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on using Atari computers in the classroom for a variety of purposes.

In closing, thank you for your continued support of the XL/XE computers.

Michael E. Bennett
Augusta, GA

Letters to the Editor

Thanks for the info, Michael — we'll pass it on to our readers (see

box, below). What Mr. Bennet neglected to mention in his letter is that he, too, is a public domain distributor. A long-time teacher, he's worked for several years to assemble a unique curriculum for teaching computer literacy and other subjects, all based on Atari 8-bit systems. As a consultant, he's successfully implemented this curriculum at several Georgia schools, and many more are showing interest in the program. We'll be covering Mr. Bennett's unique program in our next issue.

PD Software for 8-bits

Dear Atari Explorer,

One thing I have never seen in the pages of Atari Explorer is a listing of distributors of Atari 8-bit public domain and shareware software. To this end, I have enclosed a list of 15 distributors of this type of software. All will give info and/or catalogs if queries are made with a self addressed, stamped envelope.

The Educators' Atari Club deserves special thanks from the Atari 8-bit community for their efforts in accumulating, testing, and debugging hundreds of public domain educational programs for the Atari computer. In addition, they publish a good-quality nationally distributed monthly newsletter with reviews of new educational software for the Atari. The newsletter also gives tips

DeskJet Update

Dear Explorer,

I really appreciate the HP DeskJet Envelope Accessory for which you included a C-listing in Explorer's Jan/Feb 1990 issue. (see "A DeskJet Envelope Accessory," Jan/Feb 1990, page 66). I

A Partial Listing of Atari Public Domain and Shareware Software Distributors. All will send catalogs and information upon receipt of a self-addressed, stamped envelope.

AAPDS
6-18th Edgemore
Hutchinson, KS 67502

BELLCOM
Box 1043-A
Peterborough, ON
Canada K9J 7A5

BRE Software
352 West Bedford
Suite 104-A
Fresno, CA 93711

C&T ComputerActive
P.O. Box 893
Clinton, OK 73601

Dino's RYO
664 W. Arrow Hwy.
Suite 197
San Dimas, CA 91773

Loeffler
18 Wendy Drive
Farmingville, NY 11738

MWPDS
890 N. Huntington St.
Medina, OH 44256

PATNOR
P.O. Box 370782
El Paso, TX 79937

Software Infinity
642 East Waring Avenue
State College, PA 16801

The Educators' Atari Club
P.O. Box 1024
Laytonville, CA 95454

The Munich Atari XL/XE
Public Domain Assn.
c/o Florian Bechert
August-Foppl-Str. 17.8000
Munchen 50
West Germany (FRG)

Vulcan Software
P.O. Box 692
Manassas, VA 22111-0692

typed it in, compiled it, and it works fine. I also added some extra buttons to the dialog box so I could use it for different letter formats.

But there still exists one problem. I can't use the Swedish letters å,ä,ö and Å,Ä,Ö. I have tried to modify the program, but apparently, my knowledge of C programming isn't enough. In the default return address file I have placed my city's name "EKSJÖ", but when the accessory loads the file, it just skips the letter "Ö". When I'm using my word processor, I use two small programs to be able to write and print the Swedish characters. One of them assigns the ASCII-values 134, 132, 148 and 143, 142, 153 to the "{", "}", "\", and "[", "]", "I" keys on the keyboard, and the other program simply translates these ASCII-values to the proper ones for my printer.

I'd like to use the Envelope Accessory in conjunction with my word processor and those two programs, but I can't find out how I should change the C-listing!

Stefah Gustavsson
Eksjö, Sweden

Luckily, the problem is fairly easy to solve. Because I hadn't really anticipated international interest for this program, I imposed a couple of structural details that — although they make the program marginally more reliable — also frustrate those who wish to use it with the ST international character set.

The reason your special characters are stripped out of the default address file is because they're not really ASCII — that is, their values lie outside the range of 0-127. In order to prepare material in the input file for copying into the string buffers of editable objects in the accessory's dialog box, the program replaces all "control" characters with nulls ('\0'), including special characters such as these Swedish ones. To fix that problem, replace the first for()

loop in the function movebuf() with the code shown in box 1.

This fix will serve to mark the line-ends with nulls (ASCII 10 = LF, ASCII 13 = CR), while leaving special characters alone.

Your first small program, which I assume remaps the keyboard, should serve to let you enter the special characters in the dialog. If this doesn't work, you should probably acquire a general-purpose "keyboard remapping" program that will permit you to enter international characters the same way in all applications.

The next step is to figure out how to send the special characters to your HP DeskJet. This is simply a matter of modifying the function println() so that when it encounters one of the Swedish character codes, it substitutes the HP DeskJet's equivalent. Codes in the patch shown in box 2 are drawn from the HP DeskJet Roman 8 character set table. This should work fine, unless you're using an unusual font cartridge, or unless Scandinavian DeskJets employ a different character-set mapping scheme. In the latter cases, simply check the DeskJet manual for the character set you're using, and substitute the appropriate codes.

Box 1. Patch for function movebuf() to permit special characters in default address file.

```
for(i = 0; i < count; i++)
    if (buffer[i] == 10 || buffer[i] == 13)
        buffer[i] = '\0';
```

Box 2. Substitute function println(), supporting Swedish characters on HP DeskJet.

```
println(s)
char *s;
{
    int c;

    while((c = (int) *s++) != 0){
        switch(c){
            case(134): c = 0xD4;
                       break;
            case(132): c = 0xCC;
                       break;
            case(148): c = 0xCE;
                       break;
            case(143): c = 0xD0;
                       break;
            case(142): c = 0xD8;
                       break;
            case(153): c = 0xDA;
                       break;
        }
        Bconout(0,c);
    }
}
```

PHONE.ACC, Redux

Dear Editor,

Your Spring 1990 issue mentioned a program called PHONE.ACC (see "The Ultimate Address Book," Spring 1990, page 42), saying that it was available on CompuServe, GENie, and by mail. I've looked on both information services, and haven't been able to find it. Please help.

Sorry, sorry, sorry! Version 2.0 of PHONE.ACC is now available in the ATARIVEN section of CompuServe's Atari forums, and in the new Atari Explorer section of

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Genie's ST Roundtable. The program is also available, gratis, by mail. Please send a self-addressed diskette mailer and one formatted diskette to our editorial offices: Atari Explorer Magazine, 29-05 Broadway, Astoria, NY 11106. We'll turn them around as fast as we can.

Version 2.0 of *PHONE.ACC* has some interesting added features, some apparent, some hidden. The memory-management scheme has been optimized so that the accessory uses minimum RAM for directory-database storage, and can handle files limited in size only by availability of RAM space. The accessory now reads and writes pure ASCII files in a format compatible with the Atari Portfolio palm-top computer, so it can be used as a means for managing and using Portfolio phone-bases on the ST. Use of ASCII files also means that you can use your favorite text-editor or database program to assemble phone lists.

PHONE.ACC V 2.0 addresses envelopes and can automatically insert addresses into correspondence (provided you use a GEM-based word processor). It's capable of saving marked subsets of address records to separate files. The autodialer itself has been enhanced and simplified: in addition to dialing via a Hayes (or compatible) modem, the .ACC is now capable of generating DTMF tones directly, through the ST's sound hardware — so you can just hold the receiver up to the monitor speaker, and go!

What's Up Doc?

Dear Editor,

While working on "Westward Ho!", a program that you put in your Spring, 1990 issue (see "Westward Ho!", Spring 1990, page 66), I ran into a problem on page 74, line 1400. The line reads:

```
1400 IF RND(1) * 10 > ((M/100-4) ^2+72)/
((M/100-4) ^2+12)-1 THEN RETURN
```

What are the little 'caret' symbols, and what do they mean?

Luke Wayman
Coarsegold, CA

The 'caret' symbols (up-arrows) are produced by hitting *SHIFT-6* on your ST keyboard. In BASIC, these symbols indicate exponentiation — the raising of a number to a specific power. Thus, for example, $(M/100-4)^2$ means "(M/100-4) to the second power" or "(M/100-4) squared." ■

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The New Atari Explorer

The issue of Atari Explorer Magazine you now hold in your hands is something I'm immensely proud of. Proud, because the fact that you're reading it means we've kept the promise made last Spring: to continue bringing you the best in Atari news and product information. Proud, because of the energy, imagination, and expertise that Atari people have contributed in making this issue happen. And finally, proud because putting together this magazine was the hardest and most rewarding job I've ever done.

In many ways, this issue of Explorer represents a new beginning. Long-time readers will already have noticed Explorer's elegant new "look," product of Art Director Peter Kelley's expertise and talent, and of our changeover to Atari-only desktop publishing. This entire issue, with the exception of art, was produced on a Mega ST 4 with SM124 monochrome monitor and Megafile 20 hard disk, running PageStream software. Pages were proofed on an SLM804 laser printer, then sent in PostScript format (via Atari modem) to a local service bureau for final output on a Linotronic 330 at 1270 dpi. The result, we think, is a fine example of what Atari DTP systems can accomplish: an elegant publication with a distinctive graphic "snap," produced in an eminently cost-effective manner.

