
D,62,65,72,73,00,57
1040 data 72,69,74,74,65,6E,20,75,73,6
9,6E,67,20,54,44,49
1050 data 20,4D,6F,64,75,6C,61,2D,32,0
0,4E,55,4D,42,45,52
1060 data 20,4D,41,5A,45,00,62,79,20,5
3,6F,6C,20,47,75,62
1070 data 65,72,00,4F,4B,00,44,6F,20,7
9,6F,75,20,77,61,6E
1080 data 74,20,61,20,53,74,61,6E,64,6
1,72,64,20,47,61,6D
1090 data 65,3F,00,45,61,73,79,00,4D,6
5,64,69,75,6D,00,4E
1100 data 4F,00,52,65,76,65,72,73,69,6
2,6C,65,20,77,69,74
1110 data 68,20,52,61,6E,64,6F,6D,20,6
E,75,6D,62,65,72,73
1120 data 00,45,41,53,59,2D,4E,6F,20,4
D,55,4C,54,2F,44,49
1130 data 56,00,4D,65,64,69,75,6D,2D,4
D,55,4C,54,2F,44,49
1140 data 56,00,44,6F,20,79,6F,75,20,7
7,61,6E,74,20,4D,75
1150 data 6C,74,69,70,6C,69,63,61,74,6
9,6F,6E,00,61,6E,64
1160 data 20,44,69,76,69,73,69,6F,6E,3
F,00,59,65,73,00,4E
1170 data 6F,00,44,6F,20,79,6F,75,20,7
7,61,6E,74,20,74,6F
1180 data 20,62,65,20,61,62,6C,65,00,5
4,6F,20,6D,6F,76,65
1190 data 20,62,61,63,6B,77,61,72,64,7
3,3F,00,4E,4F,00,59
1200 data 45,53,00,44,6F,20,79,6F,75,2
0,77,61,6E,74,20,74
1210 data 68,65,20,43,6F,6D,70,75,74,6
5,72,00,74,6F,20,70
1220 data 69,63,6B,20,6E,75,6D,62,65,7
2,73,20,66,6F,72,20
1230 data 79,6F,75,3F,00,52,41,4E,44,4
F,4D,00,43,48,4F,4F
1240 data 53,45,00,57,68,61,74,20,6E,7
5,6D,62,65,72,73,20
1250 data 64,6F,20,79,6F,75,20,77,61,6
E,74,3F,00,4F,4B,00
1260 data 40,00,41,64,64,69,74,69,6F,6
E,2D,3E,5F,00,39,00
1270 data 40,00,53,75,62,74,72,61,63,7
4,69,6F,6E,2D,3E,5F
1280 data 00,39,00,57,68,61,74,20,6E,7
5,6D,62,65,72,73,20
1290 data 64,6F,20,79,6F,75,20,77,61,6
E,74,3F,00,40,00,41
1300 data 64,64,69,74,69,6F,6E,2D,3E,5
F,00,39,00,40,00,41
1310 data 64,64,69,74,69,6F,6E,2D,3E,5
F,00,39,00,40,00,53
1320 data 75,62,74,72,61,63,74,69,6F,6
E,2D,3E,5F,00,39,00
1330 data 40,00,53,75,62,74,72,61,63,7
4,69,6F,6E,2D,3E,5F
1340 data 00,39,00,4F,4B,00,57,68,61,7
4,20,6E,75,6D,62,65
1350 data 72,73,20,64,6F,20,79,6F,75,2
0,77,61,6E,74,3F,00
1360 data 40,00,41,64,64,69,74,69,6F,6
E,2D,3E,5F,00,39,00
1370 data 40,00,53,75,62,74,72,61,63,7
4,69,6F,6E,2D,3E,5F
1380 data 00,39,00,40,00,4D,75,6C,74,6
9,70,6C,69,63,61,74
1390 data 69,6F,6E,2D,3E,5F,00,39,00,4
0,00,44,69,76,69,73
1400 data 69,6F,6E,2D,3E,5F,00,39,00,4
F,4B,00,57,68,61,74
1410 data 20,6E,75,6D,62,65,72,73,20,6
4,6F,20,79,6F,75,20
1420 data 77,61,6E,74,3F,00,40,00,41,6
4,64,69,74,69,6F,6E
1430 data 2D,3E,5F,00,39,00,40,00,41,6
4,64,69,74,69,6F,6E
1440 data 2D,3E,5F,00,39,00,40,00,53,7
5,62,74,72,61,63,74
1450 data 69,6F,6E,2D,3E,5F,00,39,00,4
0,00,53,75,62,74,72
1460 data 61,63,74,69,6F,6E,2D,3E,5F,0
0,39,00,40,00,4D,75
1470 data 6C,74,69,70,6C,69,63,61,74,6
9,6F,6E,2D,3E,5F,00
1480 data 39,00,40,00,4D,75,6C,74,69,7
0,6C,69,63,61,74,69
1490 data 6F,6E,2D,3E,5F,00,39,00,40,0
0,44,69,76,69,73,69
1500 data 6F,6E,2D,3E,5F,00,39,00,40,0
0,44,69,76,69,73,69
1510 data 6F,6E,2D,3E,5F,00,39,00,4F,4
B,00,44,6F,20,59,6F
1520 data 75,20,57,61,6E,74,20,74,6F,2
0,53,65,65,20,00,74
1530 data 68,65,20,53,6F,6C,75,74,69,6
F,6E,3F,00,4E,6F,00
1540 data 59,65,73,00,00,00,01,A0,00,0
0,01,A2,00,00,01,AE
1550 data 00,03,00,06,00,00,11,80,00,0
0,00,FF,00,02,00,0C
1560 data 00,00,01,B0,00,00,01,B2,00,0
0,01,C1,00,03,00,06
1570 data 00,00,11,80,00,00,00,FF,00,0
2,00,0F,00,00,01,DD
1580 data 00,00,01,DF,00,00,01,EB,00,0
3,00,06,00,00,11,80
1590 data 00,00,00,FF,00,02,00,0C,00,0
0,01,ED,00,00,01,EF
1600 data 00,00,01,FB,00,03,00,06,00,0
0,11,80,00,00,00,FF
1610 data 00,02,00,0C,00,00,01,FD,00,0
0,01,FF,00,00,02,0E
1620 data 00,03,00,06,00,00,11,80,00,0
0,00,FF,00,02,00,0F
1630 data 00,00,02,10,00,00,02,12,00,0
0,02,21,00,03,00,06
1640 data 00,00,11,80,00,00,00,FF,00,0
2,00,0F,00,00,02,40
1650 data 00,00,02,42,00,00,02,4E,00,0
3,00,06,00,00,11,80
1660 data 00,00,00,FF,00,02,00,0C,00,0
0,02,50,00,00,02,52
1670 data 00,00,02,61,00,03,00,06,00,0
0,11,80,00,00,00,FF
1680 data 00,02,00,0F,00,00,02,63,00,0
0,02,65,00,00,02,77
1690 data 00,03,00,06,00,00,11,80,00,0
```

```
0,00,FF,00,02,00,12
1700 data 00,00,02,79,00,00,02,7B,00,0
0,02,87,00,03,00,06
1710 data 00,00,11,80,00,00,00,FF,00,0
2,00,0C,00,00,02,A6
1720 data 00,00,02,A8,00,00,02,B4,00,0
3,00,06,00,00,11,80
1730 data 00,00,00,FF,00,02,00,0C,00,0
0,02,B6,00,00,02,B8
1740 data 00,00,02,C4,00,03,00,06,00,0
0,11,80,00,00,00,FF
1750 data 00,02,00,0C,00,00,02,C6,00,0
0,02,C8,00,00,02,D7
1760 data 00,03,00,06,00,00,11,80,00,0
0,00,FF,00,02,00,0F
1770 data 00,00,02,D9,00,00,02,DB,00,0
0,02,EA,00,03,00,06
1780 data 00,00,11,80,00,00,00,FF,00,0
2,00,0F,00,00,02,EC
1790 data 00,00,02,EE,00,00,03,00,00,0
3,00,06,00,00,11,80
1800 data 00,00,00,FF,00,02,00,12,00,0
0,03,02,00,00,03,04
1810 data 00,00,03,16,00,03,00,06,00,0
0,11,80,00,00,00,FF
1820 data 00,02,00,12,00,00,03,18,00,0
0,03,1A,00,00,03,26
1830 data 00,03,00,06,00,00,11,80,00,0
0,00,FF,00,02,00,0C
1840 data 00,00,03,28,00,00,03,2A,00,0
0,03,36,00,03,00,06
1850 data 00,00,11,80,00,00,00,FF,00,0
2,00,0C,FF,FF,00,01
1860 data 00,01,00,14,00,00,00,10,00,0
2,11,00,00,00,00,00
1870 data 00,24,00,0D,00,00,00,02,00,0
6,00,19,00,00,00,10
1880 data 00,01,31,52,00,01,00,01,00,2
2,00,0B,00,03,FF,FF
1890 data FF,FF,00,1C,00,00,00,00,00,0
0,00,24,00,02,00,03
1900 data 00,1A,00,01,00,04,FF,FF,FF,F
F,00,1C,00,00,00,00
1910 data 00,00,00,3F,00,02,00,07,00,1
A,00,01,00,05,FF,FF
1920 data FF,FF,00,1C,00,00,00,00,00,0
0,00,5A,00,08,00,01
1930 data 00,0B,00,01,00,06,FF,FF,FF,F
F,00,1C,00,00,00,00
1940 data 00,00,00,66,00,08,00,05,00,0
C,00,01,00,01,FF,FF
1950 data FF,FF,00,1A,00,27,00,00,00,0
0,00,73,00,0B,00,09
1960 data 00,08,00,01,FF,FF,00,01,00,0
7,00,14,00,00,00,10
1970 data 00,02,11,00,00,00,00,00,00,2
7,00,0D,00,02,FF,FF
1980 data FF,FF,00,1C,00,00,00,00,00,0
0,00,76,00,03,00,01
1990 data 00,1C,00,01,00,03,FF,FF,FF,F
F,00,1A,00,17,00,00
2000 data 00,00,00,93,00,02,00,0A,00,0
8,00,01,00,04,FF,FF
2010 data FF,FF,00,1A,00,15,00,00,00,0
0,00,98,00,0D,00,0A
2020 data 00,08,00,01,00,05,FF,FF,FF,F
F,00,1A,00,15,00,00
2030 data 00,00,00,9F,00,19,00,0A,00,0
8,00,01,00,06,FF,FF
2040 data FF,FF,00,1C,00,00,00,00,00,0
0,00,A2,00,02,00,03
2050 data 00,22,00,01,00,07,FF,FF,FF,F
F,00,1C,00,00,00,00
2060 data 00,00,00,C1,00,08,00,05,00,1
0,00,01,00,00,FF,FF
2070 data FF,FF,00,1C,00,20,00,00,00,0
0,00,D2,00,08,00,07
2080 data 00,0F,00,01,FF,FF,00,01,00,0
1,00,14,00,00,00,10
2090 data 00,02,11,00,00,00,00,00,00,2
4,00,0C,00,00,00,02
2100 data 00,05,00,19,00,00,00,10,00,0
1,11,00,00,03,00,01
2110 data 00,1F,00,0A,00,03,FF,FF,FF,F
F,00,1C,00,00,00,00
2120 data 00,00,00,E2,00,02,00,01,00,1
A,00,01,00,04,FF,FF
2130 data FF,FF,00,1C,00,00,00,00,00,0
0,00,FD,00,08,00,03
2140 data 00,0D,00,01,00,05,FF,FF,FF,F
F,00,1A,00,17,00,00
2150 data 00,00,01,0B,00,04,00,06,00,0
8,00,02,00,01,FF,FF
2160 data FF,FF,00,1A,00,35,00,00,00,0
0,01,0F,00,12,00,06
2170 data 00,08,00,02,FF,FF,00,01,00,0
1,00,14,00,00,00,10
2180 data 00,02,11,00,00,00,00,00,00,2
3,00,0C,00,00,00,02
2190 data 00,05,00,19,00,00,00,10,00,0
1,11,00,00,01,00,01
2200 data 00,20,00,0A,00,03,FF,FF,FF,F
F,00,1C,00,00,00,00
2210 data 00,00,01,12,00,05,00,01,00,1
6,00,01,00,04,FF,FF
2220 data FF,FF,00,1C,00,00,00,00,00,0
0,01,29,00,07,00,03
2230 data 00,12,00,01,00,05,FF,FF,FF,F
F,00,1A,00,15,00,00
2240 data 00,00,01,3C,00,13,00,06,00,0
8,00,02,00,01,FF,FF
2250 data FF,FF,00,1A,00,37,00,00,00,0
0,01,3F,00,05,00,06
2260 data 00,08,00,02,FF,FF,00,01,00,0
1,00,14,00,00,00,10
2270 data 00,02,11,00,00,00,00,00,00,2
3,00,0B,00,00,00,02
2280 data 00,05,00,19,00,00,00,10,00,0
1,11,00,00,01,00,01
2290 data 00,20,00,09,00,03,FF,FF,FF,F
F,00,1C,00,00,00,00
2300 data 00,00,01,43,00,04,00,01,00,1
8,00,01,00,04,FF,FF
2310 data FF,FF,00,1C,00,00,00,00,00,0
0,01,5C,00,04,00,03
2320 data 00,18,00,01,00,05,FF,FF,FF,F
F,00,1A,00,15,00,00
2330 data 00,00,01,75,00,13,00,06,00,0
8,00,02,00,01,FF,FF
2340 data FF,FF,00,1A,00,37,00,00,00,0
0,01,7C,00,04,00,06
2350 data 00,08,00,02,FF,FF,00,01,00,0
1,00,14,00,00,00,10
2360 data 00,02,11,00,00,00,00,00,00,2
4,00,0B,00,00,00,02
2370 data 00,05,00,19,00,00,00,10,00,0
1,11,00,00,01,00,01
2380 data 00,21,00,09,00,03,FF,FF,FF,F
F,00,1C,00,00,00,00
2390 data 00,00,01,83,00,01,00,01,00,1
9,00,01,00,04,FF,FF
2400 data FF,FF,00,1A,00,05,00,00,00,0
0,01,9D,00,17,00,07
2410 data 00,08,00,01,00,05,FF,FF,FF,F
F,00,1D,00,08,00,00
2420 data 00,00,03,64,00,01,00,03,00,0
B,00,01,00,01,FF,FF
2430 data FF,FF,00,1D,00,28,00,00,00,0
0,03,80,00,01,00,05
2440 data 00,0E,00,01,FF,FF,00,01,00,0
6,00,14,00,00,00,10
2450 data 00,02,11,00,00,00,00,00,00,2
3,00,0C,00,02,FF,FF
2460 data FF,FF,00,1C,00,00,00,00,00,0
0,01,C3,00,01,00,01
2470 data 00,19,00,01,00,03,FF,FF,FF,F
```

```
F,00,1D,00,08,00,00
2480 data 00,00,03,9C,00,01,00,03,00,0
B,00,01,00,04,FF,FF
2490 data FF,FF,00,1D,00,08,00,00,00,0
0,03,B8,00,01,00,05
2500 data 00,0B,00,01,00,05,FF,FF,FF,F
F,00,1D,00,08,00,00
2510 data 00,00,03,D4,00,01,00,07,00,0
E,00,01,00,06,FF,FF
2520 data FF,FF,00,1D,00,08,00,00,00,0
0,03,F0,00,01,00,09
2530 data 00,0E,00,01,00,00,FF,FF,FF,F
F,00,1A,00,25,00,00
2540 data 00,00,02,23,00,17,00,08,00,0
8,00,01,FF,FF,00,01
2550 data 00,06,00,14,00,00,00,10,00,0
2,11,00,00,00,00,00
2560 data 00,25,00,0B,00,02,FF,FF,FF,F
F,00,1C,00,00,00,00
2570 data 00,00,02,26,00,01,00,01,00,1
9,00,01,00,03,FF,FF
2580 data FF,FF,00,1D,00,08,00,00,00,0
0,04,0C,00,01,00,03
2590 data 00,0B,00,01,00,04,FF,FF,FF,F
F,00,1D,00,08,00,00
2600 data 00,00,04,28,00,01,00,05,00,0
E,00,01,00,05,FF,FF
2610 data FF,FF,00,1D,00,08,00,00,00,0
0,04,44,00,01,00,07
2620 data 00,11,00,01,00,06,FF,FF,FF,F
F,00,1D,00,08,00,00
2630 data 00,00,04,60,00,01,00,09,00,0
B,00,01,00,00,FF,FF
2640 data FF,FF,00,1A,00,25,00,00,00,0
0,02,89,00,14,00,03
2650 data 00,08,00,01,FF,FF,00,01,00,0
A,00,14,00,00,00,10
2660 data 00,02,11,00,00,00,00,00,00,2
7,00,0C,00,02,FF,FF
2670 data FF,FF,00,1C,00,00,00,00,00,0
0,02,8C,00,01,00,01
2680 data 00,19,00,01,00,03,FF,FF,FF,F
F,00,1D,00,08,00,00
2690 data 00,00,04,7C,00,01,00,03,00,0
B,00,01,00,04,FF,FF
2700 data FF,FF,00,1D,00,08,00,00,00,0
0,04,98,00,0F,00,03
2710 data 00,0B,00,01,00,05,FF,FF,FF,F
F,00,1D,00,08,00,00
2720 data 00,00,04,B4,00,01,00,05,00,0
E,00,01,00,06,FF,FF
2730 data FF,FF,00,1D,00,08,00,00,00,0
0,04,D0,00,11,00,05
2740 data 00,0E,00,01,00,07,FF,FF,FF,F
F,00,1D,00,08,00,00
2750 data 00,00,04,EC,00,01,00,07,00,1
1,00,01,00,08,FF,FF
2760 data FF,FF,00,1D,00,08,00,00,00,0
0,05,08,00,14,00,07
2770 data 00,11,00,01,00,09,FF,FF,FF,F
F,00,1D,00,08,00,00
2780 data 00,00,05,24,00,01,00,09,00,0
B,00,01,00,0A,FF,FF
2790 data FF,FF,00,1D,00,08,00,00,00,0
0,05,40,00,11,00,09
2800 data 00,0B,00,01,00,00,FF,FF,FF,F
F,00,1A,00,25,00,00
2810 data 00,00,03,38,00,0C,00,0B,00,0
8,00,01,FF,FF,00,01
2820 data 00,01,00,14,00,00,00,10,00,0
2,11,00,00,00,00,00
2830 data 00,23,00,0D,00,00,00,02,00,0
5,00,19,00,00,00,10
2840 data 00,01,11,00,00,02,00,01,00,1
F,00,0B,00,03,FF,FF
2850 data FF,FF,00,1C,00,00,00,00,00,0
0,03,3B,00,05,00,01
2860 data 00,13,00,01,00,04,FF,FF,FF,F
F,00,1C,00,00,00,00
2870 data 00,00,03,4F,00,09,00,03,00,0
D,00,01,00,05,FF,FF
2880 data FF,FF,00,1A,00,15,00,00,00,0
0,03,5D,00,11,00,07
2890 data 00,06,00,02,00,01,FF,FF,FF,F
F,00,1A,00,37,00,00
2900 data 00,00,03,60,00,06,00,07,00,0
6,00,02,00,00,05,5C
2910 data 00,00,06,04,00,00,06,C4,00,0
0,07,54,00,00,07,E4
2920 data 00,00,08,74,00,00,09,04,00,0
0,09,AC,00,00,0A,54
2930 data 00,00,0B,5C
2940 data *
```

## Number Maze Checksums

```
 100 data  819, 948, 117, 614, 503, 21
8, 410, 427, 14, 109, 4179
 190 data  650, 357, 627, 619, 775, 82
4, 828, 810, 781, 820, 7091
 1080 data  786, 807, 820, 863, 802, 8
41, 820, 886, 830, 849, 8304
 1180 data  811, 805, 800, 818, 843, 8
37, 795, 840, 803, 854, 8206
 1280 data  782, 805, 800, 806, 840, 8
53, 792, 832, 806, 857, 8173
 1380 data  797, 821, 838, 841, 836, 8
06, 769, 811, 823, 910, 8252
 1480 data  827, 824, 818, 849, 779, 8
82, 722, 619, 654, 696, 7670
 1580 data  678, 756, 681, 692, 622, 5
04, 629, 564, 622, 624, 6372
 1680 data  581, 612, 589, 671, 634, 7
12, 666, 701, 629, 723, 6518
 1780 data  706, 609, 584, 615, 538, 6
26, 551, 796, 500, 537, 6062
 1880 data  720, 699, 879, 723, 721, 8
82, 718, 745, 689, 704, 7480
 1980 data  717, 897, 693, 732, 851, 7
27, 715, 850, 712, 743, 7637
 2080 data  674, 501, 487, 878, 729, 7
56, 870, 679, 708, 663, 6945
 2180 data  502, 494, 861, 664, 687, 8
55, 693, 721, 665, 503, 6645
 2280 data  496, 862, 677, 705, 863, 6
93, 731, 667, 506, 498, 6698
 2380 data  865, 696, 733, 865, 694, 7
16, 686, 684, 734, 873, 7546
 2480 data  727, 754, 877, 750, 758, 8
78, 689, 497, 881, 685, 7496
 2580 data  712, 885, 700, 709, 869, 7
03, 729, 691, 695, 725, 7418
 2680 data  880, 729, 747, 884, 750, 7
59, 892, 764, 716, 880, 8001
 2780 data  721, 722, 881, 723, 498, 5
33, 713, 718, 870, 737, 7116
 2880 data  740, 885, 563, 660, 645, 1
77, 220, 3890
```

```
      Loop
      Put 90,10,S1$
      Defline 1,14
      Color 9
      Line 300,10,300,110
      Defline 1,1
    Endif
    If A>110 And A<140 And B>150 And B<170 !turn left
      En=En-2
      Pd=Pd-1
      If Pd<1
        Pd=4
      Endif
      @Move
    Endif
    If A>180 And A<210 And B>150 And B<170 !turn right
      En=En-2
      Pd=Pd+1
      If Pd>4
        Pd=1
      Endif
      @Move
    Endif
    If A>140 And A<180 And B>135 And B<155 !move forward
      En=En-5
      @Fixpxpy
      D=Pd
      @Dir
    If M(X,Y)<>1 And (X<>Cx Or Y<>Cy)
      Px=X
      Py=Y
      If M(X,Y)<15
        M(X,Y)=M(X,Y)+20
      Endif
      @Move
    Endif
  Endif
  Color 15
  Plot 260+Px,140+Py
  If Px=Ex And Py=Ey !display energy pods
    Put 91,80,Ep$
  Endif
  If Int(M(Px,Py)/10)=1 Or M(Px,Py)>25 !display gold
    Put 215,95,Go$
  Endif
Return
Procedure Fire !.............................
  Zh=0
  Defline 1,1,0,0
  Color 2
  For I=1 To 9
    Ellipse I*6+120,100-I*4,(11-I)*1.5,I+2,0,1800
    Ellipse 200-I*6,100-I*4,(11-I)*1.5,I+2,0,1800
    Wave 8,1,8,5200,0
    Exit If Sx(I)=0
    For J=1 To Rn
      If Sx(I)=Rx(J) And Sy(I)=Ry(J)
        If Random(9)>I
          For K=1 To 30
            Color Random(15)
            Circle 140+Random(40),90-I*3+Random(20),2
            Wave 8,1,14,32,0
          Next K
          Sc=Int(Sc+100*M1)
          Ht=Ht+1
          @Prints
          Rx(J)=Cx
          Ry(J)=Cy
          M(Sx(I),Sy(I))=M(Sx(I),Sy(I))-2
          M(Cx,Cy)=M(Cx,Cy)+2
        Endif
      Endif
      If Sx(I)=Cx And Sy(I)=Cy
        Zh=1
      Endif
    Next J
  Next I
  Wave 0,0
  If Zh=1
    Sc=Int(Sc+En)
    @Newlevel
  Endif
  Put 90,10,S1$
  En=En-100
Return
Procedure Move !.............................
  E=0
  @Fixpxpy
  D=Pd
  Put 70,0,W1$(0)
  Wn=1
  A=110
  Sx(Wn)=0
  Do
    @Dir
    Exit If M(X,Y)=1
    Sx(Wn)=X
    Sy(Wn)=Y
    Sx(Wn+1)=0
    R=Y
    C=X
    A=A-9+Wn
    If X=Cx And Y=Cy
      B=A
      E=Wn
    Endif
    Inc Wn
    Exit If Wn>9
  Loop
  If Wn>1
    Put 110,10,W1$(Wn-1)
  Endif
  D=Pd-1
  If D<1
    D=4
  Endif
  @Fixpxpy
  @Dir
  If M(X,Y)<>1
    Put 70,30,D1$
  Endif
  D=Pd+1
  If D>4
    D=1
  Endif
  @Fixpxpy
  @Dir
  If M(X,Y)<>1
    Put 240,30,Dr$
  Endif
  If E>0
    J=(11-E)*3
    Color 4
    Line 160,B-J,160-J,B
    Draw  To 160+J,B
    Draw  To 160,B-J
    Deffill 4,2,4
    Fill 160,B-1
    Fill 160,B-J+1
  Endif
  A=105
  For I=1 To 9
    Exit If Sx(I)=0
    If M(Sx(I),Sy(I))>19
      Put 156-(9-I)*4+Random((9-I)*4),A,Fp$(I),6
    Endif
    A=A-(10-I)
  Next I
  Get 90,10,230,130,S1$
Return
Procedure Fixpxpy
  X=Px
  Y=Py
  R=Py
  C=Px
Return
Procedure Map !..........................
  Z=0
  Deftext 6,0,0,4
  Text 80,128," MAP uses 500 Energy units "
  Defline 1,1
  For I=0 To Nc
    For J=0 To Nr
      Color 0
      If M(I,J)=1
        Color 1
      Endif
      For K=1 To Rn
        If Rx(K)=I And Ry(K)=J
          Color 6
        Endif
      Next K
      Box I*2+257,J*2+137,I*2+258,J*2+138
    Next J
  Next I
  Color 3
  Box Ex*2+257,Ey*2+137,Ex*2+258,Ey*2+138
  Color 2
  Box Cx*2+257,Cy*2+137,Cx*2+258,Cy*2+138
  Color 15
  Box Px*2+257,Py*2+137,Px*2+258,Py*2+138
  Wave 8,1,10,20000,350
  Wave 0,0
  En=En-500
  Deffill 8,2,8
  Pbox 256,136,315,195
  Color 1
  Box 260,140,260+Nr,140+Nr
Return
Procedure Radar !..........................
  A=3000
  If En<3000
    A=En
  Endif
  Defline 1,14,0,0
  Color 3
  Line 270,110,270,110-Int(A/30)
  Defline 3,14
```

```
  Color 9
  Line 270,109-Int(A/30),270,10
  Defline 1,1,0,0
  Put 4,134,Gd$
  Setcolor 4,Random(7),Random(7),Random(7)
  X=Ex
  Y=Ey
  Deffill 3
  @Radarfix
  X=Cx
  Y=Cy
  Deffill 2
  @Radarfix
  Deffill 6
  For I=1 To Rn
    If Rx(I)>0
      X=Rx(I)
      Y=Ry(I)
      @Radarfix
    Endif
  Next I
Return
Procedure Radarfix
  If Abs(X-Px)<5 And Abs(Y-Py)<5
    A=(X-Px)*6
    B=(Y-Py)*6
    If Pd=1
      Pcircle 35+A,165+B,2
    Endif
    If Pd=2
      Pcircle 35+B,165-A,2
    Endif
    If Pd=3
      Pcircle 35-A,165-B,2
    Endif
    If Pd=4
      Pcircle 35-B,165+A,2
    Endif
  Endif
Return
Procedure Prints !..............................
  Deffill 9,2,8
  Pbox 10,35,60,45
  Pbox 10,60,60,70
  Pbox 10,85,60,95
  Pbox 10,110,60,120
  Graphmode 2
  Deftext 3,0,0,4
  Text 12,17,"THETATEN"
  A$="Level "+Str$(M1)
  Text 12,42,A$
  A$="Hits  "+Str$(Ht)
  Text 12,67,A$
  A$="Ships "+Str$(Lv)
  Text 12,92,A$
  A$="$ "+Str$(Int(Sc))
  Text 12,117,A$
  Graphmode 1
  Showm
Return
Procedure Newlevel !............................
  @Rndmaze
  Cls
  Inc M1
  Rn=M1+Ms-1
  If Rn>Ms*2+3
    Rn=Ms*2+3
  Endif
  S1$=""
  Sx(1)=0
  For I=1 To Rn
    Rerand:
    X=Random(Nc)
    Y=Random(Nr)
    If M(X,Y)<>0
      Goto Rerand
    Endif
    M(X,Y)=2
    Rx(I)=X
    Ry(I)=Y
    Rd(I)=1
  Next I
  Cls
  Put 70,0,W1$(0)
  Color 1
  Restore Dat1
  Dat1:
  Data 5,5,65,25,9,5,30,65,50,9,5,55,65,75,9,5,80,65,100,9,5,105,65,125,9
  Data 255,5,315,125,9,0,130,70,199,8,250,130,319,199,8,75,180,245,199,8
  Data 75,140,95,170,14,225,140,245,170,14,100,135,220,175,14
  For I=1 To 12
    Read A,B,C,D,E
    Box A,B,C,D
    Box A+1,B+1,C-1,D-1
    Deffill E,2,8
    Fill A+2,B+2
    Box A+3,B+3,C-3,D-3
  Next I
  @Prints
  Graphmode 2
  Deftext 6,0,0,6
  Text 82,158,"W"
  Text 232,158,"M"
  Text 267,119,"E"
  Text 296,119,"G"
  Deftext 15,0,0,4
  Text 82,193,"Plyr"
  Deftext 2
  Text 112,193,"H-Base"
  Deftext 6
  Text 156,193,"Saucers"
  Deftext 3
  Text 204,193,"Energy"
  Graphmode 1
  Defline 1,6,0,1
  Color 2
  Line 140,160,110,160
  Line 180,160,210,160
  Line 160,155,160,140
  For I=1 To Ms*25
```

```
    Do
      X=Random(Nc)
      Y=Random(Nr)
      Exit If M(X,Y)=0
    Loop
    M(X,Y)=10
  Next I
  Do
    Px=Random(Nc)
    Py=Random(Nr)
    Exit If M(Px,Py)=0
  Loop
  M(Px,Py)=20
  Do
    Ex=Random(Nc)
    Ey=Random(Nr)
    Exit If M(Ex,Ey)=0
  Loop
  Do
    Cx=Random(Nc)
    Cy=Random(Nr)
    Exit If M(Cx,Cy)=0 And Cx<>Ex And Abs(Cx-Px)>2 And Abs(Cy-Py)>2
  Loop
  Pd=1
  @Move
  Defline 1,12,0,0
  Color 6
  If Gd<50
    Line 299,110,299,110-Gd*2
  Else
    Line 299,110,299,10
  Endif
  Defline 1,1,0,0
  Color 1
  Box 260,140,260+Nr,140+Nr
  Deffill 11,2,14
  Fill 1,1
Return
Procedure Makeput !.............................
  Deffill 1,2,4
  For I=1 To 10
    Pellipse 10,5,I,I/2.5
    Get 0,0,20,10,Fp$(11-I)
  Next I
  For I=1 To 10
    Cls
    J=I*4
    Defline 1
    Color 2
    Deffill 2.2.8
    Line J/2,J/2-I-2,J/4,J/2
    Draw  To J-J/4,J/2
    Draw  To J/2,J/2-I-2
    Fill J/2,J/2-1
    Deffill 4,2,5
    Ellipse J/2,J/2,J/2,J/6+1
    Fill J/2,J/2+1
    Get 0,0,J,J,Sb$(I)
  Next I
  Cls
  Color 3
  For I=0 To 3
    Rbox I*4,0,I*4+4,30
    Deffill 2,2,7
    Fill I*4+1,9
  Next I
  Get 0,0,16,30,Ep$
  Cls
  Deffill 11,2,8
  Prbox 0,0,72,72
  For I=5 To 1 Step -1
    Deffill I+6,2,4
    Pcircle 36,36,I*8
  Next I
  Deffill 15
  Pcircle 36,36,2
  Get 5,5,67,66,Gd$
  Cls
  Deffill 6,2,8
  Pbox 0,0,6,15
  Get 0,0,6,15,Go$
  Cls
  Deftext 1,0,0,6
  Text 20,180,"ThetaTen - written in GFA BASIC"
  Defline 1,1
  Color 1
  Rbox 70,0,250,130
  Deffill 5,2,8
  Fill 80,8
  Color 8
  Line 71,120,90,110
  Draw  To 230,110
  Draw  To 249,120
  Line 90,110,90,30
  Draw  To 71,15
  Line 90,30,120,1
  Line 200,1,230,30
  Draw  To 249,15
  Line 230,30,230,110
  Deffill 8,2,8
  Fill 72,100
  Fill 248,100
  Deffill 10
  Fill 90,1
  Fill 230,1
  Deffill 7
  Fill 160,2
  Get 70,0,250,130,Wl$(0)
  A=110
  B=110
  C=210
  D=40
  E=15
  For Wn=1 To 9
    Color 1
    Line A,B,C,B
    Draw  To C,D
    Draw  To C-22+Wn*2,E
    Draw  To A+22-Wn*2,E
    Draw  To A,D
    Draw  To A,B
    Color 5
```