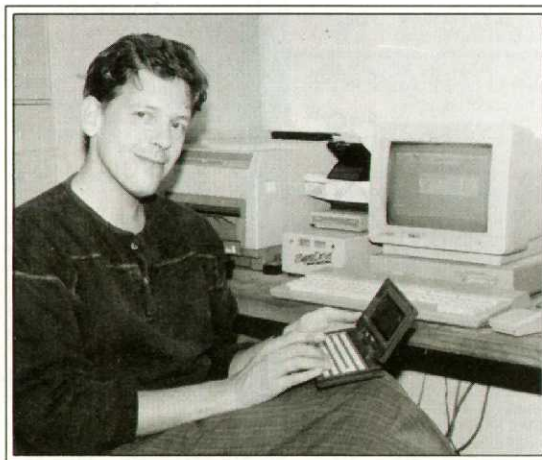
Looking past the surface changes, you'll notice that Explorer's layout and organization has also been transformed. We're covering more Atari

equipment than ever before — from high-end productivity tools like the new TT030 computer, to game systems like the Lynx, so no matter what Atari products you own and use, you're sure to find something new, relevant, and exciting in Explorer's pages. We're emphasizing customer relations in new ways, too, as our "Outreach: Atari"

section, beginning on page 10, demonstrates. Produced with the help of Diana Goralczyk, Atari's Director of Customer Relations, Bob Brodie, Director of User Groups, and numerous other Atarians, Outreach is the place to turn if you need guidance or help with Atari products — results guaranteed!

The new Explorer is covering Atari products in greater depth, so you'll find our articles both longer and more comprehensive than before. Naturally, this implies a

compromise: because Explorer's size is limited, choosing to dwell on one product or system at length allows us less page-space to devote to others. Rest assured, however, that as we settle into our new format in coming issues, space has



By John B. Jainschigg

been reserved for the Atari product or system that you use; whether you're an ST MIDI music aficionado, or an 8-bit word-processing whiz.

Our departmental and contributing editors: Peter Kelley and Pamela Hahn on graphics and desktop publishing; Edmund Mann on business applications; Mihai Manoliu on music; and others, are all professionals who use Atari equipment to help pay the rent, so they're tough judges indeed when it comes to discerning what works and what doesn't. Adding to the new Explorer's frontline talent is the expertise and dedication of Atari's brass: the people who make Atari really happen. In this issue, Sam Tramiel relates Atari's hopes for '91, discusses management changes, and indicates

This issue of Explorer represents a new beginning

new marketing directions that will carry Atari forward into the new decade. In coming issues, you'll meet other personalities in the Atari hierarchy, and learn more of the details of how Atari operates, both in the U.S., and abroad.

To all of our readers, old friends and new ... we bid you welcome. The curtain's going up, and the lights are going down. Turn the page, and let the show begin.

Note to Subscribers

Atari Explorer's last issue was dated Spring '90. The current issue — as you've probably noticed — is dated January/February 1991. Explorer is now back on schedule after moving and reorganization, and from this point on, will publish regularly on a bimonthly basis (six times per year). Please note our new editorial, customer-service, and advertising address and phone information, listed on the masthead.

Subscribers whose orders were mailed in the first part of 1990 have now been added to our list. Their subscriptions begin with the current issue. Address changes have also been processed, and in

cases where an issue was skipped, we have extended subscriptions by one issue to make up for the loss. Long-time subscribers please note that your subscriptions to Explorer have been extended to make up for the delay in getting this issue to your door. We're very grateful for your patience, and are working hard to make this and future issues of Explorer worth waiting for.

Those with further subscription problems, new subscribers, and those who wish to renew their subscriptions may call or write our subscription department at the address shown below.

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By Sam Tramiel

November Comdex is the industry's biggest national convention, and Atari went to the show in force. We brought with us the message that Atari is committed to the American market. We're committed to bringing American business, professional, and personal computer users the most cost-effective and workable solutions to every productivity problem.

In particular, Atari is proud to offer a full, vertically-integrated spectrum of compatible text-processing and desktop-publishing solu-

Jack Tramiel
(center) with his
sons, (from left)
Garry, Sam, and
Leonard.



Sam Tramiel, President of Atari,
speaks out on management changes,
new products, and new directions.

tions, ranging from STe systems (offering full home-office/small-business word processing applications), to midrange desktop-publishing applications based on such popular programs as our own DeskSet II and Calamus, on up to our new TT030-based professional DTP/CAD solutions.

The new TT030, based on the powerful 68030 CPU, running at 32 Mhz, falls into place as a faster, more powerful ST with numerous additional features. Built-in SCSI capability makes the TT compatible with a wide variety of standard peripherals, and the basics for network interfacing are also built into the machine.

In addition, the TT will run UNIX System V.4, the most comprehensive and universal version of the popular AT&T operating system. As a UNIX machine, the TT is aimed at the educational and scientific markets, and at the more sophisticated user.

Atari brought several TT's to Comdex. Installed in these machines will be the new GEM Desktop, a strongly revised and enhanced version of the ST user-interface, designed primarily for the TT but also compatible with present and future STs.

Our Portfolio MS-DOS command-compatible computer was also highlighted. We see the Portfolio, both in present and future versions, as the answer to the "superorganizer" problem. It's an easy-to-use machine whose built-in applications offer the customer a means for keeping track of all their appointments, dates, meetings, correspondence, to-do lists, budgets, and other data in a

convenient and dynamic way. At the same time, the Portfolio offers a good degree of compatibility with the MS-DOS standard, giving application developers a leg up in developing specialized software for the machine. Many applications are currently being developed, ranging from trotter-handicapping to stock-price tracking. The STe, which now forms the basis of the ST line, the Stacy professional portable computer, and our new SLM604 laser printer were also featured.

All this underscores the fact that Atari is now emphasizing the U.S. market, and is ready to provide both inventory and a new level of attention and support. During the past several months, Atari has made several major changes in Engineering and in the management of the U.S. Corporation, in support of this commitment. Atari Dallas is now responsible for R&D on all new

68000-family-based products (ST and TT family). The reorganization has streamlined communications and will facilitate fast turnaround of designs.

Worldwide, Atari is stronger than ever, particularly in Western Europe. In August, I visited the World of Atari show in Dusseldorf, a five-day spectacular that attracted over 43,000 attendees. We also see Eastern Europe and Russia as big potential markets for Atari. There are already Atari clubs in Russia. Our strength in Europe aids our efforts in the Eastern Bloc.

Atari Explorer Magazine, the Official Atari Journal, will be the place to read about these changes — and much more — in coming months. Explorer's recent reorganization has made the magazine a more useful and timely reference for all Atari owners, and we welcome Explorer back into full production, with this issue. ■

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Outreach:

On an average business day, Atari Customer Relations handles hundreds of calls, letters, and requests for information on topics ranging from where to buy ST software in Peoria to the intricacies of 8-bit Basic programming. Providing customer support for a small, fast-growing company is a complex and demanding job, requiring detailed mastery of Atari's many product lines and up-to-the-minute familiarity with fast-changing policies. The job also requires patience, diplomacy, and a gift for teaching; all useful in overcoming the frustrations that leading-edge technology seems, every so often, to foist upon its users.

Though broad in scope, questions fielded by Atari Customer Relations tend to fall into a number of well-defined categories. Some callers simply want to know where Atari equipment is sold in

their area. Others call to inquire about repairs or ask about warranty limitations. Many call in need of technical support, both for Atari's own products and for compatible products manufactured by third parties. And an increasing number of callers wish to order Atari equipment and software directly.

Customer Relations and Tech Support agents are trained in all of these areas, their training backed up by a dizzying array of dealer and user-group databases, manuals,

price lists, ordering information, policy statements, and other tools of the trade.

Atari Explorer, too, can be considered part of Atari Corp.'s Customer Relations enterprise, existing to facilitate the spread of information, to teach, to provide a forum for exchanging views, and to encourage our readers to get the most out of their Atari investment.

It is in this spirit that we present Outreach: Atari — a guide designed to help you make better use of the services Atari stands ready to provide. Whatever you need: dealer information, help finding a user-group, repair or warranty information, or maybe just a little hand-holding, it's all just a phone-call away!