```
  For J=B-10+Wn To B
    Line A+1,J,C-1,J
  Next J
  Color 1
  Line A+1,B-10+Wn,C-1,B-10+Wn
  A=A+10-Wn
  B=B-10+Wn
  C=C-10+Wn
  D=D+5-Wn/2
  E=E+10-Wn
  Deffill Wn+7
  If Wn>5
    Deffill 12
    Endif
    Fill 160,62
    Get 110,10,210,110,W1$(Wn)
  Next Wn
  For I=1 To 9
    Color 9
    Line I+70,I+30,I+70,124-I
    Line 240+I,40-I,240+I,114+I
  Next I
  Color 5
  For I=115 To 125
    Line 71,I,249,I
  Next I
  Get 70,30,80,125,D1$
  Get 240,30,250,125,Dr$
Return
Procedure Initial !.............................
  Setcolor 0,2,2,2
  Setcolor 1,7,0,0
  Setcolor 2,0,5,0
  Setcolor 3,7,7,0
  Setcolor 4,0,7,7
  Setcolor 5,0,0,6
  Setcolor 6,1,2,2
  Setcolor 7,0,0,5
  Setcolor 8,0,0,4
  Setcolor 9,0,0,3
  Setcolor 10,0,0,2
  Setcolor 11,4,0,4
  Setcolor 12,1,0,1
  Setcolor 13,7,7,7
  Setcolor 14,0,0,0
  Setcolor 15,0,0,0
  Dim M(28,28),Rx(9),Ry(9),Rd(9),Fp$(10),W1$(10),Sb$(10),Sx(12),Sy(12)
  C$=""
  B$=""
  Restore Dat2
  For I=1 To 16
    Read A
    C$=C$+Mki$(A)
    B$=B$+Mki$(2047-A)
  Next I
  Dat2:
  Data 0,112,136,292,372,292,136,112,0,0,0,942,298,298,302,0
  Mous$=Mki$(11)+Mki$(5)+Mki$(1)+Mki$(5)+Mki$(6)+B$+C$
  Defmouse Mous$
  Showm
Return
Procedure Moverobot !..........................
  Zc=0
  Do
    Inc Zc
    Exit If Zc>Rn Or Random(M1+Ms)=1
    Inc Rm
    If Rm>Rn
      Rm=1
    Endif
    @Moverob
  Loop
Return
Procedure Moverob
  Sound 1,12,Rm+3,2,0
  R=Ry(Rm)
  C=Rx(Rm)
  D=Rd(Rm)
  X=C
  Y=R
  @Testevod
  Gosub Dir
  If M(X,Y)<>1
    Goto Move
  Endif
  D=Rd(Rm)
  X=C
  Y=R
  @Dir
  If M(X,Y)<>1
    Goto Move
  Endif
  X=C
  Y=R
  Inc Rm
  @Testevod
  Dec Rm
  @Dir
  If M(X,Y)<>1
    Goto Move
  Endif
  Retry:
  X=C
  Y=R
  @Testevod
  @Dir
  If M(X,Y)<>1
    Goto Move
  Endif
  Goto Retry
  Move:
  M(Rx(Rm),Ry(Rm))=M(Rx(Rm),Ry(Rm))-2
  For I=1 To 10
    Exit If Sx(I)=0
    If Rx(Rm)=Sx(I) And Ry(Rm)=Sy(I)
      Put 90,10,S1$
    Endif
  Next I
  Rx(Rm)=X
  Ry(Rm)=Y
  Rd(Rm)=D
  M(X,Y)=M(X,Y)+2
  If X=Px And Y=Py
    If En<400+100*M1
      B$="Ship LOST - hit by Saucerbot"
      @Looselife
    Else
      Setcolor 0,7,7,7
      Deftext 1,0,0,4
      Text 75,128,"Hit by Saucerbot-Shields held"
      Wave 8,1,1,50000,100
      Setcolor 0,2,2,2
      En=Int(En-400-100*M1)
      Rx(Rm)=Cx
      Ry(Rm)=Cy
      @Move
    Endif
  Endif
  For I=1 To 9
    Exit If Sx(I)=0
    If X=Sx(I) And Y=Sy(I)
      Put 160-10+I+Random((10-I)*2),80-I*3,Sb$(10-I),6
    Endif
  Next I
  Sound 1,0,0,0,0
Return
Procedure Testevod !...................
  If Even(Rm)
    Inc D
    If D>4
      D=1
    Endif
  Endif
  If Odd(Rm)
    Dec D
    If D<1
      D=4
    Endif
  Endif
Return
Procedure Rndmaze !............................
  Z1=2
  Arrayfill M(),0
  For R=0 To Nr
    M(0,R)=1
    M(Nc,R)=1
  Next R
  For C=0 To Nc
    M(C,0)=1
    M(C,Nr)=1
  Next C
  R=Nr/2
  C=Random(Nc/2-4)*2+2
  R=Random(Nr/2-4)*2+2
  Gosub M980
  K=0
  T=(Nc/2-1)*(Nr/2-1)-1
  While K<T
    @M930
    Inc K
    Color Random(15)
    Circle 75+Random(170),5+Random(120),3
    Sound 1,10,C+R,4,0
    Wend
    Sound 1,0,0,0,0
    Z1=1
  Return
  Procedure M930
    M931:
    C=Random(Nc/2)*2
    R=Random(Nr/2)*2
    M932:
    D=Random(4)+1
    If M(C,R)<>2
      Goto M931
    Endif
    X=C
    Y=R
    Inc D
    If D>4
      D=1
    Endif
    @Dir
    If M(X,Y)<>1
      Goto M932
    Endif
    A=(Y+R)/2
    B=(X+C)/2
    M(B,A)=1
    M(C,R)=1
    @M950
  Return
  Procedure M950
    For D=1 To 4
      X=C
      Y=R
      @Dir
      If M(X,Y)=0
        M(X,Y)=2
      Endif
    Next D
  Return
  Procedure M980
    M(C,R)=1
    @M950
  Return
  Procedure Dir
    If D=1
      Y=R-Z1
    Endif
    If D=2
      X=C+Z1
    Endif
    If D=3
      Y=R+Z1
    Endif
    If D=4
      X=C-Z1
    Endif
  Return
```

**END**

# Laser C

**Megamax, Inc.**
**Box 851521**
**Richardson, TX 75085-1521**
**(214) 987-4931**
**$199.95**

**Reviewed by**
**Dare[illegible] Mihocka**

By now, almost everyone reading this has seen Megamax's full-page advertisements in various Atari magazines: "The Fastest C Language available for your ST! Compile and Link the Sieve Benchmark in only five seconds!" *Laser C*, the long-awaited Megamax C, version 2, is finally available, and it is quite something: An improved GEM shell, a more efficient compiler, a faster linker, a debugger, a real MAKE utility, excellent documentation, no more 32K limitations in the compiler, and more!

Although still very similar to *Megamax C*, Laser C is a much more complete development package that is easy to use and is among the best I've seen on the ST, although it is not without its share of problems. In this review Laser C version 1.01 is benchmarked and compared with its predecessor, Megamax C, and a few points are compared with *Alcyon C* and *Mark Williams C*, although this is in no way a complete product comparison.

Laser C comes on three single-sided disks and with a 600-page manual which is quite extensive. Along with documentation for the compiler, linker and editor, the manual has full documentation for all BIOS, XBIOS, GEMDOS, and GEM calls, and even includes a full chapter on "Line-A" calls. For most functions a sample source code is provided, which is a tremendous benefit to both new programmers and experienced developers who may need to occasionally refresh their memory on how to call certain routines. Sample GEM programs are provided, and even the object code file format is described in the manual.

## Laser C shell and editor

To satisfy both those people that prefer to use GEM and those that insist on using a command-line interface, Laser C operates equally as well in both environments. The shell uses custom windows and file selectors, and includes a built-in command-line interface, although Laser C can be used without the shell by using any public-domain or commercial command-line interface.

The Laser C graphics shell can virtually replace the ST's desktop, providing a built-in editor, dynamic disk cache, disk commands and a command-line interpreter. Compiling, linking, and testing of software can all be done from within the shell.

The disk cache is quite an asset. Depending on how it is configured, it can be set to cache both reads and writes, or reads only. It is dynamically allocated by the shell, so as the text buffers grow, the cache reduces its size and flushes out the least recently used files if necessary. Even on a hard disk, it noticeably improves the performance of disk operations, with hit rates usually above 80%.

The caching eliminates the need to set up a RAMdisk for development, as many people do with Megamax C and other compilers. The only problem I experienced with the cache was not being able to turn it off. When the cache gets too full, it tends to slow down, especially when running a program that allocates more memory than is currently available. Time is lost as it reshuffles memory, and the only remedy for now seems to be to periodically flush out the cache.

One nice side effect of the cache is that I was able to compile and run the sample source code files supplied on the Laser C disks while they still had write protection turned on. The cache detects if the floppy is removed and prompts you to reinsert it to flush the cache.

One can install other applications into the shell environment. For example, I prefer to use *Tempus* as my text editor, so after installing Tempus, to edit a file I simply go up to the menu bar and click on the menu entry "TEMPUS.PRG" instead of "Open." The shell has special menu entries for the compiler, linker, and make utility, and these too can be configured so that, for example, the old Megamax compiler can be used from this shell.

The shell maintains a configuration file so that each time it is loaded, environment variables like search paths, installed applications and editor parameters are also loaded. Similarly, the linker maintains link files for multiple module links.

The file selectors in Laser C are an extension of the standard GEM file selector. They override any other custom file selectors that may be loaded and offer the ability to access any of the possible 16 drives (A: through P:) and have five predefined file masks available. Multiple files can be selected for disk operations, and folders are entered by double clicking, which is similar to the way the GEM desktop windows operate.

The built-in command-line interface is actually another editor window. All text output from the compiler and other utilities is redirected to this window, so that TOS programs can execute without leaving the window-based shell. Since it is an editor window, all text output is captured, allowing one to easily review past compilations. Commands can be executed from this window by placing the cursor on a line of text within this buffer and pressing the Enter key.

The editor, which is an integral part of the shell, can edit up to four text files at once (in addition to the output window), limited in size only by available memory. It is similar in appearance to the older Megamax C editor, although it seems to scroll faster and has

some new features. Although I use another editor, I still find it handy to have this editor available to make minor changes to files after, say, a compile error.

One feature I particularly like is the ability of the editor to match opening and closing braces and parentheses. For example, in a complex expression with many levels of parentheses, by double clicking on an opening parenthesis, the editor will locate the matching closing parenthesis.

There is an auto-save option in the editor to automatically save the text buffers at periodic times. The option will also save the text buffers before running a compiled file, so that in the event of a crash, the code is safely saved to disk.

One bug I found in the editor was in the Shift Left and Shift Right commands, which take a selected block of text and indent it (or unindent it) one tab stop. I found that if the block is too large (about 100 lines or more), the editor will hang up or crash. This bug is supposed to be fixed according to a README file, but obviously they didn't test it enough.

## The compiler

The Laser C compiler is similar to the Megamax C compiler. It still supports in-line assembly code, and offers several improvements. Still being a one pass compiler, it is about the same speed as the Megamax C compiler.

The major change is the elimination of the 32K restrictions found in Megamax C. Both the data and code can now be unlimited in size because PC-relative code is no longer generated. All references to labels and data objects are made using absolute 32-bit addressing modes. This of course increases code size slightly and also increases execution time, but makes Laser C more compatible with the rest of the world and is a necessary price to pay for the ability to write large applications without having to code around 32K limitations.

Up until now, Megamax C users have sometimes had to go to great lengths to convert pieces of Alcyon C and DRI assembler code to compile on Megamax C. With Laser C the code can be taken almost verbatim, so that it is no longer necessary to label code as "Megamax C compatible" as is even done sometimes in ST-Log.

Megamax owners may wonder how much of a speed degradation absolute addressing will cause to existing code. For example, probably one of the most common instructions in C is of the form X = Y, where X and Y are integers. Under Megamax C, this compiles into one instruction, move.w Y(A4), X(A4), which is six bytes long and takes 20 clock cycles to execute. Under Laser C (and most other compilers), the code generated is (and ignore the underscores), move.w __Y.l, __X.l which is 10 bytes long and takes 28 cycles to execute, 40% longer. This is probably a worst case example, since code is not made up only of these instructions. More on this later on.

Table 1 summarizes some benchmark results I obtained using six different setups repeated on two different 1040STs:

—Alcyon C 1.0 with the new ALN linker
—Mark Williams C 2.1
—Megamax C 1.1 on a hard drive
—Megamax C 1.1 on a 400K RAM disk
—Laser C 1.01 on a hard disk with an empty disk cache
—Laser C 1.01 with a full disk cache

Due to the size of the files required for Alcyon, I could not do a benchmark of Alcyon C on a RAMdisk. Based on its very poor results on the hard disk, it probably would not compete with Laser C on a RAMdisk either.

TABLE 1: Benchmark Results

As advertised, Laser C will compile and link the Sieve in five seconds. However, what Megamax fails to mention in their ad is that executable code size and execution times are larger and longer compared to the original compiler. The slower execution speed can be attributed to the absolute code generation. The larger file size is due to what appears to be a larger run-time library, which contains faster, more accurate floating point routines.

Listing 1 is the code for the Sieve benchmark and is provided for your reference.

After modifying the sieve to not use register variables, I got execution times of 4.00, 4.31 and 4.89 seconds for Megamax C, Laser C and Mark Williams C, respectively.

In other tests I tried with much larger source code files, the actual code size stayed roughly the same or increased slightly with Laser C. Although Megamax C usually produces the tightest code, in large programs that require the use of overlays, it generates a lot of extra code in the form of jump tables (to allow it to move between code segments). Larger programs also tend to have more global variables and thus more initialization data. Megamax generates an extra code segment containing an initialization code which executes at run time. Laser C does away with both these extra code problems, which helps to minimize the extra size of its code.

Since Laser C now frees up registers A4 and A5, four address register variables are now available instead of the two in Megamax. Any C function can have a total of eight register variables, four data and four address.

Most Megamax code can be converted over quickly by just removing overlay statements and removing references to A4, A5, and PC from in-line assembler code. Register A6 is still used as the stack frame-pointer and interrupt routines no longer need to go through the hassle of restoring A4.

Laser C automatically optimizes branch statements at compile time, generating a short two-byte branch whenever possible. Megamax C required a separate pass through the object code to do this.

**TABLE 1**

| | Alcyon(HD) | MWC(RAM) | MM(HD) | MM(RAM) | Laser(HD) | (cache) |
|---|---|---|---|---|---|---|
| SIEVE.C | | | | | | |
| Compile | 0:22 | 0:05 | 0:08 | 0:02 | 0:06 | 0:03 |
| Link | 0:09 | N/A | 0:12 | 0:07 | 0:07 | 0:02 |
| Total | 0:31 | N/A | 0:20 | 0:09 | 0:13 | 0:05 |
| Size | 12517 | 12415 | 5997 | 5997 | 11241 | 11241 |
| Time | 2.45 | 2.89 | 2.37 | 2.37 | 2.45 | 2.45 |
| APSKEL.C | | | | | | |
| Compile | 0:55 | N/A | 0:08 | 0:07 | 0:10 | 0:07 |
| Link | 0:10 | N/A | 0:13 | 0:08 | 0:07 | 0:02 |
| Total | 1:05 | N/A | 0:21 | 0:15 | 0:17 | 0:09 |
| Size | 11424 | N/A | 5618 | 5618 | 8569 | 8569 |

A pleasant surprise was that Laser C compiles switch/case instructions in one of three ways: using jump tables, a binary search or a linear search. The parameters that determine which method is to be used can be adjusted by setting the -s switch when compiling, but simply put, the default configuration works like this: If there are less than 10 case statements for a given switch, and their values are fairly close together, a jump table is generated. Otherwise, if there are more than 12 case statements, a binary search method is used; otherwise, the familiar linear search is used. This means that the programmer doesn't need to worry about the number of case statements he uses and doesn't have to try to code around them by using elaborate if/then/else combinations. Laser C will do it automatically based on the conditions of each switch.

A few minor omissions from Megamax C are now finally included in Laser C. These include support for void and unsigned long types. Much to my disappointment, though, a few bugs in the in-line assembler were carried over, such as the MOVEP and DC.B code generation bugs, although at the time this review was being written, an update with these and most of the other outstanding bugs fixed was available.

## Code generation differences

Since the Sieve benchmark is only one of thousands of programs I could have compiled and benchmarked, I decided a better test of the compiler would be to actually look at the code produced by Megamax C and Mark Williams C and compare it to Laser C's code. Comparing to Megamax C code would show where the compiler has been optimized, and comparing to Mark Williams C code would show how different compiler writers implement their code. I used the object files generated by each compiler for the Sieve program and disassembled them.

A problem I encountered on the ST is that all instructions execute in a multiple of four clock cycles. Thus, even though the official Motorola publications on the 68000 may list a certain instruction as taking 10 cycles to execute, it really takes 12. To verify this, I used the program shown in Listing 2 to time individual instructions. The formula works for my monochrome ST; it may need adjusting on other systems, even monochrome ones, since not all STs seem to run at quite the same speed.

While testing the various instructions produced by the three compilers, I found one piece of code that stuck out, and that is in the way the various compilers adjust the stack pointer after a function call.

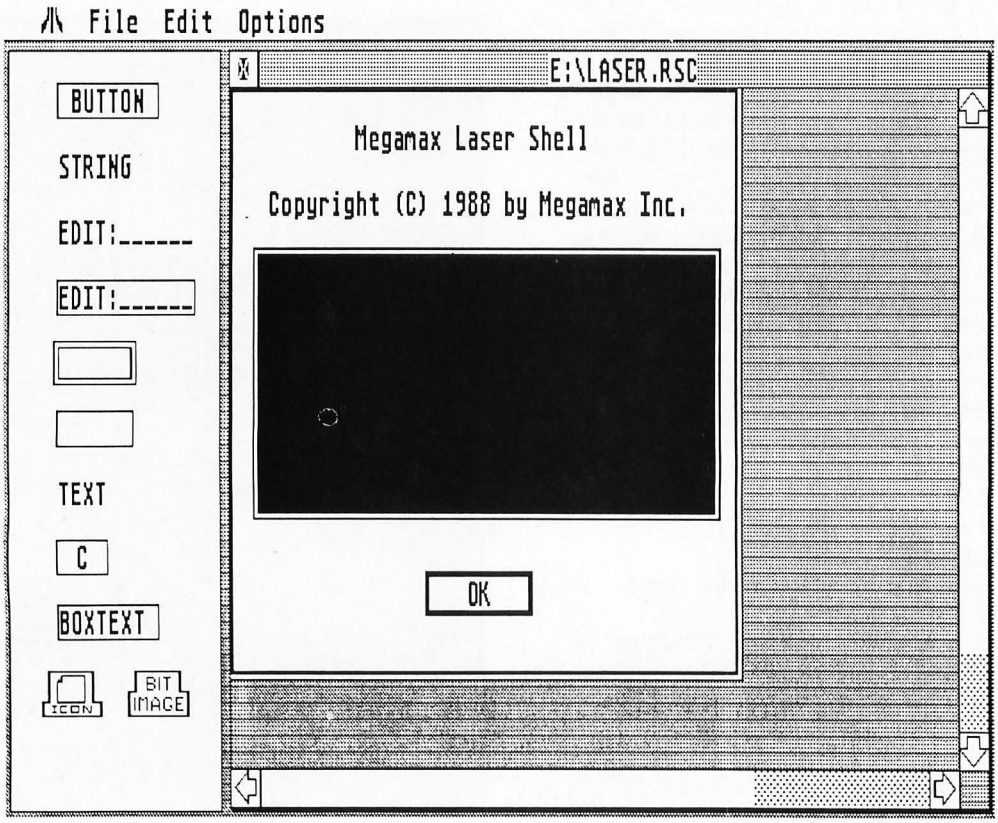
The fastest and shortest method to increment the stack pointer by values less than or equal to 8 is to use ADDQ.L#nn,A7. When nn is larger than 8 though, the obvious choice is to use ADDA.L#nn, A7 which takes 12 clock cycles, and is the method used by Mark Williams C. Laser C, on the other hand, uses the faster LEA nn(A7), A7 which takes only eight cycles.

Other than that obvious difference, the code generated by the compilers looked very similar, even when it came to register variable usage. All three compilers generate totally different code to access elements of an array, but after timing each of the three code segments, I found they all take 28 cycles each.

I only found one line of Laser C code that disturbed me. Right after one of the floating point operations in the Sieve program, the stack pointer needs to be incremented by 10. Laser C generates an ADDQ.L#8,A7 followed immediately by an ADDQ.L#2,A7. This is just plain brain-dead code! Hopefully these occur few and far between.

The only factor I can see that might cause the poorer speed shown by the Mark Williams C code is that it structures for loops differently, in terms of where the comparisons and branches are placed. The rest of the code was the same.

In general, none of the compilers produce bad code, but none of them stand out as being superior, like Turbo C and Microsoft C 5.1 do in the IBM PC world.



## The linker

The linker comes with a wide selection of command-line switches, and the linker now produces standard DRI object files. One option I found interesting (although hardly practical to most people) is the ability to relocate the code to an absolute position and link time. Most programs on the ST are relocatable and are bound to a specific address only at run-time. This feature is probably most useful to someone writing code for the cartridge slot, which will then be burned into ROMs.

The linker also has the usual options of producing map files and including a symbol table in the executable file.

The first thing that struck me when using the linker is how fast it is. Compared to the Megamax linker, it is about four times faster, if not more. Programs that used to take a minute to link on a hard drive now take about 10 or 15 seconds. This rivals the speed of Atari's ALN linker. The documentation hints at the fact that the library contains an index which the linker uses at link time. This is similar to the external index files used by ALN.

When linking a desk accessory or an application that makes use of floating point, it is not necessary to do anything extra. No extra libraries need to be linked in, and no weird .L files (that Megamax C uses) are required.

## Documentation and utilities

Several UNIX-like utilities are included with Laser C. These include MAKE, LS, CAT, RM, CP and EGREP. The disassembler provided will disassemble any Laser C or DRI-compatible object file. The disassembler will include label names if symbols are present in the file, but only the first bytes of each instruction are in hex.

All of the utilities are documented in the manual, some in great detail, some not. For example, 10 pages are spent talking about the MAKE utility, and examples of simple and complex make files are given. Unlike the bare-bones make function of the Megamax shell, this MAKE utility is full-blown UNIX-type make. One limitation I found is that the Laser C shell only allows for 10 targets to be displayed in the drop-down menu, although the make file can have as many more targets. For more targets, the command line must be used. Anyone familiar with using MAKE on an MS-DOS or UNIX environment will feel right at home using it.

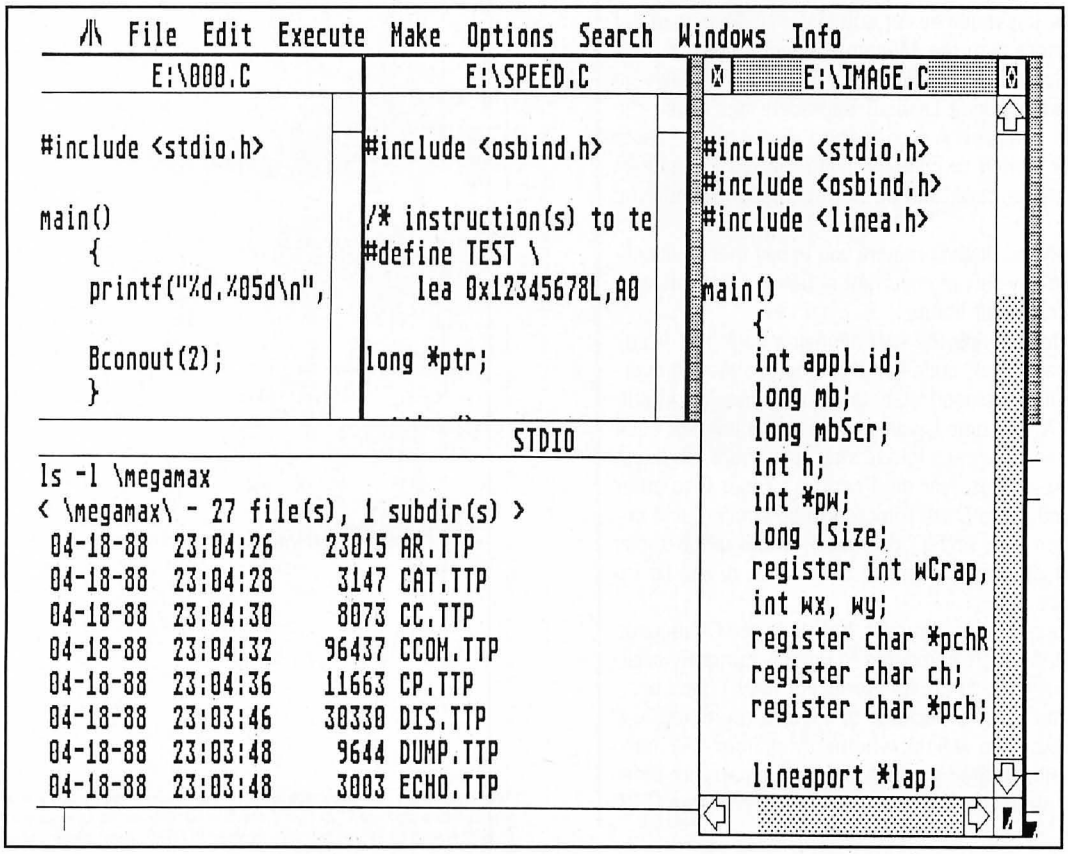
Another 10 pages are devoted to the resource construction program included with Laser C. This I feel, is far too inadequate for anyone not already familiar with using a resource editor. Although the manual gives many examples of GEM routines, I think it fails to explain the importance of resources, and no sample resource files (other than Laser C's resource file) are provided on the disk.

The resource editor is a plain vanilla type. It has most of the basic functions found in all resource editors, and lacks nice features like the ability to produce C-compilable source code of the resource (like Atari's *RSC 2.0*), or the ability to test resources (like Kuma's *K-Resource*). However, considering that some other compilers don't even come with a resource editor, it is certainly a welcome part of the package.

The first 100 pages of the manual cover 14 chapters, from the shell and editor, to the linker, to all the utilities. I think this leaves many topics insufficiently covered for the first-time user, although it is more than adequate for the experienced developer.

As I already mentioned, the rest of the documentation is loaded! It contains dozens of sample programs, dealing with everything from creating and displaying a window to using the timer interrupts. It's a good 500 pages of well-written BIOS, GEM and VDI documentation. The Line-A documentation is as detailed as other descriptions I've seen, and of course comes with lots of sample code.

In comparing the Laser C manual with that of Mark Williams C, which is almost identical in content and appearance, I found the Laser C manual to be easier to get around in, since the functions are grouped types, like GEM, VDI, BIOS, etc. In the Mark Williams C manual all functions are mixed in alphabetically, but lots of sample code is also provided.



## Bugs and debugging

Laser C comes with a "debugger." I use the quotes because I wasn't impressed with it. For two years I've been using *MonST* and recently *Tempelmon*, an excellent public-domain 68000 debugger/monitor program. Although not a symbolic debugger, with Tempelmon it is a snap to track down almost any crashing bug, and it works well with Megamax C.

One problem with Laser C is that it refuses to boot up with Tempelmon resident, and even worse, any programs compiled by Laser C that call the printf( ) function won't boot either. To make matters worse, the folks at Megamax claim to have developed Laser C using Tempelmon as their debugger.

The problem appears to be an illegal use of the Fdatime( ) call on Laser C's part, and the Megamax people have been notified of this.

Getting back to Laser C's debugger, it consists of a compiler and linker switches which cause them to generate extra debugging code and a symbol file. The debugger, which is about 30K of code, is linked in with the program being compiled. When it is executed, the debugger is entered. At this point you can set break points, run the program, dump variables, and do all of the usual debugger things at the symbol level.

However, I find the debugger to be more of a kludge than a powerful debugging tool. A couple of dozen well-placed printf( ) statements in a program can be just as useful. Perhaps I'm spoiled, but having used Tempelmon and the source level debugging in *Microsoft's Quick C*, I find this debugger to be very limited.

## The verdict

Laser C is available to Megamax C owners as a $20 upgrade—which is a steal! Even if you choose to stick with the old Megamax compiler (if an existing piece of Megamax code is tight and fast, don't mess with it!), the updated documentation will be beneficial and the new shell environment is simply fantastic. And you'll still get the same great phone support and update policy as with Megamax C.

For small programs, it is much easier and faster to develop under the Laser C environment than the Megamax environment. If code size or speed is really critical, the finished product can always be compiled with Megamax, since Laser C upgraders don't lose the right to use their old compiler. A nice feature would be for Laser C to have a compiler switch to compile using the old PC relative code, but such is not the case, and so both compilers should be kept handy.

As before, Megamax Inc. doesn't require you to pay them a licensing fee or even put up any sort of copyright notice in your software for the use of their run-time library.

Laser C is not perfect. It has the few annoying bugs and it still produces the odd "brain-dead" code here and there, although overall it appears to produce as good or better code than Mark Williams C or Alcyon C. At the time I was writing this, I had not seen *Mark Williams C 3.0*, and I've been told to stay away from the latest version of *Alcyon* due to bugs. Nor did I compare Laser C to other compilers (*Aztec C* and *Turbo C* are rumored to be coming, and nobody really uses *Hippo C* or *GST C*, do they?). If and when those compilers make their appearance on the ST market, it will be interesting to test them.

However, Laser C is not just a compiler. It is an entire C-language development package. As such, compared to what is currently available, I feel it is without equal in the ST world. For now, I don't hesitate to recommend the Laser C package to anyone interested in C programming on the ST. Time will tell whether Megamax will make frequent enough updates to their product to maintain par with other compilers, especially with the juicy features Mark Williams C 3.0 is supposed to have. ■

## Laser C Review Listing 1 C