Where to Buy It

Depending on the product or type of system you wish to purchase: whether it's a Lynx game system or a Mega 4-based desktop-publishing powerhouse, the best place to buy it is from an authorized Atari dealer. Atari evaluates and certifies its dealers with great care, depending on the product lines they wish to sell, service, and sup-

YOUR ATARI CUSTOMER RELATIONS

Atari

port. Simpler products, such as the Lynx Portable Entertainment System, are often sold through nationwide chains, department stores, and other mass-merchandising outlets capable of selling at low prices and of exchanging occasionally defective merchandise immediately, out of stock. More complex products, such as the Mega line of business systems, the SLM804 laser printer, and the several powerful vertically-integrated desktop-publishing systems built up around this combination of equipment are typically better sold by individual Business Computer Centers, whose staffs know the ins and outs of the technology, and are able to provide hands-on assistance and training to the customer. Specialized products, such as the Atari Stacy portable computer, designed primarily for use by musicians, are sold through dealers that specialize in serving the professions — in this case, through qualified music stores.

Regardless of product or outlet, the object of Atari's dealer arrangements is always the same: to provide customers with equipment at the lowest possible cost consistent with appropriate support. And Atari's dealers do a terrific job: helping and encouraging customers, staying on top of developments in the Atari world, and providing feedback to the company. Many — perhaps most — of Atari's individually-owned dealerships were founded by Atari owners. These businesses are conducted with an expertise, enthusiasm, and commitment that comes from long experience, and real affection for the Atari line.

Finding an Atari Dealer

If you're an experienced user who wants to buy a computer with which you're already familiar, buy some entertainment software, or acquire a standard peripheral such as an SMM804 dot-matrix printer; especially if you're sure you won't need much in the way of hand-holding and support, it's often practical to shop by mail. Mail-order houses, particularly well-established

CUSTOMER RELATIONS QUICK REFERENCE CARD

Write or call Atari Customer Relations to:

- Locate the Atari Dealer nearest you
- Locate the Atari User Group nearest you
- Get technical support for Atari hardware and software
- Authorize repair/replacement transactions
- Order selected Atari products

To Call:

(408) 745-2367

Atari Customer Relations is standing by from 8:00 AM to 5:00 PM Pacific Standard Time, Monday through Friday. Best times to call are late in the day between 3:00 PM and 5:00 PM PST) and late in the week (Thursday or Friday).

To Write:

Atari Corporation
Attention: Customer Relations
P.O. Box 61657
Sunnyvale, CA 94088

When you write, please explain your situation carefully, and specify what information you require. If describing a problem with hardware, please include all particulars of relevant equipment and software including makes and model or version numbers. If making an order, please include full address information, and a check or money order for the correct amount, plus shipping and taxes, as applicable. Also please include a daytime phone number.

Portfolio/Lynx Direct

(800) 443-8020

Direct order line for the Atari Portfolio MS/DOS compatible palmtop computer, accessories, and software. Also use this line to order game cartridges and accessories for the Atari Lynx Portable Entertainment System.

REFERENCE GUIDE

ones such as BRE and Computer Games +, offer low prices, fast turnaround, and maximum convenience. Finding a mail-order house is easy: just turn the pages of *Atari Explorer*, *STart*, or any other magazine serving the Atari market.

If you're not sure about a mail-order dealer, don't fret. Most are run by seasoned pros who work hard to satisfy their customers. While Atari doesn't actively "police" mail-order houses, Customer Service does maintain dealer records which may in certain cases, permit them to recommend sources known to be reliable. If in doubt, call Atari Customer Relations at (408) 745-2367 and ask for a recommendation. Don't be afraid to talk over your fears, if any, with the person who answers the phone. As Atari users themselves, they'll often have personal experience that bears on your particular situation.

Retailers

If service and support is what you're after, particularly if you're considering a first-time Atari purchase or are in the market for a complex product, it's worthwhile establishing a relationship with a local Atari retailer. Retail Atari dealers generally provide quite extensive support for the products they sell, and offer the potential of providing one-stop maintenance, repair, and

upgrade services, as well.

Several categories of Atari retailers exist; the most comprehensive being certified as Business Computer Centers and/or Authorized Repair Centers. In general, the more involved your purchase, the more important it is to make it where you can also get support and service. As a rule, the nearer you live to a large city, the easier it is to find a registered dealer close by. Again, just call Atari Customer Relations at (408) 745-2367, explain what you're looking for, and ask for the name of the retailer nearest you. At last count, Atari's retailer database numbered in the thousands, and new dealers are coming into the fold every day!

Admittedly, with so many dealers to keep track of, Customer Relations is hard pressed to keep its records up-to-the-minute. And sometimes, admittedly, dealers leave the fold and stop supporting Atari products the way they should. Thus, even when you receive a dealer referral from Customer Relations, it's a good idea to shop defensively — call ahead and make sure the dealer really handles the product you're interested in buying. If you find something out that Atari didn't know, please call or write us with that information. You'll be doing a fellow customer — and Atari — a favor by doing so.

Buying Direct From Atari

Though Atari supports its dealers and asks that you patronize them whenever practical, if all else fails, you can purchase certain products direct from Atari. Though Atari can't hope to offer the same low prices as can be obtained from dealers, occasionally buying direct is the only way to go. This is particularly true when searching for small parts, special cables, and "antique" hardware that dealers often can't afford to keep in stock.

Atari Direct Information

The price lists shown on the opposite and following pages are current as of November, 1990. Please note that prices may change without notice, that certain products may be unavailable and that certain presently-unreleased new products may become available by the time this issue of *Explorer* reaches you. Call Atari Customer Relations at

(408) 745-2367 prior to ordering, for current price and availability updates!

Ordering Information:

To order, please send check or money order for the appropriate amount plus shipping and handling as follows:

\$3.50	(orders under \$50.00)
\$5.00	(orders \$50.00 to \$100.00)
\$7.50	(orders over \$100.00)

Please add applicable sales tax for your area:

IL	Add 6.75%	NY	Add 8.00%
CA	Add 7.25%	TX	Add 8.25%

Mail to: Atari Corporation
Attention: Customer Relations
P.O. Box 61657, Dept. AE
Sunnyvale, CA 94088

ATARI DIRECT PRICE LIST

ST Hardware

ST Computers

Model #	Product Title	Retail Price
520 STFM	16/32 Bit Computer w/built in disk drive	\$399.95
520STFM	Mono 16/32 Bit System w/monochrome monitor	\$599.90
520 STFMRGB	16/32 Bit System w/RGB color monitor	\$699.95
1040 STE	16/32 Bit System - Enhanced, CPU only	\$699.95
1040 STF CPU	16/32 Bit System - CPU only	\$699.95
1040 STF Mono	16/32 Bit System w/monochrome monitor	\$899.90
1040STF RGB	16/3 Bit System w/RGB color monitor	\$1,099.50
Mega 2 Mono	2 Mb Computer System w/monochrome monitor	\$1,699.95
Mega 2 RGB	2 Mb Computer System w/RGB color monitor	\$1,899.95
Mega 4 Mono	4 Mb Computer System w/monochrome monitor	\$1,995.90
Mega 4 RGB	4 Mb Computer System w/RGB color monitor	\$2,195.90
Mega 2 CPU	2 Mb Computer - CPU only	\$1,499.95
Mega 4 CPU	4 Mb Computer - CPU only	\$1,795.95

ST Disk Drives

F354	3 1/2" 360K Disk Drive	\$179.95
SF314	3 1/2" 720K Disk Drive	\$199.95
Megafile 30	30 Mb Hard Drive	\$699.95
Megafile 44	44 Mb Removable Media Hard Drive	\$1,195.00
Megafile 60	60 Mb Hard Drive	\$999.95

ST Monitors

SM124	12" Hi-Res. B/W Monochrome Monitor	\$199.95
SC1224	12" RGB Color Monitor	\$399.95

ST Printers

SMM804	Dot Matrix Printer (8-bit compatible)	\$ 249.95
SLM804	Laser Printer	\$1,099.00
SLM804	PCV Laser Printer (w/UltraScript software)	\$1,195.00

ST Printer Accessories

CO70263	SMM804 Printer Ribbon	\$9.95
LPS005	Toner Kit for SLM804 (3K copies)	\$59.95
LPS004	Drum Kit for SLM804 (10K copies)	\$199.95

ST Modem

SX-212	1200/300 Baud Hayes-compatible Modem	\$99.95
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ST Diskettes

C026225-001	ST 3.5" DSDD Diskettes (package of 5)	\$14.95
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ST Software

Communications

Part #	Product Title	Retail Price
TP6005	Bulletin Board (BBS)	\$79.95

Drawing/Painting/Animation

TP6026	Make-It-Move	\$69.95
TP6701	Easy Draw	\$99.95
TP6025	GFA Draft	\$99.95
DS5027	Neochrome	\$39.95

ST Software CONTINUED

Education/High School

Part #	Product Title	Retail Price
DS5007	Home Planetarium	\$49.95
DS5059	Algebra I, Vol. 1	\$29.95
DS5061	Algebra II, Vol. 1	\$29.95
DS5062	Algebra II, Vol. 2	\$29.95
DS5063	Algebra III	\$29.95
DS5065	Geometry, Vol. 2	\$29.95
DS5066	Statistics	\$29.95
DS5068	Biology, Vol. 1	\$29.95
DS5069	Biology, Vol. 2	\$29.95
DS5070	Biology, Vol. 3	\$29.95
DS5071	Biology, Vol. 4	\$29.95
DS5073	Chemistry, Vol. 2	\$29.95
DS5074	Physics, Vol. 1	\$29.95
DS5075	Physics, Vol. 2	\$29.95

Education/General

TP6036	Perfect Match	\$39.95
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Education/Grade School

DS5088*	Magical Math I	\$29.95
DS5089*	Magical Math II	\$29.95
DS5090*	Magical Math III	\$29.95
DS5092*	Memory Master	\$29.95
DS5093*	Memory Master II	\$29.95
DS5094*	Alphabet Tutor	\$29.95
DS5095*	Typing Tutor	\$29.95
DS5097*	Equation Builder	\$29.95
DS5105*	General Store	\$34.95
TP7601	Math Wizard	\$39.95
TP7602	Fraction Action	\$39.95
TP7603	Decimal Dungeon	\$39.95
TP7604	Read & Rhyme	\$39.95
TP7605	Kinderama	\$39.95
TP7606	Animal Kingdom	\$39.95
TP7607	Read-A-Rama	\$39.95
TP7608	Aesop's Fables	\$49.95

* New Bentley Bear Series

Entertainment

DS5018	Missile Command	\$ 29.95
DS5019	Star Raiders	\$ 29.95
DS5020	Battlezone	\$ 29.95
DS5026	Joust	\$ 29.95
DS5045	Crystal Castles	\$ 29.95
TP6011	Major Motion	\$ 39.95
TP6012	Time Bandit	\$ 39.95
TP6013	Cards	\$ 39.95
TP6024	8-Ball	\$ 29.95
TP6027	Match Point	\$ 39.95
TP6037	Gold Runner	\$ 39.95
TP6041	Airball	\$ 39.95
DS5058	Moon Patrol	\$ 29.95
DS5079	Robotron	\$ 29.95

ATARI DIRECT PRICE LIST

ST Software CONTINUED

Integrated Packages

Part #	Product Title	Retail Price
TP6301	Zoomracks I	\$ 79.95
TP6305	Accounting Starter Kit	\$ 49.95

Music

TP7301	Midi Play	\$ 49.95
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Midi Play Music Disks

TP7302	Beatles, Vol. 1	\$ 19.95
TP7303	Classics, Vol. 1	\$ 19.95
TP7304	Hits '86	\$ 19.95

Personal Calendar

Part #	Product Title	Retail Price
TP7501	Inagem +	\$ 49.95

Program Languages/Utility

TP6019	GFA Basic	\$ 79.95
TP6020	GFA Basic Compiler	\$ 79.95
TP7801	Mark Williams "C"	\$179.95
TP6029	Michtron Utilities	\$ 59.95
TP6031	Stuff	\$ 39.95
TP6703	Fast	\$ 29.95

Spreadsheet

TP7101	EZ-Calc	\$ 69.95
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ST Software Catalog

CO266313	International Software Catalog (Revision B)	\$ 12.95
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Atari 7800 Cartridges

Model #	Game	Price
CX7846	Ace of Aces	\$29.99
CX7815	Ballblazer	\$19.99
CX7801	Centipede	\$14.99
CX7821	Choplifter	\$14.99
CX7838	Commando	\$29.99
CX7836	Crack'ed	\$29.99
CX7844	Crossbow	\$29.99
CX7837	Dark Chambers	\$29.99
CX7802	Deluxe Asteroids	\$14.99
CX7811	Desert Falcon	\$19.99
CX7803	Dig Dug	\$14.99
CX7848	Donkey Kong	\$19.99
CX7849	Donkey Kong Jr.	\$19.99
CX7851	Fight Night	\$29.99
CX7804	Food Fight	\$14.99
CX7805	Galaga	\$14.99
CX7829	Hat Trick	\$19.99
CX7857	Jinks	\$29.99
CX7806	Joust	\$14.99

Model #	Game	Price
CX7822	Karateka	\$19.99
CX7850	Mario Brothers	\$19.99
CX7807	Ms. Pac Man	\$14.99
CX7824	1 on 1 Basketball	\$19.99
CX7808	Pole Position II	\$14.99
CX7834	R.S. Baseball	\$19.99
CX7809	Robotron:2084	\$14.99
CX7826	Summer Games	\$29.99
CX7828	Super Huey	\$19.99
CX7823	Touchdown Football	\$19.99
CX7856	Tower Toppler	\$29.99
CX7831	Winter Games	\$29.99
CX7858	Xenophobe	\$29.99
CX7810	Xevious	\$14.99

NEW!

CX7862	Ikari Warriors	\$29.99
CX7847	Mean 18 Golf	\$29.99
CX7868	Planet Smashers	\$29.99

Atari 2600 Cartridges

Model #	Game	Price
CX2649	Asteroids	\$ 9.99
CX2624	Basketball	\$ 9.99
CX2681	Battlezone	\$12.99
CX26135	Boxing	\$14.99
CX26190	B M X	\$ 9.99
CX2676	Centipede	\$12.99
CX26139	Crossbow	\$14.99
CX26110	Crystal Castles	\$14.99
CX26151	Dark Chambers	\$14.99
CX26120	Defender II	\$12.99
CX26140	Desert Falcon	\$14.99

Model #	Game	Price
CX2677	Dig Dug	\$14.99
CX26144	Donkey Kong Jr.	\$12.99
CX26159	Double Dunk	\$14.99
CX2684	Galaxian	\$ 9.99
CX2685	Gravitar	\$12.99
CX2688	Jungle Hunt	\$12.99
CX2689	Kangaroo	\$12.99
CX26129	Midnight Magic	\$14.99
CX26118	Millipede	\$14.99
CX2638	Missile Command	\$ 9.99
CX2692	Moon Patrol	\$12.99

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your request for repair or replacement, you may receive an in-warranty machine back to Atari (along with documentation proving purchase within the first 90 days) for prompt repair or replacement, at Atari's option. (For more information, see Repair/Replacement, below).

If your equipment is out-of-warranty, don't panic. In general, the best place to take a broken Atari is an Atari Authorized Repair Center. Repair centers, like dealers, must pass stringent controls before they are permitted to stock proprietary components and perform board-level repair. Repair centers are also authorized to perform approved upgrades. Again, like dealers, the closer you live to a big city, the nearer you generally are to an Authorized Repair Center. For a list of centers in your area, simply call Atari Customer Relations at (408) 745-2367, and ask.

Once you have the name of a repair center in your area, the next step is to pack up your equip-

ment. Atari offers a program that can get you up and running with all you have to do is return it to Atari, and you'll receive a standardized Atari repair kit to replace (usually at no charge) the return it to you.

There are several ways to get your Atari repaired. If you don't have modified Atari parts, you can't get an authorized Atari repair kit. If you haven't modified your Atari, you're pretty much in luck. Atari can't offer you a repair kit around that area, but you can get a price for repair kit. A fraction of what you'd pay at the Repair/Replacement Center details. Prices since 1990, but may

Product Title	Retail Price
Atari Master	\$12.99
Atari Baseball	\$14.99
Atari Breakout	\$ 9.99*
Atari Football	\$14.99
Atari Guard	\$ 9.99
Atari Juke	\$12.99

*Middle Controllers are required.

2600 Accessories

Atari Joystick Controller	\$ 9.95
Atari Joystick Adaptor, 2600	\$14.95**
Atari Joystick Adaptor, 7800	\$ 8.95
Atari Joystick Switch Box	\$ 4.95
Atari Joystick Controller	\$ 8.95**
Atari Joystick Controller	\$14.95**
Atari Joystick Cartridge	\$ 9.95

**2600 or 2600 cartridges running in 7800

Technical Support

If you have a technical problem with Atari equipment or software, don't lose hope — just call Customer Relations and ask for help. Atari Technical Support representatives are trained in the use of Atari equipment and are familiar with most popular software, so it's rare that a basic question can't be answered right away. Even more difficult questions can often be answered the same day or, if more information is requested than can easily be transmitted over the phone, by mail. The Atari Technical Support direct line is (408) 745-2004.

When seeking technical support by phone, here are a few suggestions for getting faster results:

1. Before calling, think about the problem you're having and take the time to jot down some notes. Make sure you write down everything that might pertain to the problem, so that you can refer to your list when speaking with Atari Technical Support. What kind of Atari equipment are you using? What kind of software? What are you trying to do with it? Does the problem recur on a regular basis, or in similar circumstances every time?

2. When you call, please try to have your equipment turned on, and any relevant software loaded. That way, you may be able to recreate the

problem while speaking with Technical Support, which will help determine its cause.