```
#include <osbind.h>

#define true 1
#define false 0
#define size 8190

long *ptr;

gettime()
{
        *ptr = *(long *)0x462;
}

char flags[size+1];
main()
{
        register int i,k;
        register int prime,count,iter;
        long t, t2;

        printf("10 iterations\n");
        ptr = &t;
        Supexec(gettime);
        for (iter = 1; iter <= 10; iter++) {
                count = 0;
                for (i = 0; i <= size; i++)
                        flags[i] = true;
                for (i = 0; i <= size; i++) {
                        if (flags[i]) {
                                prime = i + i + 3;
                                for (k = i+prime; k <= size; k+=prime)
                                        flags[k] = false;
                                count++;
                        }
                }
        }
        ptr = &t2;
        Supexec(gettime);
        printf("Took %0.2f seconds\n",(double)(t2-t)/(Getrez()==2 ? 70:60));
        puts("Press RETURN to exit");
        Cconin();
}
```

## Laser C Review Listing 2 C

```
#include <osbind.h>

/* instruction(s) to test: */
#define TEST \
        lea 0x12345678L,A0

long *ptr;

gettime()
        {
        *ptr = *(long *)0x462;
        }

main()
        {
        register long c;
        long t, t2;

        ptr = &t;
        Supexec(gettime);

        for (c=0; c<1000000L; c++)
                {
        asm
                {
                TEST
                }
                }

        ptr = &t2;
        Supexec(gettime);
        printf("%0.0f cycles\n",(double)(((t2-t)/70.0)-4.25)/0.133);
        Cconin();
        }
```

**END**

*Darek Mihocka is a third-year computer-engineering student at the University of Waterloo. His latest ST project was the improved ST Xformer II, and he is currently working on image-processing and character-recognition software. He can frequently be found on DELPHI under the user name DAREKM.*

# BOOT UP TO BIG SAVINGS!

## 1 YEAR FOR ONLY $28

SAVE $14 OFF THE COVER PRICE

## 1 YEAR *WITH DISK* ONLY $79

**SAVE TIME AND MONEY SUBSCRIBE TO ST-LOG**

**SAVE $14 OFF THE COVER PRICE WITH THE CONVENIENCE OF HAVING ST-LOG DELIVERED DIRECTLY TO YOUR DOOR *BEFORE* IT EVEN HITS THE NEWSSTANDS! GET THE MOST OUT OF YOUR COMPUTER**

**SUBSCRIBE TO ST-LOG TODAY!**

☐ 1 YEAR @ $28 — SAVE $14! (MCJWW)
FOREIGN — ADD $7 PER YEAR
☐ 1 YEAR *WITH* DISK @ $79 (DCJWW)
*FOREIGN* — ADD $15 PER YEAR
☐ PAYMENT ENCLOSED ☐ BILL ME
CHARGE MY: ☐ VISA ☐ MC #_____

EXPIRATION DATE SIGNATURE

MONEY BACK ON ALL UNUSED PORTIONS OF SUBSCRIPTIONS IF NOT SATISFIED.

NAME

ADDRESS

CITY STATE ZIP

MAKE CHECK PAYABLE TO L.F.P., INC., P.O. Box 16928, N. Hollywood, CA 91615. Offer expires December 30, 1988. Your first issue will arrive in 6 TO 8 weeks.

**WATCH FOR IT!**

# ULTIMATE STORAGE

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

**The ST-Log binder** opens flat for easy reading and reference. They're economically priced at only $9.95 each—3 binder for $27.95 or 6 binders for $52.95.

**The ST-Log file** is attractive and compact, holding 12 issues for easy access. Files are available for only $7.95 each—3 files for $21.95 or 6 files for $39.95

*Add $1.00 per case/binder for postage and handling.*
*Outside U.S., add $2.50 per case/binder—U.S. funds only.*

- - - - - - - - - - - - - -

I enclose my check or money order in the amount of $_____
Send me: ____ **ST-Log** files
____ **ST-Log** binders.

*PLEASE PRINT.*

Name: _____

Address: (No P.O. Boxes)_____

City: _____

State: _____ Zip Code: _____

Send your order to:

**Jesse Jones Industries**
DEPT. ACOM, 499 East Erie Ave.,
Philadelphia, PA 19134
Call Toll Free 1-800-972-5858
7 days, 24 hours.

Charge orders only, minimum $15.00
PA residents, add 6% sales tax

*Satisfaction guaranteed or money refunded.*

# JINXTER

**by Magnetic Scrolls**
**Rainbird Software**
**P.O. Box 2227**
**Menlo Park, CA 94026**
**(415) 329-7699**
**Color or monochrome**
**$39.95**

**Reviewed by Betty D. DeMunn**

The following is taken from an interview with a *Jinxter* player who, for obvious reasons, wishes to remain anonymous. He is currently in a maximum security facility, having been apprehended in Boston Harbor with twenty kilos of Earl Grey teabags.

BD: How did a nice guy like you. . . .?

JP: I used to review adventure games. Some critics just print the box. I deal with these suckers first-hand. I get in there and sweat bullets, or arrows, as the case may be.

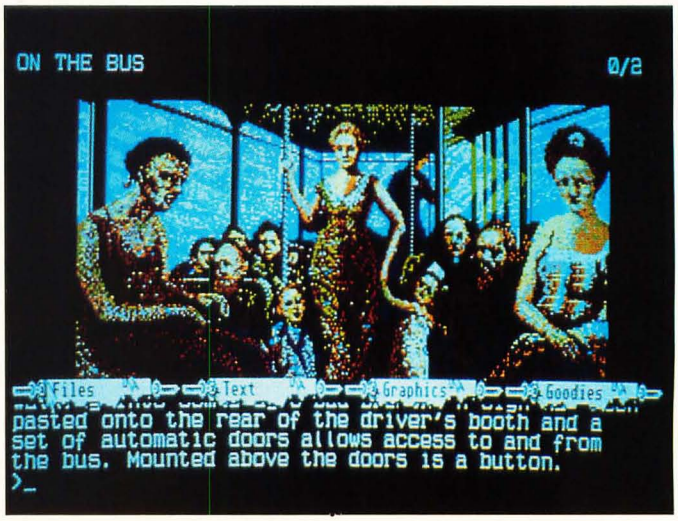
BD: How did you get mixed up with Jinxter?

JP: Well, Rainbird gave us *The Pawn* and *Guild of Thieves*, both good games. Jinxter promised to surprise me at every turn. The package said it was "infuriating, enchanting, absurd and hilarious." How can an American deal with truth in advertising?

(At this point JP handed me a well-chewed Jinxter box.)

JP: Look. Examine the drawing of the carousel. See the guy with the mustache who looks like Manson? See the iffy-gendered person in the red sports car? See the chicken in the background? Those are the perpetrators of Jinxter. They call themselves "Magnetic

**The graphics are awesome, probably the best drawings, pixel for pixel, in the business.**



Scrolls," and they're in London plotting to overthrow Infocom.

BD: That'll be the day. What was in the package?

JP: A beer mat, a very authentic office memo, a tabloid called *The Independent Guardian* and a player's guide.

BD: What's the beer mat for?

JP: It advertises "Old Moose bolter" beer and a contest. Every six months for two years they'll choose the best answer to the question, "Why did the Moose Bolt?" Winners get all of Magnetic Scrolls' software free for life. Or was that the booby prize? I forget. Anyway, I checked, and it's legit.

BD: Tell me about the tabloid.

JP: It's funny if you're British, narmean? The banner states "Quality News for the Hard of Thinking." The weekly for the "Association of Registered Stochastic Executives." Acronym that for a titter. However, all idiot idiom aside, it's important to read every word.

BD: Any special features in Jinxter?

JP: Unusually intelligent parser. It understands almost everything you type—and answers rudely. Then, too, you can script and unscript—toggle the graphics on and off—the usual.

BD: Is there a save option?

JP: Yes, on separate disk. There's room for about 20 saves per disk, and you'd better save a lot. But when you boot up and "restore," you have to search the newspaper for word? on page? in column? on line? The BB guns of surveillance—aimed at pirates, hitting us.

BD: I understand there are online clues.

JP: If you played Pawn or Guild you know the hint system. It's a two-letter code that you type in to get an obtuse clue that needs another clue to make sense. The hint system is another reason they put me in here. (He gestures at the smerfy walls.)

BD: The scenario, please.

JP: The legendary bracelet of Turani has been separated from its charms by a certain witch named Jannedor, weakening her power and allowing her and her rebel organization to seize power. You have to find the five charms and the bracelet and put them back together because Aquitania's luck is running out fast. So is yours.

BD: How is the writing?

JP: Eloquent, elegant, except for the undeleted expletives and occasional obscenities. All the words are spelled right except two. But then they throw in words like "lambent" and "tetragrammaton," and you wear out your dictionary.

BD: After all, English is our mother tongue.

JP: Yeah, it's some kinda mother. How would you like to meet a guy who says, "I was down the old frog-and-toad having an apple-and-pairs, and I sez to the old Hampton Wick, I sez, 'Give us a bottle-and-glass in the old hot dinner, and I'll Aristotle any tit-for-tat in the boat race.'"

BD: That's Cockney rhyming slang. Many people consider it funny. Is Jinxter really "hilarious"?

JP: Compared to what? It's funnier than, say, Doug Llewellyn.

BD: Is it difficult?

JP: Take a dozen babel fish. . . .

BD: How are the graphics?

JP: Awesome. Probably the best drawings, pixel for pixel, in the business. All through the game, whenever the drive whirs, you know you can pull down the scroll bar and see another work of art.

BD: The game, JP.

(At this point JP assumed a fetal position on his futon.)

JP: There are no monsters to kill, only sadistically contrived puzzles to solve. The bracelet charms are hidden with typical British vengefulness. If and when you get in trouble and death is nigh, you're rescued by your Guardian. This lulls you into thinking it's better than getting killed, but beware the cost to your luck. That's what it's really all about. Luck.

(At this point, JP idly sketched a loaf of bread on the soft wall with his black crayon.)

BD: When did you realize you were in trouble?

JP: With four charms in hand, I got stuck on the carousel.

I desperately need the ladder—I can see the ladder, I can move the ladder, but I can't get the ladder. Finally I call Rainbird. AT&T's famous robotess tells me the number's been changed. I call again and get a recording that says press one if you want this, press two if you want that—all the way up to six. I press 2 which is "game hints" and get something that sounds like "mega-genetics." Eventually I get Product Support, but P.S. is "not in the office—leave a message, etc." Communication with other human beings is now controlled by beeps. I thought: *Will he get back to me?* Of course not. Did any software company anywhere ever get back to anyone? Of course not. You should see my phone bill.

(At this point JP screamed, wrenching everyone's guts within a five-mile radius.)

JP: But I was wrong! The next day P.S. called with the secret name of a secret person who had secretly finished Jinxter. I secretly called her, and she secretly gave me some secret hints and told me a secret. She had called those blokes in England several times. You should see her phone bill.

(At this point JP calmed down somewhat and ate his non-toxic black crayon.)

JP: Anyway, shame is fleeting. I cheated my way into possession of the five charms and was ready to confront Jannedor in her wossname, boudoir, when. . . .

(At this point JP went berserk and ran amok. He was quickly subdued by a burly screw, and I left with the strains of "Rule Brittania" drifting in my wake.)

It was difficult to believe that a simple adventure game could wreak such havoc on an otherwise stable mind. I bought Jinxter, determined to see for myself. After two weeks I tried to buy a contract on the guy with the mustache. They caught me.

*Epilogue*: JP and I communicate quite well via a two-letter code through the adjoining soft walls. I feel great compassion for him because I have walked a mile in his tap shoes. Get Jinxter and join us. Narmean?

**Jinxter promised to surprise me at every turn. The package said it was "infuriating, enchanting, absurd and hilarious." How can an American deal with truth in advertising?**

*Ms. DeMunn is a TV, stage and radio personality who is well-known within a five-mile radius of Buffalo, New York. To keep humble, she writes and fools around with her ST.*

# COMPUTER SCRABBLE

**by Leisure Genius**
**Distributed by Electronic Arts**
**820 Gateway Drive**
**San Mateo, CA 94404**
**(415) 572-ARTS**
**520/1040 ST color or monochrome**
**$39.95**

**Reviewed by Betty D. DeMunn**

The credits read like the Bible "begats," beginning with the board design copyrighted in 1948 by Selchow & Righter, sifting through a bevy of American and British companies, and ending with Electronic Arts. As you must address all correspondence to the latter, there is no need to bore you with the genealogy of this version of *Scrabble*. So sue me.

Well, the old girl's been with us for 40 years. Happy birthday, Scrabble! You're still the Numero Uno word game in the world. But don't throw away your old Scrabble sets yet, folks. Board games have been known to lose something in electronic translation.

Assuming that just about everyone has played Scrabble at one time or another, we'll skip the rules, which are in the manual, and go right to boot. After viewing a really nice title screen, during which a million credits are flashed too fast to read, the familiar Scrabble board unfolds on the left. Very authentic, but lacking the words in the premium squares for an obvious reason: They'd be too small to read. Above are four pulldowns: File, Options, Display and Clock. In the upper right is the clock, showing minutes and seconds.

There are eight levels of difficulty—levels 1 through 4 for children and compulsive winners; 5 through 8 for more erudite masochists. All the options of regular Scrabble are here. You may pass, exchange tiles and juggle the letters on your rack. In addition, you may force the computer to stop searching and play the word it is currently considering. You can ask for a hint if you're really stuck, or end the game at any time. Other options include a rundown on the distribution of each letter and a reminder of the value of the pink, blue and red premium squares.

The Display menu has three items. "View Thoughts" has a little arrow zipping around the board as the computer ponders its moves. However, once it decides, the move is made in less than a second. If you're not watching carefully, you have to hunt for the word it has played. As the board fills up, this is a real pain, as Mr. Computer dearly loves to tuck strange two-letter words in ob-

scure corners. "View Racks" allows you to see all the racks, which I consider cheating. But, clicked off, your own rack disappears, so that you can't contemplate your own letters without pencil and paper. A definite minus. The third item under Display is "Redraw" to erase unwanted information that won't go away by itself.

If you've ever played with slowpokes, you'll appreciate the clock. Choose your move times in increments of half minutes from "Lightning" (30 seconds), to a leisurely five minutes. "Tournament" is two minutes, which is long enough in most cases. Turn the clock off to pause the game or to find a hook for that panting seven-letter word. Cheat, cheat! There is also a save-and-resume game option in case of bedtime.

I named my computer opponent "Chip" and challenged him to a best of five. Being an erudite masochist, I chose Level 8, "Tournament" time.

I go first with the letters i, i, u, v, u, o, u in my rack. So I cheat and start again. The same letters appear. I cheat again. The same letters appear for the third time! Finally, Chip remembers what "random" means and deals out decent letters. The game begins.

Halfway through the second game Chip begins to annoy me. He's challenging perfectly common words like "lobster," "liner," "prone" and "table." Of course, when he asks "Are you sure?" I click on "yes," but inside I'm seething with guilt. Does he believe me? Anyway, his repeated suspicions are holding up the game. Moreover, as he doesn't recognize these words; he's failing to capitalize on the situation by adding an s or other suffix. Therefore the game tilts in my favor.

Meanwhile, Chip is slamming his tiles down in a flurry of x, z, v, q and j words that keep me running to the *Official Scrabble Dictionary*. Sure, they're all there, and even if they weren't, I have no option to challenge *him*. Just once I catch him playing an illegal word: He adds an s to "kent" which everyone knows is the past tense of "ken." As I'm winning, I merely smile, recognizing that computers are people too.

Of course I win, merrily cheating all the way. (For humility's sake I played a couple of games honestly and got creamed.) But there should be more time at the end of a game to rehash the plays. You have about eight seconds to linger over the completed board, then a new board is drawn and that incredible seven-letter "bingo" is gone forever.

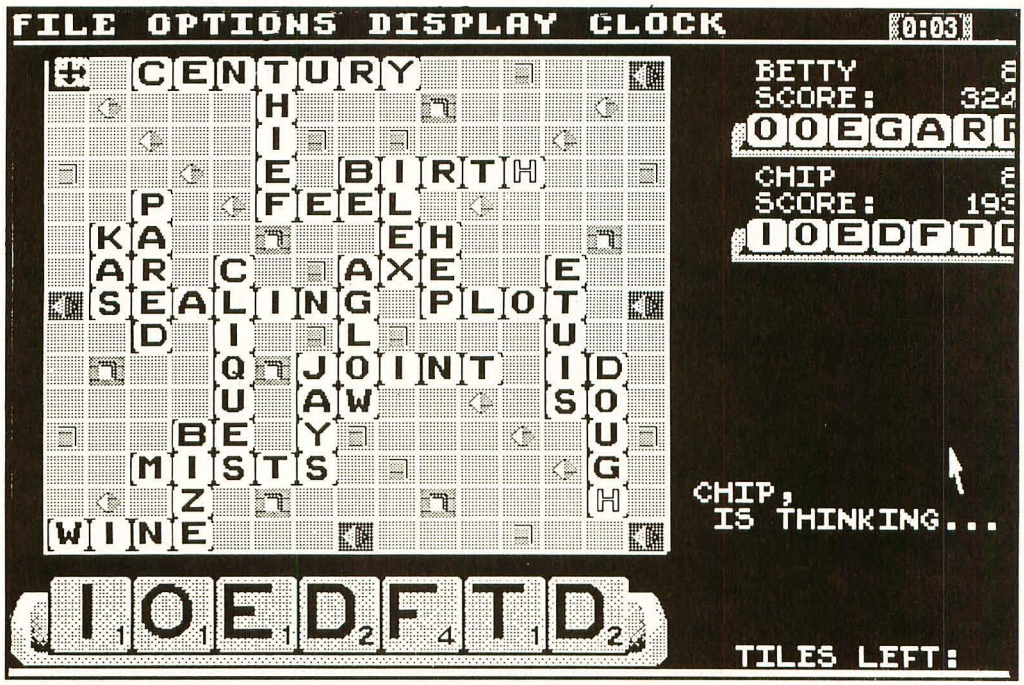
Up to three can play, with the computer making it four. But picture three scrabbling players crammed around the monitor trying to see, fighting for the mouse, spilling beverages into the surge suppressor and tripping over cords. No thanks. Use the kitchen table.

But if you're aiming to hone your vocabulary skills or training for a Scrabble tournament, by all means, give it a challenge. You'll learn weird words, like "vugg" and "oe" and "zein." You'll see creative high-scoring ways to use two-letter words. You'll discover q words that don't need a u. Qaid...qintar...qoph....

Computer Scrabble knows 23,000 words, yet it doesn't recognize many common ones. There are 100,000 words in the *Official Scrabble Dictionary*. See what you're missing?

As they say, dear Scrabble, you're not getting older, but you're not getting any better, either. How can you improve on perfection?

**There are eight levels of difficulty—levels 1 through 4 for children and compulsive winners; 5 through 8 for more erudite masochists.**




*Betty is an actress and freelance writer who lives in Buffalo, New York. She owns three computers and can't tell you the first thing about how they work. Adventuring is her game, where her aggressive tendencies are diffused by snuffing monsters. She used to own a cat.*

# Test Drive

**Accolade**
**20813 Stevens Creek Blvd.**
**Cupertino, CA 95014**
**(408) 446-5757**
**Color only**
**$39.95**

**Reviewed by Scott Wasser**

For some people there's nothing like the thrill of getting behind the wheel of an exotic sports car and tearing up a stretch of twisting, winding road. *Test Drive* tries to simulate that feeling, but comes up just a little short.

Not that it isn't an entertaining program based on an original and intriguing idea. But contrary to claims on its packaging, booting-up Test Drive and taking it for a spin on your ST doesn't really provide the same feeling as buckling yourself into the driver's seat of a Lamborghini Countach and hitting the highway.

But Test Drive will provide ST owners with a novel and enjoyable way to spend a few hours. It is a driving simulation with a twist. Instead of racing against other vehicles, you race against the clock. And instead of being plopped behind the wheel of any old computer-generated gas burner, you can choose to drive any one of five different sports cars: a Countach, a Chevy Corvette, a Ferrari Testarossa, a Lotus Turbo Esprit or a Porsche 911 Turbo.

You select the car from one of the most impressive menus ever created for a computer game. After the copy-protected program loads, you see a split-screen featuring a beautifully drawn sports car on top and a "spec sheet" on the bottom. Pushing the joystick up or down changes the car and the spec sheet, which shows pertinent data such as acceleration times, horsepower, stopping distances and cornering ability.