Please try to be patient in dealing with the representative who answers your call. Though they are trained and have considerable experience in handling a wide variety of problems, it's just possible that you're the first person who's ever called with the problem at hand. Remember, also, that the representative is trying very hard to visualize your situation from your description of it — something that's not easy to do, even under the best of circumstances.

Remember, also, that Atari Technical Support cannot possibly keep track of all the software and peripherals that other vendors supply for the Atari line. It's therefore possible that the problem you're experiencing lies with equipment or software outside the representative's range of experience. This should not dissuade you from asking questions, however. In fact, it's often the case that Atari personnel can help guide you in the right direction, even when a product's not our own.

If It's Broke, We'll Fix It!

It's true: even Atari equipment breaks down. Wear and tear, dust, heat build-up, accidents, power surges, and gremlins do occasionally conspire to put

REPAIR PRICING

Computers

65XE	\$ 50.00
130XE	\$ 65.00
520STFM	\$300.00
1040 ST	\$375.00
Mega 2	\$525.00
Mega 4	\$675.00
Portfolio	\$120.00

Disk Drives

XF551	\$ 75.00
SF354	\$ 75.00
SF314	\$ 90.00
Megafile 30	\$225.00

Printers

1020	\$ 30.00
1025	\$ 75.00
1027/XDM121	\$ 95.00
XDM121	\$ 95.00
XMM801	\$ 75.00
SMM804	\$ 75.00

Game Systems

2600	\$ 25.00
7800	\$ 45.00
XE Game	\$ 65.00
XE Keyboard	\$ 25.00
XE Console	\$ 50.00
Lynx	\$ 90.00

Monitors

SM124	\$130.00
SC1224	\$260.00

Modem & Interface

850	\$ 40.00
XM301	\$ 40.00
SX212	\$ 40.00
XEP80	\$ 35.00
Mouse	\$ 35.00

T PRICE LIST

CONTINUED

Retail Price

\$ 79.95

\$ 49.95

\$ 49.95

\$ 19.95

\$ 19.95

\$ 19.95

Personal Calendar

Part #	Product Title	Retail Price
TP7501	Inagem +	\$ 49.95

Program Languages/Utility

TP6019	GFA Basic	\$ 79.95
TP6020	GFA Basic Compiler	\$ 79.95
TP7801	Mark Williams "C"	\$179.95
TP6029	Michtron Utilities	\$ 59.95
TP6031	Stuff	\$ 39.95
TP6703	Fast	\$ 29.95

Spreadsheet

TP7101	EZ-Calc	\$ 69.95
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ST Software Catalog

CO266313	International Software Catalog (Revision B)	\$ 12.95
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Atari 7800 Cartridges

Switch Boxes

CX522	\$ 19.95	5200 Switch Box
CX262	\$ 4.95	2600/7800 & XL/XE Computers

Controllers

CX52	\$ 15.00	5200 Controller
CX40	\$ 8.95	2600 & XL/XE Joystick
CX30	\$ 14.95	2600 Paddles
CX530	\$ 19.9	5200 Trakball
CX22 or CX80	\$ 14.95	2600/7800/8-bit Trakball
CX24	\$ 9.95	Pro-Line Joystick
XES2001		
(CA200132)	\$ 29.95	XE Light Gun
CA070025	\$ 49.95	Mouse

Printer Ribbons/Accessories

FC100626	\$ 3.95	1027 Ink Roller
C070263	\$ 9.95	XMM801/SMM804 Ribbon
C399016	\$ 7.95	XDM121 Printer Ribbon (carbon)
C39940	\$ 11.95	XDM121 Printer Ribbon (fabric)
C39941	\$ 12.95	XDM121 Printwheel (pica)
C39942	\$ 12.95	XDM121 Printwheel (elite)
SQ400	\$129.00	Megafile 44 Cartridge
LPS005	\$ 59.95	Toner Kit for SLM804 (3K Copies)
LPS004	\$199.95	Drum Kit for SLM804 (10K Copies)
LPS0051T	\$ 64.95	Initial Toner for SLM804
STS004	\$ 19.95	Tilt-Swivel Monochrome Monitor Stand

something on the fritz. If this happens to you, it's wise to be prepared.

If your equipment is in-warranty, and you bought it from an Atari dealer, you should have no difficulty returning it to that dealer for prompt repair or replacement, provided the terms of the

warranty have not been broken. Atari's warranty is ironclad, and explicit — so long as you have not modified the equipment in any way and have taken reasonable care to ensure its safety, you are protected if something goes wrong within the warranty period (90 days). If your dealer cannot satis-

fy your request for repair or replacement, you may send an in-warranty machine back to Atari (along with documentation proving purchase within the past 90 days) for prompt repair or replacement, at Atari's option. (For more information, see Repair/Replacement, below).

If your equipment is out-of-warranty, don't panic. In general, the best place to take a broken Atari is an Atari Authorized Repair Center. Repair Centers, like dealers, must pass stringent controls before they are permitted to stock proprietary components and perform board-level repair. Repair centers are also authorized to perform approved upgrades. Again, like dealers, the closer you live to a big city, the nearer you generally are to an Authorized Repair Center. For a list of centers in your area, simply call Atari Customer Relations at (408) 745-2367, and ask.

Once you have the name of a repair center in your area, the next step is to pack up your equipment (preferably in the cartons it came in, though any secure cardboard carton with appropriate padding will probably be fine), and take it on down to the center for a look-see. If technicians can identify the problem rapidly, and have parts on hand, they may elect to do the repair locally. Otherwise, they may elect to return the machine to Atari for repair/replacement, depending on what's the most economical and timely solution. In either case, you have the right to an estimate of how long the repair will take, and how much it will cost. An Authorized Repair Center will always be able to give you a reasonable answer to both questions.

Repair/Replacement

If there's no Authorized Repair Center nearby, don't give up hope. Atari Customer Relations of-

fers a program called "Repair/Replacement" that can get you up and running in no time. Basically, all you have to do is send your broken equipment back to Atari, along with a check or money order for a standardized amount, and Atari will repair or replace (usually the latter) the equipment and return it to you promptly.

There are only a few limitations on Atari's Repair/Replacement policy. Naturally, you must not have modified your equipment in any unauthorized way. Nor can Atari be held responsible if you haven't taken proper care of it. Otherwise, you're pretty much home-free. And while Atari can't offer you the same low prices and fast turnaround that an Authorized Repair Center can, the price for repair-replacement is still generally only a fraction of what the device originally cost. See the Repair/Replacement box, opposite, for pricing details. Prices shown are accurate as of November, 1990, but may change without notice. Call Atari Customer Relations at (408) 745-2367 for latest price information.

To arrange Repair/Replacement, send equipment to Atari, along with a check or money order for the appropriate amount (return shipping is included). Equipment should be securely packed, preferably in original cartons. Atari cannot be held liable if equipment is lost or further damaged in shipment, so it's wise to declare value with your shipper as appropriate. Remember to include return address information.

Mail to: Atari Corp.
Attention: Customer Relations
Repair/Replacement
P.O. Box 61657
Sunnyvale, CA 94088

Portfolio And Lynx Direct

In addition to normal services performed by Customer Relations, Atari supports a toll-free ordering and information line for the Portfolio MS/DOS Compatible palmtop computer and the Lynx Portable entertainment system.

The Atari Portfolio is sold through Montgomery Wards, Good Guys, Bizmart, Battery One Stop and other retailers. The Atari Lynx and cartridges are currently available through your local Toys 'R' Us, Kay-Bee Toys (East Coast),

Children's Palace, Lionel Playworld, Good Guys, Babbages, Electronic Boutique, Montgomery Wards F.A.O. Schwartz, and other major toy stores and electronics retailers. If you are unable to locate the Portfolio or Lynx dealer nearest you, simply call Atari direct at (800) 443-8020 for prompt assistance.

You can also order Lynx and Portfolio hardware, software, and accessories via this toll-free line. Prices shown (next page) are correct as of

November, 1990, but may change without notice. Please call (800) 443-8020 for current pricing and product availability information.

Ordering Information:

To order direct from Atari, call (800) 443-8020 (VISA/MC accepted), or send check or money order for the appropriate amount, plus indicated sales tax and shipping.

Add \$3.50 for shipping and handling charges. Also please add applicable sales tax for your area:

IL - 6.75% NY- 8.00%
CA - 7.25% TX- 8.25%

Mail to: Atari Corporation
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Atari is proud of its user groups, and tries to maintain close contact with them. If the idea of joining a user group appeals to you, Atari can help there, too. Just call Atari Customer Relations at (408) 745-2367 for the names and numbers of user-group coordinators in your area. ■

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Two innovative adventures and a classic version of chess for the ST!

ST Games



If you have a thing for huge mazes, crawly creatures, wierd castles, magic spells, great graphics and hurling hundreds of axes per minute, then Artura is definitely the game for you. This new diversion from the recently-formed Arcadia division of Virgin Mastertronic (licensed from Grem-lin Software) is a visual and aural treat that pays homage to older games while managing to stay a step ahead of the pack.

Artura

Based loosely on parts of the King Arthur legend (with the names just barely changed to protect the nonexistent), Artura is an arcade adventure that plays like a hybrid of Black Lamp and Gauntlet. The plot is typical of many of the hideously complex fantasy tales that it imitates: You become Artura of Camelod, son of

the Pendragon in ancient Albion. Your task is to convince the warlike Chieftains of the tribes of Albion to come to terms and live in peace under your Divine sovereignty. But peace can never exist until the sacred treasures of Albion are returned. This cannot be done, unfortunately, since the only person who knows the locations of the treasures is your advisor and friend, the wizard Merdyn, and he has vanished.

So all you have to do is find Merdyn in the maze, right? Nope. Merdyn isn't in the maze. In fact, Merdyn isn't even in the *game*. The maze in question is the underground castle of Morgause, your evil half-sister, and it is Merdyn's *apprentice*, the beautiful Nimue, who has been kidnapped to the castle. She is the only one who knows Merdyn's location, and you must rescue her to find Merdyn. So all you have to do is find *Nimue* in

SYSTEM:

Atari ST

REQUIRED EQUIPMENT:

Color Monitor,
Joystick

SUMMARY:

The legend lives on in adventure-arcade splendor.

DISTRIBUTOR:

Virgin Mastertronic
8001 Cowan,
Suites A & B
Irvine, CA 92714
(714) 833-8710

the maze, correct? Wrong again. To get to Nimue, you must first find the eighteen pieces of the six Rune Stones of Cerriddwen. Only by finding these pieces and reassembling the stones can you ride the mystical wheel of Cerriddwen to Nimue's aid, who will lead you to Merdyn and the treasures. This (at long last) is your quest.

You start on level one of Morgause's castle, the top level of her subterranean domain, and you must search the castle for pieces of the rune stones. This is where the game begins to resemble a horizontally scrolling Gauntlet. In almost every room you are surrounded by guards, rats, dwarves, spiders, bats, owls, and various other creatures. You fight these nasties off with a seemingly endless supply of axes that you carry with you.

You must, however, take into account that your axes are affected by gravity — this can be used to your distinct advantage if used properly. You have an energy bar at the bottom of the screen that gradually depletes as you get munched on by the bad guys. You start off with a lot of energy. Enough, in fact to make you feel invincible and let you do something stupid. But don't — you take a lot of hits in Artura, and you only get one life.

This would make Artura an impossible quest, if it were not for the food stores that are scattered throughout the castle (another Gauntlet-esque touch). Chowing on a tasty turkey in Morgause's storage rooms, for example, will bring your energy back up to full, giving you once again a temporary sense of invincibility. There are twenty-nine food supplies in the castle, and they are scattered enough to make it easy to get to one when you need it — if you can find one, that is.

Another, more difficult way to gain back energy is to complete one of the six rune stones. The runes

were destroyed by Morgause's evil touch, and the pieces lie in all corners of the maze. Some of them are guarded by huge creatures or evil wizards who will torment you with a cannonade of fireballs or projectiles. Given your massive energy limit, however, you can usually laugh these off, and a good torrent of axes should take out these guys.

What you really have to watch out for are the traps. Some of these fiendish devices (such as spikes on the floor) simply take energy away when you walk on or through them. The ones you really need to avoid are the ones that afford no escape to the hapless Artura. These, however, you must discover by trial and error — there are no indications to show you where a pit trap is until you've stumbled into it. If there is a way to escape from these pitfalls, I have yet to find it.

Like Black Lamp, Artura is a horizontally scrolling action game involving multiple "dimensions" — there are doors on either side of your horizontal path ("deeper" and "shallower" on the playfield than your on-screen counterpart) that lead to other corridors and rooms. After taking a few games to orient yourself to this system, you'll find that it is a wonderful device that gives a feeling of extraordinary depth to the game. Morgause's castle is a huge and unrelenting place so it will take a good while to discover it all even after you've mastered the pseudo-3D playing system.

The graphics in Artura are absolutely top-drawer. I could hardly ask for a more beautifully rendered landscape than Morgause's castle, replete with scary skeletons, piles of bones, vegetation and starry night skies in the outer gardens, huge rats that munch on you, shields, coats-of-arms, pillars, masks, and a "goodbye-cruel-world" animation that accompanies the death of each bad guy that you

exterminate. The characters themselves move in a realistic manner, the energy bar depletes itself in a pleasing, unwinding double helix, and the visuals in the game are generally wonderful. The sound is not the absolute best that I've heard, but it certainly is good. And the musical selection is a very decent rendition of Steeleye Span's fabulous song "Alison Gross." This wonderful fact alone raised my respect for Artura several notches.

In the Meticulous Details department, the guys at Gremlin have done well in general. The game takes only one disk, which I appreciate; the trend towards multi-disk games that can't be installed on a hard drive is one of my biggest pet peeves. Artura can't be installed on a hard drive, but it *can* be shoved in the drive and forgotten — no annoying disk-switching to contend with. I still wonder when the ST industry will realize that off-disk copy protection is just as successful (if not more so) as on-disk.

The game *does* save your high scores to disk, unlike many of today's arcade contests. You'd better get a score of over 942, however, since the demo mode is very adept at the game, and its scores are saved every time, and yours will be wiped right off if you let the demo run. This was a strange choice on the part of the programmers, but you'll surely be playing long enough to get your high scores well above the Gremlin crew.

Another nice thing about Artura is the fact that it comes with its own map and hints — nobody is trying to squeeze an extra five bucks out of you for a hint book. The map is detailed but rather confusing, since you are given no reference point by which to orient yourself. It would have been nice for them to include a "You are here" on the map to show you where you start. The map includes

only outlines of the corridors and the stairs — the locations of the food and rune pieces are written in the back of the manual. While this system does give the most flexibility to players who want a range of possible challenges, it makes it very difficult to place your location on the map, making the map virtually useless if you get lost.

To complicate matters, the stairways, pits, and doorways are arranged in such a way that it is very hard to tell which level you are on, or even when you have crossed over to another level. It appears that when your character goes off the bottom or top of the screen on a stairway that he is crossing over to the next level. But don't count on it.

Overall, it was a kind and possibly useful gesture for Virgin Mastertronic to have included maps and hints with the game, but you may find that you are better off "painstakingly constructing" a map of your own, as the manual suggests for greater challenge.

Gremlin Software has turned out a very good program here. The graphics are nice, the music is good, the gameplay is smooth and beautifully animated, and the little details are pretty well thought out. I could still ask for better maps, hard drive installation, and perhaps another Steeleye Span tune or two on the soundtrack, but that would constitute almost lethal nit-picking.

Given the detail, challenge, and general aesthetic pleasingness of Artura, I don't think you can go too wrong. And now — to Camelod. ■



Fool's Errand

Featured in Game Player Magazine's Hit 100 for June, 1990, Fool's Errand is now available from Miles Computing (distributed by Electronic Arts) for the Atari ST. The game is based on the exceptionally rich and interesting material surrounding Tarot, a method of fortune-telling that employs a set of cards bearing archtypic images of mystical significance. The plot: a Fool (one of the Tarot's "mortal" cards) seeks to unravel clues to the whereabouts of 14 treasures, hidden by the evil High Priestess (one of the Tarot's "mystic" cards). To do so, the Fool must assemble the pieces of a map, given to him by the Sun (one of the Tarot's "astral" cards), as well as solve a wide variety of puzzles and "games within a game."

Underlying Fool's Errand is a more-or-less linear storyline based on the different cards in the Tarot

SYSTEM: Atari ST

REQUIRED EQUIPMENT:
Color Monitor

SUMMARY:

Unique, graphically sophisticated adventure-puzzle game based on the Tarot. A winner.

PRICE: \$49.95

MANUFACTURER:

Electronic Arts
1810 Gateway Dr.
San Mateo, CA 94404

deck. The names of these cards are presented in five pull-down menus at the top of the screen, a random group of which are made selectable at the beginning of the game. The game is played by selecting cards from the menus, causing the related "chapter" of the story to be displayed. Each chapter contains a reference to a clue and permits access either to a puzzle or a sub-game that develops or further explains the clue in its solution. As places are visited, clues are found, and puzzles solved, the overall story line and map can be filled out, chapter by chapter and piece by piece, until the fourteen treasures are discovered.

Like the Tarot cards they represent, chapters of the story are enigmatic. Ferociously well-written, they lead the player through an abstract universe of signs and symbols, where things are not often as they appear. The

puzzles and games embedded in the cards are similarly enigmatic: ranging from very simple word-jumbles and graphic "picture puzzles" to more complex mazes incorporating hidden doors and other dynamic elements. Fully-developed sub-games are also presented. In one chapter, the Hermit (another of the Tarot's "mortal" cards) challenges you to a game of Thoth, a sort of mystical version of one-card draw, whose rules you must deduce in actually playing the game. In all, a total of 57 challenges lie buried in Fool's Errand, all of which must be met before the game can be won.