After studying the spec sheets and admiring the beautiful automobile images, pressing the fire button selects the car you're going to test drive. A few seconds later the screen changes, and you're in the driver's seat of that car. Looking out the windshield, you see an instrument panel, the top half of a steering wheel and a stretch of narrow mountain road.

The dashboard's graphics are stunning: well-detailed and realistic looking. During your test drive you'll need to constantly monitor your instruments for maximum performance. A single joystick is

used to accelerate, brake, steer and shift the car.

Once you get the hang of accelerating and smoothly shifting through the gears, the object is to keep the car on the road while going as fast as possible. That's no easy task, since any of these cars can easily be pushed to over 125 miles per hour, and the road in question twists and winds its way along the side of a mountain.

A slight jerk of the steering wheel can send you crashing into the mountainside or tumbling off it. There's also oncoming traffic and slow-moving vehicles to contend with. Finally, you need to watch out for "Smokey," who'd like nothing better than to nail some smart aleck in a fancy sports car. The radar detector mounted on your visor will let you know when Smokey is around, giving you the option of slowing down or trying to outrun him.

Slowing down will, of course, wreak havoc with your average speed for a given leg of the test drive. You're awarded points for each of five legs based on your average speed during that leg. Being pulled over by the highway patrol or slowing down to avoid a speeding ticket means it will take you longer to complete a given leg. So the best drivers will put the pedal to the metal and outrun Smokey.

Of course there's always the danger that you'll wreck while trying to outrun him. That also drastically lowers your average speed. Also, if you wreck five times during a given leg your test drive ends. Every time you complete a leg, the screen changes to show your car pulled up to the pump of some hick gas station. There you find out your average speed for the just-completed leg and see comments such as: "Did you pass any low-flying planes?" or "You drive like my grandmother."

If your average speed was laughable, you'll be told "You drive too slow to have a sports car," and the test drive will end. Otherwise, you'll find yourself back out on the same mountain road ready to start the next leg. Each leg is more twisty and filled with more traffic than the last. Complete all five legs and your points are added up and, if they're high enough, they'll automatically be saved to disk.

Although animation during the test drive is good, it's not quite up to the standards set by state-of-the-art graphics. While the road scrolls smoothly, conveying a real sensation of driving down a highway, the rest of the animation isn't as good. For example, other vehicles sometimes seem to hop towards your car rather than steadily approaching.

Another complaint is that Test Drive's options are limited. The folks at Accolade say they plan to release additional disks with different cars and roads. Let's hope so. The five cars are good to start with, but it doesn't take long to get tired of driving them down the same road all the time. I'd also like to have the option of saving a game in progress or restarting a test drive at the point where the fifth crash occurred.

I was also slightly disappointed in the feel of Test Drive. There just didn't seem to be that much difference in performance from one car to the next. Some cars did seem to accelerate faster or corner better than others, but the differences just weren't all that noticeable. The excellent graphics and smooth-scrolling road make you feel like you're actually in the driver's seat. If it weren't for the different dashboards, though, it would be difficult to tell just which seat you're in.

Maybe the program designers were a bit too ambitious when they set out to create Test Drive. It is, considering its playability, price and concept, a very good ST program and a truly unique one. But it's difficult for any program to succeed when it aspires to do something so ambitious. It's not hard simulating the look and sound of being in a sports car blasting down a stretch of road. But capturing the seat-of-the-pants feel of that thrill is something we probably don't have a right to expect a computer game to do. ■

**Once you get the hang of accelerating and smoothly shifting through the gears, the object is to keep the car on the road while going as fast as possible.**

*Scott Wasser has been a daily newspaper reporter and editor for the past 12 years and has been interfacing with computers for the past four. He has written columns and feature stories about computer hardware, software and home electronics, and takes pride in writing fair and thorough evaluations of the software he tests for* ST-Log.

# IAN'S QUEST

by Ian Chadwick

Computer Aided Design (CAD) programs hold a particular fascination for me. I've always enjoyed model building and design, despite my absolute lack of physical skills in that area. Fortunately, the computer has provided me a medium through which I can work without getting glue or ink all over my fingers.

The ability to design objects and layout plans on the computer is very appealing. I have spent hours creating imaginary objects or modelling real ones such as Stonehenge or a street map of my neighborhood. For the Stonehenge model, I did considerable research about the position and design of the stones, then had to use my wits to create the model in the limited resources of the program.

CAD isn't a definition as much as a general catch-all for a miscellany of program types. There are three basic categories of CAD programs: modelling (also called Computer-Aided Modelling [CAM]; this includes *CAD 3D, Master CAD* and *DynaCAD*), drafting (*Drafix, First CADD, GFA Draft Plus*) and specialty (Computer-Aided Engineering [CAE]; printed circuit design is one such example). I'll be reviewing several of these packages in future issues of ST-Log, but I thought I'd use this column to introduce the topic.

CAD is an application with considerable impact on certain professions, especially engineers and architects. It is for them what the pocket calculator is for scientists: A device that increases productivity, reduces mechanical work time and releases the user from the more mundane aspects of the job in order to allow him or her to concentrate on the creative and theoretical parts of a task. People with good creative and design sense are no longer limited by mediocre artistic talent, because CAD programs can better substitute for paper and pencil.

The ease with which you can redraw and alter designs in a CAD program as compared with doing so on the artist's table is impressive, as is the speed with which it is done. Computer users have come to expect such advantages—word processors are a similar example where the computer has changed the whole nature of writing through the ease and speed of use. CAD programs will have an effect on the craft of drafting just like electronic typesetting machines had on typography. Mechanical drafting is a skill on the way to extinction, the work now being done by the designers themselves on the computer.

Tom Weeks, an architect friend of mine, told me how his firm employs many computers and CAD programs in their design and layout process. He himself, impressed with the lineup of available software, purchased a Mega-2 ST with which to work at home. You'll find some of his comments in my program reviews. His professional point of view, as well as his familiarity with a variety of similar PC-based programs should provide a better insight into this software than I alone could offer.

A recent article in *Computer Dealer News* summarized a report entitled "CAD/CAM, CAE Users: Current Applications and Future Directions," which surveyed the IBM PC CAD/CAM market. The survey found that 89% of firms using CAD applications did so for two-dimensional mechanical drafting. That means 3-D modelling is not a priority for professional users, a result that surprised me considerably.

I would have thought that modelling had a higher priority of use. After all, when a client wants a house designed, he or she is presented with a series of 2-D illustrations and blueprints. Perspective drawings are also made, which attempt to convey the "depth" missing in the 2-D drawings. In some cases, especially when office or public buildings are concerned, a model may be built after the basic plans are approved.

A good modelling program can leap

ahead of the paper process. The client can sit down in front of the screen and "see" the house from any angle, rotate the view, zoom in to examine detail, look "inside" to determine layout. If properly designed, the roof could be a cohesive object group that can be removed or temporarily hidden. Perhaps each floor could be grouped so that, from the perspective of looking straight down, the successive removal of roof and floor levels would provide a sequential blueprint effect for the viewer, showing floor plans clearly. Finally, using those programs so capable, an animated tour of the house could be designed, taking the client around and through without intervention.

I suspect that, despite the obvious value of such a presentation, most architects and professional users are wedded to their traditional display methods and tools, and therefore haven't graduated to using the computer to its full potential. Newer generations, schooled in these automated functions at the university level, will bring their profession (kicking and screaming, no doubt) into the modern era.

Drafting applications are not to be sneered at: They are very important in the design process. Paint programs are not suitable as drafting applications, since they treat the screen as a canvas.

Once painted, the only way to change the canvas is by over-painting or block alterations, a brute-force method at best. Drawing and drafting programs are object oriented. This means that a line, collection of lines, an object (such as a polygon or circle) or object group are separate entities that can be moved, altered or erased individually, with no effect on other objects on the screen.

If this distinction isn't clear, here's an example. Draw a box on the screen in a paint program: a simple, four-sided rectangle. Next, draw another so that it overlaps the first. Now try to resize the first without changing the dimensions of the second. It is possible, but only by erasing and redrawing lines or using block rescales and then patching up the differences manually. In a drawing/CAD program, you can simply select the first box and alter it, regardless of the proximity of the second.

Along with object orientation, CAD programs often offer "layering"—that is, the ability to draw on distinct levels. The advantage of this in an application such as electronic circuit boards is obvious.

CAD programs and paint programs also differ in their ideal output devices. Paint programs suit high-resolution dot matrix printers, preferably color. CAD programs suit plotters best. Both work quite well with those laser printers which combine both vector and dot-matrix print capabilities, although current 8.5 by 11-inch paper limitations certainly limit the output. Paint programs display best in low resolution, where the full range of color can be used. CAD programs work best in monochrome, where fineness of detail is at its greatest.

This isn't to denigrate paint programs. Draw/CAD programs usually lack such paint-oriented features as magnified pixel manipulation and sophisticated palette control and animation. Paint and draw programs function differently because they usually have different end-uses.

Personally, I find drawing freehand with a mouse a painful and inaccurate process. The tool is not adequate for the task, in part because the physical design of the mouse. First, the drawing "point" is not in the same location where I learned to draw with a pencil. Second, the mouse focal center, the ball, is misplaced—it is too low in the hand for precise work. The new Microsoft Mouse places the ball (and thus the drawing center) right below the fingertips and the buttons, a superior design, and one I trust others will soon follow. Finally, I look at the screen, not my hand, so I can't use simple hand-eye coordination in my drawing. I'd much rather use a drawing tablet, which acts and feels more like the paper and pen with which I learned. In CAD programs, the mouse is an excellent device (although I'd still prefer the more ergonomic MS Mouse) and a drawing tablet is often unnecessary, the mouse performing adequately.

Ideally, a combination of both types of programs would be best, but the sheer size and complexity of a combination program would preclude it from running either quickly or on smaller-memory machines. In the meantime, the better CAD programs at least permit saving the screen as a *DEGAS* or *Neochrome* format file so the image can be incorporated into illustrations. This is a critical link between the two types of programs. The other side of the coin is the ability to load a paint picture as the background onto which a model or drafting illustration may be drawn.

Because of the extreme differences between paint and CAD files, I think it necessary for the manuals to detail the file structures in order for third parties to design compatible programs around them or for hackers to be able to use the output in other applications. Of course, I believe that the file structure of *every* application should be explained in the program's manual, because secrecy over this sort of data only isolates the users from potential outside enhancements.

One of the main issues in CAD is precision scaling, not only in its ability to deal in absolute but also in relative terms. The programs need to be able to simulate various scales of reference accurately and efficiently. When designing a house, for example, you need to be able to build to exacting specifications, not simply create objects that "look" right. The same criteria applies to 2-D programs. A blueprint is a precise document and the program must be able to provide scaling and measurement functions to suit professional output.

The collateral aspect of the above is the ability to produce in listed form the technical details of an object or a group of objects. In the house example, if the client wants to know the size of a particular wall, I should be able to select that wall and print out the scale details: height and width. Better still, I should be able to list (and print) *all* of the technical specifications for all of the objects in the chosen measurement unit. In 3-D models, this includes other data such as distance from the universe center, depth and X/Y/Z coordinates. Without such information, modelling in two or three dimensions can be, at best, only an inexact and inaccurate process.

Two-dimensional and three-dimensional programs have considerable differences that go beyond the obvious dimensional differences. Objects in 3-D have different display modes (wireframe, wireframe with hidden lines removed, solid, solid with shading), variable lighting for solid displays, the complexities of solid object join and subtraction, variable perspective and movable point of view. There must also be one or more tools with which to create a 3-D object from a 2-D template; extrude and spin are the two most common tools. The ease and sophistication of these tools will be an issue I look at.

The reviews will begin next month and run for several months to follow, each one covering one program in detail. I hope you'll enjoy reading them.

*Ian Chadwick is a technical writer and the author of the 8-bit classic, "Mapping the Atari." Aside from writing, his other hobbies include zymurgy, paleontology and Napoleonic studies. He lives in Toronto with his wife, Susan, their six cats and Kepler, the dog.*

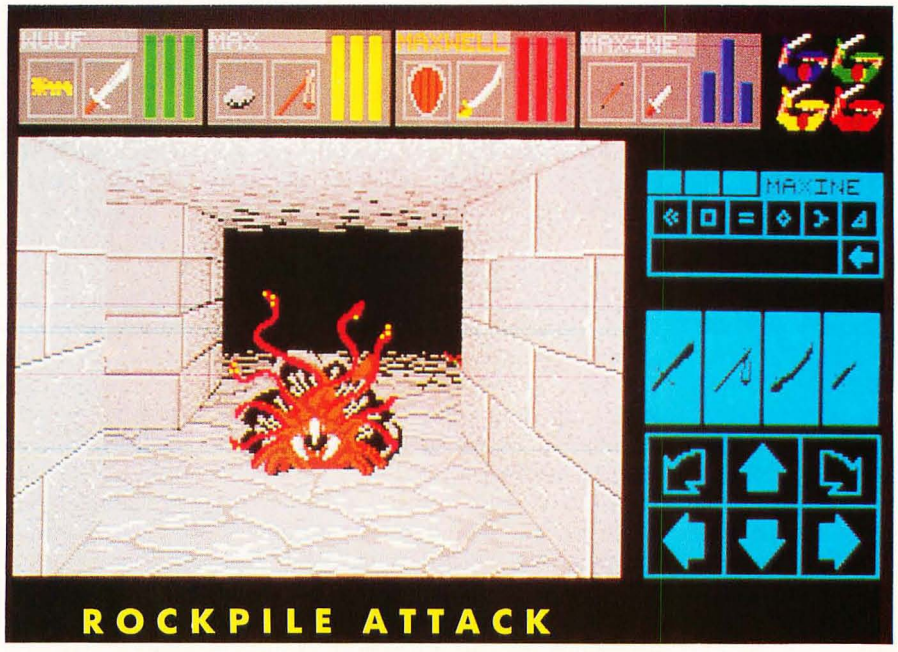
*(from page 51)*

fully charged to the maximum with mana will not be gaining any experience.

On the other hand, don't deplete your wizards' mana too much, unless you're reasonably sure you won't need it around the next turn. Cast just enough magic to keep them below the maximum, but do it consistently.

If you try to cast a spell which requires more experience than your players have, the spell isn't likely to work, but they *will* get credit for trying. Don't try to have your lower-level wizards try to throw top-level fireballs, though, even if they have enough mana to create the spell, if you're hoping to use it in battle. You'll probably end up staring into the mouth of a hungry monster, while your spell goes "fizzle." Stay with the power levels that you know your wizards can handle, but experiment once in a while with higher ones so that you'll know when you can start using them regularly.