Playing Fool's Errand is thus exceptionally rewarding. Because you are constantly jumping into one or another puzzle, the context of challenge in the game is consistently varied. And because the game unfolds before you piece by piece, in no fixed order, it manages to maintain an almost constant sense of anticipation. The user-interface is terrific. Entirely mouse-based, the game employs Macintosh-like "pull-down" menus, rather than the ST-standard "pop-downs." Puzzles and other graphic elements are rendered with all the care typically lavished on illustrations in an expensive children's book. In particular, the Tarot images are beautifully devised; the illustrations drawn both from contemporary and medieval sources. Care has also been taken in developing certain user-friendly aspects of the game. For example, once the sun's map has been completed, a print-out can be made of the entire story, so that this can be referred to in proper sequence to deduce the location of remaining treasures. Since the typical game will last over many sessions, a comprehensive "save game" feature is also included.

Fool's Errand is distributed on four disks, though the game and puzzles themselves require only

two. The remaining two disks contain the game's "prelude" and "postlude," in the form of animated sequences that fill out the beginning and conclusion of the story. While perhaps not strictly necessary, these extra elements add a certain excitement to the whole production. The Finale, which cannot be viewed until the game is completed, adds the element of a reward for the successful player.

Documentation, while not extensive, is adequate to get the game up and running, after which the more or less self-explanatory user-interface takes over. The game is not copy-protected, though I suspect it will not work if copied onto a hard disk. However, the game is capable of accessing its "game" and "puzzle" diskettes regardless of the floppy drives in which these diskettes reside; thus it is possible to play Fool's Errand without a lot of disk-swapping. Copy-protection of a sort is provided by including a code-wheel with the package, which is used to determine a sequence of symbols that must be input to "unlock" the game at the beginning of play.

Fool's Errand is a winner: a game with classic elements that nevertheless completely exploits the medium of the computer in its presentation. Moreover, the game is so devised as to present challenges to players of any age: certain of the puzzles and games within Fool's Errand could conceivably be enjoyed even by younger children, while the overall scenario requires the mental powers of a fairly acute adult to unravel. Fool's Errand may thus represent an entirely new genre of "family-oriented" adventure game. Consider this a must-buy. ■



Colossus Chess X

Since the dawn of the computer, the prospect of artificial intelligence has been an enticing one, whispering seductive promises to gamers everywhere. One of the first applications of AI was at Bell Labs, where a computer was taught to play Tic-Tac-Toe and to learn from its opponents. In recent years it has been chess that has tested the mettle of programmers and processors. The complex game is perfect for putting AI algorithms to the test, and many skilled chess programs have been developed over the years.

We have come a long way since those prehistoric days at Bell Labs; there are now chess computers that can challenge the greatest of human minds. Many of these, however, are out of the reach of the average recreational or tournament chess player, and the cry has gone up for a powerful home chess program. Many exist, but none seem to fill the need for a program that will

learn and improve with experience. Can Colossus Chess X be the program that changes all of this?

Artworx certainly seems confident that it can, billing Colossus as 'The Ultimate Chess Program.' I am not a chess expert — it will take many battles between Colossus and other chess programs to make that judgement. But after playing the game and seeing it in operation, I firmly believe that Colossus can at least give other commercial programs a good run for their money. Chock full of features, this program puts the accent on exceptional flexibility, and in many ways it may bridge the gap between the recreational player and the expert.

To begin with, Artworx made a good decision with their copy protection scheme. As is now standard in the IBM world, copy protection consists of codes that must be entered from the manual to access the program, the advantage being that you can easily make copies for your archives (but you must have the manual to play the game). This also means that the program could conceivably be installed on a hard drive, although I could not successfully get it to work.

Aesthetically and functionally this game is an absolute joy to experience. The audio-visual frills are phenomenal: the board can be viewed in two or three dimensions, the settings for each entirely user-definable; there are four sets of pieces to choose from — Standard, Oriental, Futuristic, or Medieval; you can have the program play any of four different classical tunes as you battle for supremacy; it can talk to you in synthesized speech; or it can respond with simple beeps. These cosmetic features alone had me playing around with Colossus for an hour — but it gets better. The human factors engineers (A.K.A.

SYSTEM:

Atari ST

REQUIRED EQUIPMENT:

Color Monitor

SUMMARY:

Excellent ST chess program with frills-a-plenty!

PRICE: \$34.95

MANUFACTURER:

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

chess specialist and programmer Martin P. Bryant) had a field day. The manual is light years beyond most software manuals — it is well arranged and easy to follow. In addition, the game has two screens: the board, on which play is viewed, and the information screen, where you can keep track of the game and watch Colossus analyze your moves; the program is completely GEM-compatible; moves can be entered in any of FOUR different ways (two keyboard-driven, two mouse-driven); all menu items have keyboard equivalents; and to underscore its flexibility, the game can be played in any of five different languages — when a different language is selected, the menu items, windows, message boxes, even the synthesized speech all change to the selected language (albeit with a bad accent). Of course, if a chess program had nothing more to offer it would be worth less than the disk it was written on. It is the brain behind the beauty that determines the success of a good chess program.

Colossus Chess X does not disappoint here either. The range of options for play is, well, colossal. Colossus' level of thinking can be set to six basic levels, ranging from 'Average' to 'Infinite.' In Average mode, the only parameter you set is the amount of time Colossus has to consider its move — the less time you give it, the weaker its game will be. In Infinite mode, you select the type of search Colossus will perform (selective or 'full width') and the depth of the search (up to twelve full moves, or twelve 'ply' ahead). In this way you can have Colossus search every possible option to the fullest extent of its intelligence and experience. In-between is a range of settings that limits the depth of the search and the amount of time Colossus has to make a move. There is also a 'Problem' mode, in which you can have Colossus solve mating problems (no lewd comments, please) that

you have set up. There is even a dialogue box to let you decide whether Colossus is playing for a win, a draw, or a loss. Meanwhile, you may have Colossus play a portion of your game for you with the 'Go' command, which forces it to make the next move for you; Colossus can play itself or supervise a game between two humans; it can act as a tutor, showing all of the legal moves available during a game; it lets you step backwards or forwards through a game to examine the results of different moves; and, if you are confident, you can play with one or both sides 'blindfolded,' keeping the entire game in your head.

One of the most intriguing features of this program is the openings book, a collection of over 11,000 records, 2,000 lines of moves each about 12-ply deep. Colossus draws from this book during the opening of each game, choosing among the moves that it considers best. As with all features of this game, you can set the level of expertise with which Colossus will choose its opening moves, guaranteeing a fair match. The exciting thing about the openings book is that you can have it learn new strategies as you play, extending the opening vocabulary and making Colossus a more formidable player. In addition to openings, entire games and problems can be stored on the book disk and viewed, replayed, or altered at any time. Included on the disk are 29 of the most famous computer vs. human battles in the history of electronic chess, as well as 10 mating problems.

Despite my general feelings for this game, I couldn't rest easy if I didn't find at least one small complaint. The manual has a problem or two, particularly with its notation. Instead of using different type styles or faces to denote menu items and keystrokes, the manual uses different combinations of

brackets which are almost indistinguishable without close scrutiny. On the technical side, the only way to turn off the sound is to open the 'Sound' dialogue on the Features menu, select 'Beeps,' and lower the volume to zero. Also, the seven-move game history that is displayed on the information screen may be too limited for players who like to examine a game in its entirety. The most severe drawback, however, is that it must be played in low resolution, barring monochrome users from enjoying the game. These, however, are merely the ravings of a mind forever complaining, and should not interfere with the enjoyment of the game.

Chess programs are many and varied, and it can be difficult to decide which will best suit your skill level. Colossus has such exceptional flexibility that I recommend it to players of all levels. The graphics and sound might keep even the most hardened chess-phobe interested long enough to discover the game, while advanced players can forego the frills and play for blood. Out of the box, Colossus can play at an almost infinite number of levels. What's more, it can learn new moves from your playing style, keeping it challenging long after others have gathered dust on your shelf. Despite the advances of the present, it may be a long time until the reality of artificial intelligence lives up to the visions of Asimov and Heinlein. Until then, however, computer games will continue to be the proving ground of the electronic brains, and Colossus Chess X could reign supreme on the ST front for some time to come. ■

New Products

Desktop Publishing

On the DTP front, **Dennis Palumbo** has released a second disk of high-quality fonts for PageStream. Included on the disk are three fonts: Basketville, Gallya, and Decorative Borders. Files included are .DMF (dot-matrix printer) format; 12, 24, and 36-point screen format; associated font-metrics files (.FM) and kerning pairs tables. Also included are PostScript code and header files.