One tip that will allow you to effectively increase the maximum amount of mana that any of the characters has, is to create a spell that you know you're going to need, such as Light or a Fireball, when you have enough mana for that spell. Then you can "hold" that spell while your mana recovers, so that you end up with your maximum mana, plus the magic in the spell you're holding. This is especially effective when you have your party sleep. Before you put them to sleep, have them create a light spell, and then when they wake up with their mana at a maximum, you'll have light spells ready to go, without costing any of your newly aquired mana!




Like all of the abilities in *Dungeon Master*, any character can achieve wizard or priest levels, even if they don't start out with any. All it takes is a little bit of mana, enough to create a weak spell like light. By casting this weak spell over and over, eventually even the most burly fighter can become an experienced Wizard.

If the character has too little mana to create a spell all at once, just create the symbols that they can; then they can "hold" those symbols until their mana recovers enough to cast the rest of the symbols. It can be a long process, but it's worth it in the long run.

What about those characters who start out with no mana at all, though? It takes mana to cast spells in order to get more mana. There are a few champions who start the game with zero mana, and some whose mana is so low that they can barely cast the lowest power symbols. Even these players can gain magical experience, although it'll take more effort on your part.

There is a spell which will create a potion to give a character greater mana, but the problem with this is that the amount of mana it costs one character is greater than the amount of mana it will give another character. Also, this is a fairly high-level spell, and the scroll which tells how to cast it isn't found until later in the dungeon. Even this would be worthwhile to do, though, if it was the only way to give poor dumb Halk enough mana to get him started with magic.

Fortunately, there's another way that works quite well. Some of the magical items you'll find in the dungeon will give the champion who holds them a little bit of mana or a slight increase in the mana they already have. When you put something which appears magical into a character's action hand, watch their mana statistic to see if it goes up. Use that little bit of mana to create a weak light spell, and that Champion is on the way to gaining mana of his own. The only problem with this method is that going into battle holding a tiny little wand in your hand could end up being fatal! Be sure to exchange the magical item for a weapon before you fight anything; then go back to your program of "remedial magical" education.

One word of warning about using magic to create fireballs. Be careful not to cast a fireball while you're facing directly into a wall. It'll be reflected back onto you and roast your party! However stupid it may sound, there really is a use for this seemingly senseless bit of self-destruction. If most of your party gets wiped out and you just want to start over from the point at which you last saved the game, you don't have to re-boot the game, and wait through the entire loading process. Simply turn to face the wall, and throw a fireball at it. You'll kill off the remaining members of the party and be presented with the option to reload your saved game. Restarting is a lot faster this way.

You'll find that your reliance on magic increases as you travel farther down into the dungeon; but even so, there'll be many times when magic must be aided by good old hand-to-hand combat. Even the greatest wizard can only do so much with magic before he has to rest, and if that happens before you've eliminated all the monsters in the area, your fighters will have to draw their weapons and prepare to defend the party.

So practice your magic and fighting skills. Next month we'll take a guided tour of the dungeon, with side trips to some of the more interesting (and puzzling) puzzles, and introduce you to the denizens of the dungeon.■

*Bob Retelle has been a professional in the field of telecommunications for the past several years (look for BOBR online) and has been writing (and playing) computer adventure games for longer than he'd like to admit.*

**REVOLUTIONARY NEW PRODUCT**

# SWITCH BACK

**REQUIRES at least 1 meg. of RAM**
(or a Megadisk or Polydisk Cartridge)

- Imagine Saving almost any game at any point, then being able to return there as many times as you like.
- Imagine the Ultimate Back-up Utility that actually UNPROTECTS programs as it copies them. Lets protected programs be stored as files, run from a hard disk or even be transmitted over a modem.
- Imagine saving three or more protected single sided disks on just one double sided disk.
- Imagine Instantly switching back and forth between two different programs, games, utilities or business applications.

**Now Stop Imagining and get Switch/Back.**
**It can do all this and more.**

Switch/Back is a revolutionary new hardware and software package that lets you get more from your ST, MUCH MORE.

Switch/Backs gaming features lets you instantly save most games then continue playing. If you get in trouble you can switch back to where you were as many times as you like.

**BACK-UPS** –Switch/Back can work with your favorite back-up program and allow you to save whole protected disks to files for archival purposes. It can also automatically unprotect a program and save it as standard file. This method works on hundreds of ST programs and it allows you to run the files directly. Its perfect for running protected programs off a hard disk. It creates standard TOS files, that can be stored together on disks or even transferred by modem.

**SWAP** – Switch back lets you load just about any two programs into your ST and switch instantly between them. It works with games, business programs, utilities, compilers, etc. Although only one program is running at a time, the other is available instantly, right where you left off.

The Switch/Back hardware plugs into your printer port for easy use (It has a pass through connection for your printer too.)

Switch/Back requires at least One Meg of memory (Or a Polydisk or Megadisk) **ONLY $69.95**

## ST Protection Techniques

Finally ST Copy protection techniques are revealed. This complete book and disk package details the state of the art in ST Protection methods and much, much more.

The Software included with the book provides many powerful features like the AUTOMATIC PROGRAM PROTECTOR. This easy to use Utility allows you to protect just about any ST program. You can choose a combination of protection methods like encryption, checking custom disk formats, password protection or a limited use option that makes the program self-destruct after running a preset number of times.

The book includes topics such as Phreaking, Logic Bombs, Hardware data keys, the legal aspects of piracy and software protection, Custom disk formats, Pirate Bulletin boards and much more.

In addition it contains reviews of the popular ST back-up programs and detailed explanations of ST disks and drives.

ST Protection Techniques (Book and disk package) **Only $39.95**

The worlds most inexpensive clock cartridge. Finally its affordable to keep your time and date accurate. 3 year battery included. **ONLY $24.95**

WATCHCART ST

## MEGADISK

Ultra high speed solid state disk drive • 500% Faster than a Hard Disk • Provides almost instant booting • Like a RAM disk that's always loaded with your favorite programs and ready to use • One megabyte of Solid State storage • Built in battery back-up in case of power failures

MEGADISK is actually one megabyte of RAM that simply plugs into your cartridge port. It acts as an added disk drive that's ultra fast and always ready for use. Like a Hard disk, MEGADISK won't loose its memory when your computer is turned off. It comes with its own power supply and battery back-up system so its independent of your computer.

Megadisk can be configured according to your needs. • Set it up as one large disk • An 800K double sided disk and a 200K hardware print buffer • Or as two 400K single sided disks and a print buffer

Megadisk will work fine with your current system whether you have a hard disk and two drives or you're just getting started.

Megadisk is perfect for those who want the high speed of a hard disk for a lower price. Its even better for power users or software developers who may already own a hard disk and two drives but want extra speed and power. Megadisk can also emulate other cartridges for testing and back-up. In addition Megadisk can be used with Switch/Back to allow you to instantly jump between two full size one meg applications. **$299.95***

Price Subject to change

Megadisk Clock Option – Adds a Clock/calendar card to your Megadisk cartridge. Contains replaceable Three year battery 29.95

## Polydisk

Polydisk is a 512K version of a Megadisk. Polydisk gives you the same fast boot features, the high speed access, and the print spooler. Polydisk has a power supply (like Megadisk) but does not contain a battery back-up.

Note: Those with only 512K of main memory can use Switch/Back with a Polydisk, just like those with one Meg.

Polydisk (512K Solid state drive) **Only $199.95**
(Clock option card is also available for Polydisk $29.95)

## COLOR COMPUTEREYES™

Incredible COLOR video digitizer. • The first and only full color digitizer for the ST • Uses standard video inputs like video camera, VCR, or video disk. • Works in all ST resolutions, Low res provides 16 shade black and white or full color pictures. • Pictures can be used with Degas, Neochrome, Powerprint and others. • Automatic calibration of contrast, brightness and white balance. • Plugs into cartridge port for easy set-up. • Capture your picture or that of your favorite star. **ONLY $199.95**

**SPECIAL OFFER** – Buy both Computereyes and Powerprint and SAVE 20.00 from the total.

PowerPrint ST **BLOW YOURSELF UP**

Imagine your picture on a 6 foot poster. Create a business graph that can cover a wall. Quality output for posters, t-shirts, news letters, and more.

**POWERPRINT**

Whether it's a photo digitized with ComputerEyes, a masterpiece created with Degas, or the winning screen from your favorite game, POWERPRINT can print it with unequaled clarity and resolution. PowerPrint supports **ALL** ST resolutions. It prints multiple sizes up to **GIANT WALL SIZED POSTERS.** Print 16 shades for incredible detail. Print the whole screen or **ZOOM** in on just the part you want. POWERPRINT offers unique effects, including rotate, mirror and inverse options. Selective shading option allows you to print multi-color pictures on any printer by printing one color at a time (using color ribbons). Powerprint lets you capture and print almost any ST screen. Works with Star, NEC, Citoh, Gemini, EPSON, XM8048 and compatible printers. **ONLY $39.95**

DigiSound ST High Quality sound digitizer for the ST This powerful hardware and software package lets you sample real world sounds and play them back on any Atari ST. Add special effects like Echo, Reverse, looping, pitch manipulation, mixing and envelope control. Turns your Atari keyboard into a musical instrument to play songs with your digitized sounds (also works with any MIDI keyboard). Digisound makes it simple to add sound to your own program, too! Unleash the incredible sounds in your ST with DIGISOUND. Supports sampling from 5 to 40Khz, DIGISOUND is the choice of the professionals. DIGISOUND was used to create the voice in Chessmaster 2000, and other commercial programs.

DIGISOUND **ONLY $89.95**

## DIGISOUND PROFESSIONAL

All the excellent features of DIGISOUND plus these great extras

LOGARITHMIC SAMPLING – Special hardware extends the sound quality far above the other ST sound digitizers. Logarithmic sampling and playback (external amplifiers only) greatly extends the dynamic range while reducing distortion and noise.

Internal Real Time Mixing – Input from a stereo and a microphone so you can sing over a tape. **$149.95**

## DIGIPLAYER

The High powered digisound software can now be obtained by those who already own a digitizer for the ST. Compatible all cartridge based digitizers. Extend the power of your digitizer with Digiplayer.

**Only $49.95**

**24 HOUR HOTLINE – VISA & MasterCard Welcome**

**216-374-7469**

**Customer Service line (216) 467-5665. Call or write for free catalog.**

ALPHA SYSTEMS

**Order by phone or send check or money order to:**
**ALPHA SYSTEMS 1012 Skyland, Macedonia, OH 44056**
Include $3.00 shp. & hdlg. (US & Canada). Ohio residents add 5½% sales tax. Foreign orders add $8.00

CIRCLE #128 ON READER SERVICE CARD.

# ST USER

by Arthur Leyenberger

Atari users are a vocal bunch. If they disagree with something that Atari does, they are not afraid to let their feelings be known. Likewise, if they disagree with something that appears in ST-Log, we hear about it.

The following message recently appeared on the GEnie service concerning my discussion of *WordPerfect* in the August ST User column. Since there has been a lot of talk about WordPerfect this year concerning the original buggy version released at the end of 1987, WordPerfect Corp's mid-year supposed withdrawal from the Atari market, and their excellent ongoing support of the product, I want to respond to these comments in this column. Here's the message in question:

"Well, they [the Atari-specific magazines] did it again. The August ST-Log has [a] 'review' of WordPerfect. It is incomplete and irresponsible. The author, Arthur Leyenberger, pulled some of the dumbest stunts I have heard of in some time in his feeble efforts to install the product on his system.

"He admits in his 'review' that he copied the *entire* Printer and Font disks to his WP directory on his hard drive because he could not figure out how to install a printer correctly. Why did he not call the toll-free hotline for help if he could not solve this problem?

"Better yet, he complains about Search [forward], Search [backward], and Replace. He says that he *had* to click on the OK box to commence the operation because pressing RETURN simply put a [HRT] code in his search/replace text box. First, you don't *have* to click OK. You could press F2 again, as the manual suggests. There is also a darn good reason for letting you search and replace a carriage return character. I would *die* without it!

"This guy usually does a fairly good job of reviewing things but this time, he really screwed up. In addition, he seems to be floored by the idea that one user might want up to six different printer drivers available to him with the touch of a few keys. Sheesh! What about offices where printers move around like they have legs? That happens where I work!

"Even more amusing is his desire for little pouches in the binder to hold the quick reference card and the six WP disks. First, you want the quick reference card by your side where you can get to it quickly, and second, the many updates from WordPerfect mean you have more like eight or ten or more WP disks. Wanna try to put all them in a binder, or would you rather keep the manual there? HAH!

"Oh, and somebody at WP, please call Arthur to tell him how to put his template on his keyboard. He says that the right end keeps falling down into his function keys. If he would put it in properly, this problem would not happen. I have *never* had that difficulty, and I am always banging it, etc.

"He complains that accesses to his hard drive were extremely slow. Not so for me! When was the last time he reorganized his hard disk? Mine goes like greased lightning.

"Sorry for the tirade, but this 'review' really ticked me off. The last and most important note on his review is that he tried to write a review after using it for '20 hours.' This product is so complex and complete that it takes a lot longer than that to learn it well enough to write a decent review."

Well, Mr. Colburn, you have certainly said a mouthful. You are incorrect on several points but also raise a couple of good questions that from time to time come across my desk. It would be easy to ignore your comments altogether or to dismiss them out of hand as the ravings of an overly-sensitive ST user. I'll do neither.

You are incorrect in your portrayal of my comments regarding WordPerfect as a 'review.' As I mentioned in the column, "I don't have room in this space for a complete review of WordPerfect. . .What I can do is give an *overview* of the program. . ." That is precisely what I did. When ST-Log does a formal review of a product it is a stand-alone article, is very thorough and labeled as a review.

As to being "incomplete and irresponsible," I plead guilty to the former (remember, it wasn't a formal review either implicitly or explicitly). Irresponsible, it wasn't. One of the things that ST-Log does very well—in fact, something that all of us associated with the magazine pride ourselves in—is getting information to Atari users in a timely fashion. In ST User, my charter is "news, information and opinion" about Atari ST computing. It is entirely proper for me to give my opinion about a software package based upon my use of it. And *that* is what I did.

Before I address some of your particular points, I also want to point out that the overall flavor of my overview was positive. Again, quoting myself, "WordPerfect is a *very* complete word processor." Also, "Although I have some minor complaints about the program, I don't want to give the impression that I hated the program, because that's not true." Further, "If you need the best currently available word

processor for your ST, the only choice is WordPerfect."

It is clear from that column that: 1) I liked the program more than I disliked it, 2) I thought it was a *very* powerful word processor, and 3) I recommend WordPerfect because it is the best currently available ST word processor. OK, about your specific points, Mr. Colburn.

I tried again and again to install the printer and fonts and continued to have problems. I read and re-read the manual, I tried to figure out what the screen prompts were asking me and I still was unsuccessful. Copying the entire disks to my hard disk was a last resort and appeared to allow me to proceed. Now, why didn't I call the WordPerfect hotline? Quite frankly, I was writing my column over the weekend with a deadline that had already come and gone. As you might know, if you call WordPerfect on a Saturday or Sunday, a recorded message will tell you that their normal business hours are Monday through Friday.

Of course I could have waited until Monday, called the WordPerfect hotline and hopefully straightened out the problem. But please remember once more that this was not a review of the product, it was a first impression. If the user cannot figure out how to install the program from the information in the manual and the on-screen prompts, then the program is not as good as it could be. By the way, I did contact WordPerfect after the column was written and spent over an hour discussing with them the problems I had. They were aware of some of these problems and appreciated my input. Further, I did not have the benefit of the latest 4/15/88 version which, when I finally did get it and installed it, worked fine.

You are quite correct that one can initiate the Search and Replace function with the F2 key. That was an oversight on my part. Also, I certainly agree that being able to search on the carriage return character is an important feature. Some PC word processors don't even allow you to do this.

Next, thanks for the vote of confidence you gave when you said, "this guy usually does a fairly good job of reviewing things." I try to be as knowledgeable as I can and write from the viewpoint of a user. As far as saving up to six different printer drivers, I agree that it is valuable in an office. I said, "You can install up to six printer definitions, which I guess might be useful to some people. . ." In the home, where most of the STs sold in the United States reside, very few people would need to have more than one installed printer.

You find it "amusing" that I would want a place in the binder to hold the quick-reference guide and six WordPerfect disks. If most ST users are like me, they have quick-reference guides and floppy disks all over the place. When I am not using a particular program, I would like to keep all of the documentation and disks together. I wouldn't need to keep more than six disks with the binder because when updates arrive, I replace the previous disks so as not to get the versions confused. "Hah!," indeed.

**"Atari users are a vocal bunch. If they disagree with something that Atari does, they are not afraid to let their feelings be *known*. Likewise, if they disagree with something that appears in ST-Log, we hear about it."**

Referring to the function key template, I don't know what you mean by "if he would put it in properly, this problem would not happen." It *does* fall down on the right side and the nice folks at WordPerfect agreed with me. I solved the problem by taping an "ear" on the right side. [ST-Log solved the problem by bending back the long tab that fits behind the function keys so that the top of the card slants at a 45-degree angle away from the user. The quick-reference card is easier to read at this angle, and it doesn't fall down into the slot on the right-hand side—Ed.] In mentioning the binder and template problems in the August "ST User," I referred to them myself as "snippets" and "minor problems."

Finally, you complain about my "20 hours" spent with the program, that this amount of time is insufficient to "write a decent review." Of course it is, and as I said above, this was not a formal review of WordPerfect. As it turned out, I did spend much more time with the program. That column was originally scheduled to appear in the December '87 ST-Log. As it happened, there was no December ST-Log and when we resumed publication in May 1988, I went back to that column and rewrote most of it. The original column was much more negative, based upon all of the bugs and crashes I encountered in using WordPerfect. When I rewrote it in March, I had the benefit of using a later version of the program which eliminated most of the problems.

In a second, almost identical message you sent on DELPHI to Clayton Walnum, the executive editor of ST-Log, you said "I am extremely disappointed in (Art Leyenberger's) hatchet job on WordPerfect. It appears that he succumbed to the drive to get in line with other reviewers who have also done unfair and ill-informed reviews in other magazines such as *Atari Explorer*."

As you can see, my comments about WordPerfect were not the "hatchet job" you characterized them to be. Presumably other magazines also did not have the advantage of the latest version of the program. Besides, the lead time required in publishing a magazine will almost always ensure that information about products will be three to four months old by the time it is printed.

Some readers may wonder why I spent the limited space in this column discussing the comments of one person about a product we all agree is the best currently available word processor for the ST. I did so because I want to differentiate for Mr. Colburn and everyone else, between a review of a product and informed opinion. Of course a reviewer must state his or her opinion about a product, but it is done in a much more structured way. Talk about structure, *BYTE* goes so far as to distinguish between "previews" and "reviews" in their articles.

Anyway, I thank you, Mr. Colburn, for taking the time to let us know your feelings. If anyone else has any comments please feel free to write to the editorial office of ST-Log, or better yet, contact me directly on DELPHI (ARTL) or CompuServe (71266,46).

## Mouse bits

It wasn't that long ago when the computer mouse was a novelty. I remember my pre-mousing days when the thought of using a mouse barely entered my mind. Before the popularity of graphical user interfaces few people had even heard of a mouse outside of a research lab.

The mouse is now as common on most computer desks as a can opener is in the kitchen. Just to show how far we have come, I recently read that Microsoft, one of the leading suppliers of aftermarket mice, just sold its millionth mouse. According to the company, it took four years to sell the first half-million of the little rodents, only one year to sell a half-million more, and they predict that it will take only four months to sell the next half-million.

Of course, ST users take the mouse for granted. It would be difficult to even use the ST without a mouse. It's interesting to contemplate what will be as ubiquitous five years from now. Touch screens, voice recognition input or what?

## Fight For the User

Like the Apple Macintosh and Commodore Amiga, the Atari ST computer uses a "friendly" user interface. One of the things that makes it so friendly is the use of icons on the screen. For example, you don't need to know and remember any complicated commands to run a program. Just click on the program's icon and the program starts.

Likewise for copying a file. All you do is click on the file you want to copy, drag it to the disk icon or window and the file is copied. Deleting file is just as easy: anybody can understand the trash can icon.

But using a program on the ST is not always as easy to do as using the Desktop. Programs are typically more complex than the Desktop, and it's up to the programmer to design the way the program is to be used. Design of the human-computer interface is often an afterthought and secondary in importance to the functions of the program.

If you are a programmer who wants to know how to design a good user interface, or if you are just someone interested in the subject, I recommend a book that addresses these topics and more. Called *Designing the User Interface: Strategies for Effective Human-Computer Interaction*, this new book is written by Ben Shneiderman, a human-factors professional and associate professor of Computer Science at the University of Maryland. It is published by Addison-Wesley, Reading, MA 01867 (617-944-3700).

In his book, Shneiderman examines all aspects of the complex interaction of humans and computers. The book covers menu-based and command-based programs, offering guidelines to make these programs easy to use. There are chapters on interaction devices such as keyboards, mice, touch screens and other techniques. Other chapters discuss response time, screen design, systems messages and documentation. The book ends with material on methods of testing and evaluation and a thought-provoking treatment of the "ten plagues of the computer age."

Although the book is written primarily as a textbook, it is interesting reading and provides a wealth of information about the use of computers. The information is applicable to researchers, practitioners and users alike. As a reference work, it belongs in the library of every programmer, software designer and serious user. I highly recommend it.

## More ST Bookshelf

Michtron has just published a new book about GFA BASIC. Written by George Miller, the $30 *GFA BASIC Programmers Reference Guide, Vol. 1* contains valuable information for any GFA BASIC programmer or would-be programmer. Since each GFA BASIC command is explained in detail, many with sample programs, the book provides more information than is available in the manual. There are tutorial chapters on creating graphics, using sound on the ST, using the included shape editor and more.

One chapter discusses a full-featured terminal program. This example of how to write a major program in GFA BASIC also explains the functions necessary for using the Xmodem protocol for file transfer. In addition, the program demonstrates how to access the serial and parallel ports from GFA BASIC.

If you are interested in *GFA BASIC Programmers Reference Guide, Vol. 1*, check out your local computer store. If they don't have it, contact Michtron at 576 S. Telegraph, Pontiac, MI 48053 or by telephone at (313) 334-3553.

---

**Arthur Leyenberger** *is a human factors psychologist and freelance writer living in New Jersey. He has written over 100 articles about computers in the last four years and continues to be an Atari enthusiast. When not computing, he enjoys playing with robotic toys.*

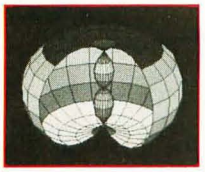
**"Like the Apple Macintosh and Commodore Amiga, the Atari ST computer uses a "friendly" user interface. One of the things that makes it so friendly is the use of icons on the screen."**

# YOU NEED THE DISK!

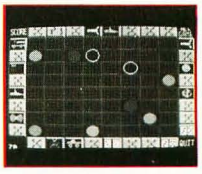
**If you want to get the most out of ST-LOG, you're also going to want to get your copy of the disk. Each issue's disk contains all the exciting programs for that issue, including the programs whose listings could not be included due to space considerations. The ST-LOG disk version is truly an excellent software value. Order yours today!**

## ONLY $9.95 EACH!

**NOVEMBER 1988**
ThetaTen, Ultra-Graph, Number Maze and more!

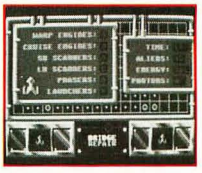


**AUGUST 1988**
Merlin's Box, MIDIMON, GEMKIT and more!

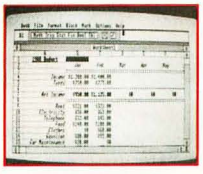


**OCTOBER 1988**
Monkeys and Balloons, Spectral Sorcery and more!

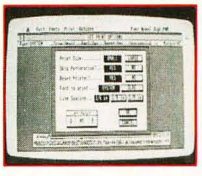
**JULY 1988**
Moonlord ST, Busy Buddy, Battle Blips and more!



**SEPTEMBER 1988**
Opus, DEGAS Fast Loader, Double Column Printing and more!



**JUNE 1988**
ST Font Printer, BASIC Draw, Mouse-ka-Source and more!



## YES! I DO WANT THE DISK! ONLY $9.95 EACH

- ☐ ST-LOG June 1988 Disk
- ☐ ST-LOG July 1988 Disk
- ☐ ST-LOG August 1988 Disk
- ☐ ST-LOG September 1988 Disk
- ☐ ST-LOG October 1988 Disk
- ☐ ST-LOG November 1988 Disk

Name_____

Address_____

City_____ State_____ Zip_____

☐ Payment Enclosed—Charge My ☐ VISA ☐ MC

#_____ Exp._____

Signature_____

**Add $1.50 postage and handling for each disk ordered.**
**Make check payable to: LFP, Inc. P.O. Box 67068, Los Angeles, CA 90067**
**California residents add 6.5%**

ST LOG
THE ATARI ST MONTHLY MAGAZINE

# MAY ALL YOUR CHRISTMAS DREAMS COME TRUE!

## SUBSCRIBE TO ST-LOG AND SAVE!

**The world of ATARI-ST continues to grow by leaps and bounds and ST-LOG is there every step of the way! SUBSCRIBE and SAVE today!**

☐ **12 Issues $28**
MCKWW

☐ **12 Issues with Disk $79**
DCKWW

MAKE CHECK PAYABLE TO L.F.P., INC.,
P.O. Box 16928, N. Hollywood, CA 91615.
Offer expires January 30, 1989.

☐ PAYMENT ENCLOSED ☐ BILL ME
CHARGE MY: ☐ VISA ☐ MASTER CARD

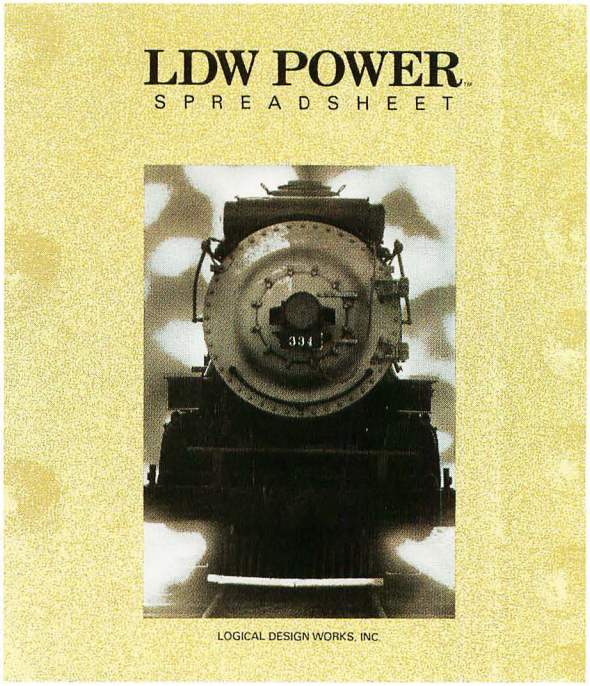
CARD # EXP SIGNATURE

NAME

ADDRESS

CITY STATE ZIP

# This Is All The Power You Will Ever Need In A Spreadsheet.



Isn't it about time that you bought a spreadsheet that takes advantage of all the POWER of the ATARI® ST™? That spreadsheet is here in LDW POWER.™
LDW POWER is a full function spreadsheet that boasts an extensive array of formats, commands, and functions along with sophisticated graphing abilities. Its Lotus® 1-2-3® compatible environment takes advantage of the GEM® interface allowing you to enter commands with the keyboard or mouse. There is also a convenient macro recorder which actually records keystrokes for future use.

Add to that its incredible speed in scrolling, recalculating, and copying, and you have one powerful tool.
Just look at these features.

### GENERAL
- Lotus 1-2-3 Release 2 compatible
- GEM and Lotus interchangable interface
- Simultaneous use of up to four worksheet windows
- Condensed display allows 29 rows per window
- Ability to hide columns
- 18 display formats
- Customized monetary formats
- Alignment for labels and numbers
- Note feature for every cell
- Close to 300 commands
- More than 80 functions

### GRAPHS
- Five graph types: XY, line, bar, stacked-bar, pie
- Automatic and manual scaling
- Optional grid, average/standard deviation lines
- Built-in printing procedure for graphs
- Metafiles and laser printer (GDOS) support

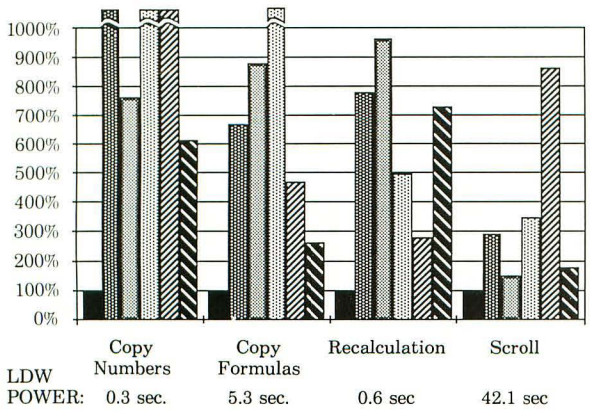
### PRINTING
- Sideways printing program

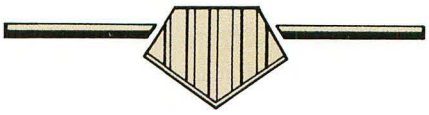
### FILE HANDLING
- Direct loading of Lotus and ASCII files
- Saving and retrieving of partial worksheets
- External file link function
- Password file protection
- Conversion of files into Lotus format
- Data Parse command

### DATABASE
- Quick sort using one or two keys
- Sophisticated Data Query operations
- Criteria involving variables and logical operators
- Single and double variable tables
- Frequency analysis

### MACROS
- Macro language compatible with Lotus 1-2-3
- Macro recorder
- Unlimited number of macros

TIMING COMPARISON





$149.95 (suggested retail price)
See your local software dealer to order or call (408) 435-1445 for more information.

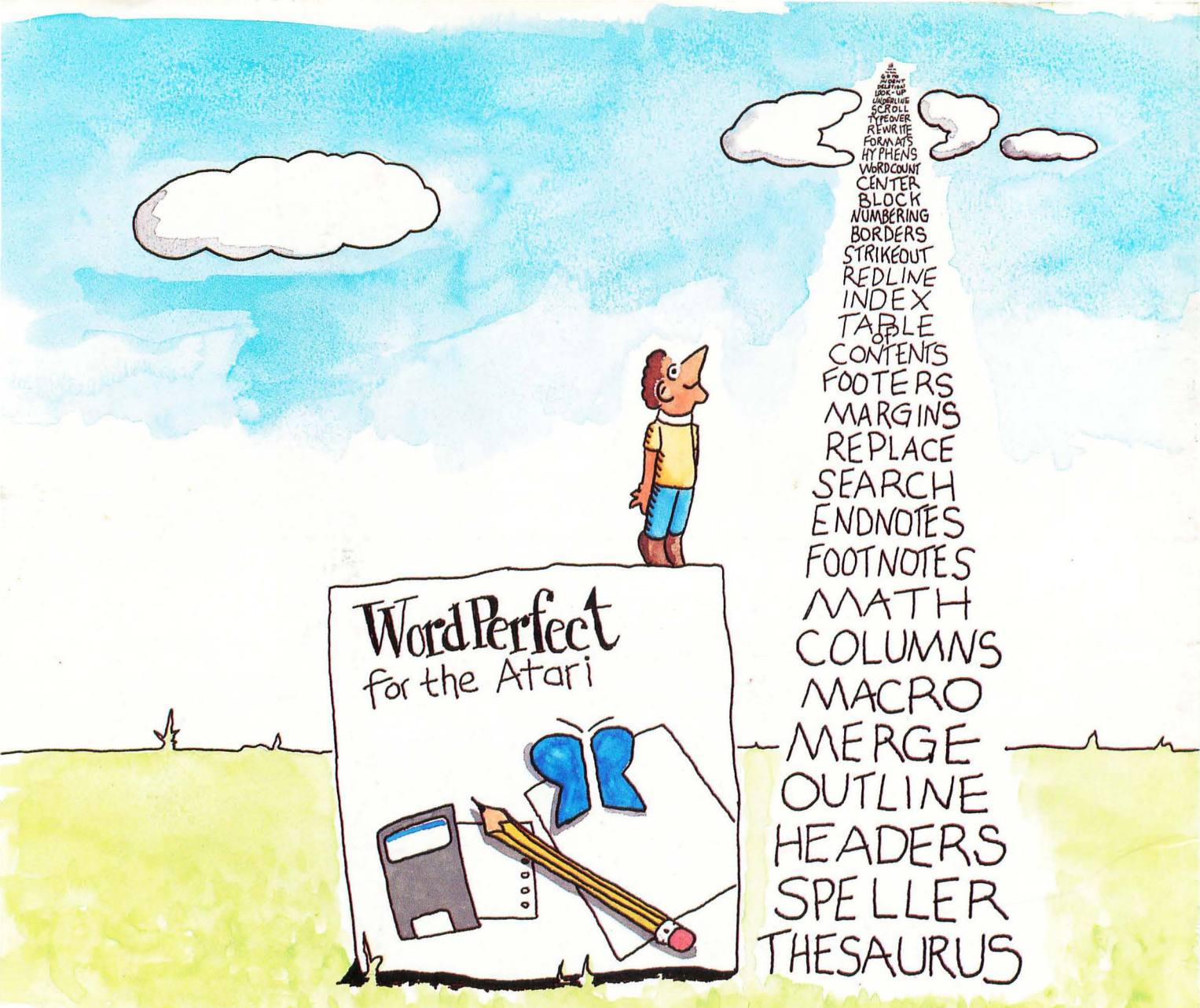
©1988 Logical Design Works, Inc.
All rights reserved.

Logical Design Works, Inc.,
780 Montague Expwy., #403,
San Jose, California 95131,
Fax: (408) 435-7355.

LDW

All brand and product names are registered trademarks of their respective holders.

CIRCLE #121 ON READER SERVICE CARD.




# WordPerfect for the Atari ST: Sky High Features.

You're looking for a word processor with speed, power and sophistication in a simple, friendly format. A pretty tall order. Maybe you should look up to WordPerfect, with features stacked as high as your expectations.

Features like our speedy Macros. With one keystroke (or click of the mouse) you'll set up a memo, insert a date, or format a letter closing.

Or our powerful Speller. It puts a 115,000-word dictionary literally at your fingertips.

Add sophisticated features like Columns, Headers and Footers, Indexing, Blocking, Footnotes, and Thesaurus. And on. And on.

Your possibilities become endless.

Plus, WordPerfect is simple to learn, and help is always a toll-free call away.

So elevate the potential of your Atari ST. There's a stack of possibilities waiting for you at your local retailer, or at

WordPerfect
CORPORATION
1555 N. Technology Way
Orem, UT 84057
Tel: (801) 225-5000
Telex: 820618
FAX: (801) 227-4477

CIRCLE #102 ON READER SERVICE CARD.