\$34.95 from Dennis Palumbo, 104 Barrymore Blvd. Franklin Square, NY 11010 (516) 352-5605.

New software,
hardware, and
accessories for all
Atari systems

For clip-art freaks, **Computer Safari** has announced the availability of Bernie LaGrave's EPS Clip-Art, Professional Logo Series, Vol. 1, for the Atari ST. EPS Clip-Art is a collection of graphics in Encapsulated PostScript format, allowing it to be used with desktop publishing programs that support PostScript printers. It can also be used with PostScript interpreters such as UltraScript. The disk contains over thirty files, ideal for designing logos, flyers, newsletters, brochures, and letterheads.

\$29.95 from Computer Safari, 606 W. Cross St., Woodland, CA 95695 (916) 666-1813.

Languages

Scientific ST users will be pleased to learn of the release of APL.68000 Level II by **Spencer Organization, Inc.** It is transparently compatible with IBM APL2/370 and APL2/PC, MicroAPL's long-awaited "second-generation APL" for the ST. The language features numerous general language enhancements, an array of new primitive functions, a broadened set of system functions and variables, and a host of new system commands. The ST version includes the full Level II interpreter, enhanced with a sophisticated mouse-driven user interface.

For more information, write the Spencer Organization, Inc., 24 Wampum Rd., Park Ridge, NJ 07656 (201) 307-9099.

Utilities

Just when you thought it was safe to double-click on something, **Jonathan Lawrence Software** of London announces Mouse Tricks, a desk accessory that combines the functions of most of the standard "mouse accelerator" programs and adds some new tricks of its own! Mouse Tricks lets you adjust your mouse pointer's, acceleration, and proportion of horizontal to vertical motion. Optionally, the accessory can also implement a variety of special effects, activated by pressing the right mouse button, as well as a function that turns GEM's "pop-down" menus into "pull-down" menus (menus that appear only when the left mouse button is held down); a "mouse mend" function that renders GEM more sensitive to mouse clicks; and a screen saver.

\$12.50 (includes shipping) from Jonathan Lawrence, 76 Sistova Road, London SW12 9QS, U.K.

8-bit owners will be pleased to hear that **Black Moon Systems**, of Wind Gap, PA, has released a new version of LabelMaster, a label-design utility, and Multi-Column

Lister, a utility that allows six-up printing of LabelMaster data files on any printer. The new versions permit printing directly on #10 business envelopes, and allow individual labels to be skipped during group printing.

\$10.00 (\$5.00 to registered owners of SBS or LabelMaster V1.5 or V1.6), from Black Moon Software, P.O. Box 152, Wind Gap, PA 18091.

New for Lynx!

Three new Lynx accessories have just been released by **Atari Corp.**, to add to the power and versatility of the Lynx Portable Entertainment System. The new Lynx Sun Visor/Screen Guard (\$4.95) solves the problem of glare when using the Lynx outdoors. The Lynx Pouch (\$14.95), constructed of rugged 420 denier nylon, provides a convenient carry-case for the Lynx with added pockets for Com-Lynx cable and game cards. Lastly, the new Lynx Automobile Cigarette Lighter Adaptor (\$9.95) can power up to two Lynxes during long car trips.

All from Atari Corp., P.O. Box 61657, Sunnyvale, CA 94088 (800) 443-8020.

Entertainment

Lucasfilm Games has released the ST version of *Their Finest Hour: The Battle of Britain*. This new air combat simulator for the ST enables players to fly both German and British missions in the Battle of Britain. Combining historical and technical accuracy with seat-of-the-pants flying action, *Their Finest Hour* will appeal to simulation buffs and action gamers alike.

\$59.95 from Lucasfilm Games, P.O. Box 10307, San Rafael, CA 94912 (800) STARWARS.

Lucasfilm has also recently released *Loom*, a uniquely sophisticated graphics adventure by Brian Moriarty, author of Infocom's *Wishbringer*. The game's user-interface is revolutionary, replacing the text-based command systems normal to adventure games with a new system based entirely on icons and music. The fantasy world of *Loom* is complex, and the game long and engrossing in the tradition of the best fantasy adventures. To establish a context for the player, Lucasfilm has also produced a 30-minute audio drama through subsidiary Sprocket Systems, boasting a cast of seven professional actors, and an original score by Jerry Gerber. A Dolby Stereo cassette

of the drama is included with the game.

\$59.95 from Lucasfilm. (800) STARWARS.

Word Processing

Word Up 3.0, a popular word processor compatible with any ST computer, has just been released by **Neconcept, Inc.** The upgraded program now includes a 116,000-word Proximity/Merriam Webster spell-checker (140,000 word version available for additional fee). Also included is the Proximity/Merriam Webster Thesaurus, with 470,000 synonyms. For an additional fee, an enhanced version of the Thesaurus is available that will list antonyms, near-antonyms, comparisons, and near-synonyms as well. In addition, a completely new set of higher quality fonts has been included, covering eight typefaces in sizes ranging from 8 to 72 points.

\$99.95 from Neconcept, Inc., 547 Constitution, Unit A, Camarillo, CA 93012 (805) 645-5666.

Publications

I.Koën Design, of Lazo, British Columbia, has released the first issue of *Radical Type*, a six-times-per-year newsletter devoted to desktop publishing on the Soft-Logik PageStream desktop-publishing system. *Radical Type's* first issue examines the newest fonts from Soft-Logik, Fontability, and Sol Guber; includes a preview of the book *PageStream Posthaste, Volume I*, the complete guide to page design with PageStream, also produced by I.Koën. And it's packed with tips, tricks, and hints to make publishing with PageStream even easier.

Subscription: \$15.95 US (\$18.95 Cnd) for six issues (one year) by money order, check, or VISA. VISA orders will be billed in Canadian dollars at Canadian price. I.Koën Design, P.O. Box 107, Lazo B.C., V0R 2K0 Canada (604) 339-5084.

Hardware

Lakmeyer Ltd. of London is introducing a new EPROM programmer designed to interface with the Atari ST via the cartridge port. The device can program the latest 32-pin 4-Megabit chips, as well as less-dense parts. Lakmeyer also produces a similar device for standard 1-Mbit chips. The package includes the chip programmer, which features a high-quality, zero-insertion-force socket, connected by ribbon cable to a cartridge port device; and software. The software itself is entirely GEM-based, and can be used by non-technical personnel under supervision, as well as providing all the functions engineers typically require.

For further information, write J.E. Sinclair & Co. (distributors), 82 Plumstead Common Road, London SE18 3RE, U.K. (081) 318-1439.

Accessories

Computer Coverup, Inc., of Chicago, has just released a versatile laptop computer carrying case that's just right for the Atari Stacy portable. Constructed of strong, durable, water-resistant 1000-denier Cordura, the case features large exterior and interior pockets and an adjustable interior padded strap that secures the computer.

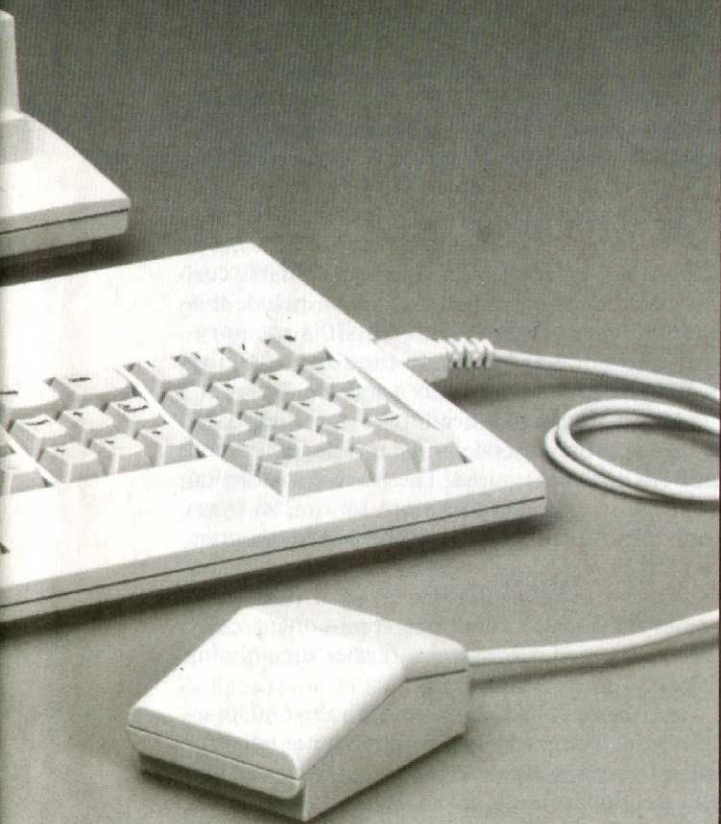
\$85.00 from Computer Coverup, Inc. 2230 S. Calumet, Chicago IL 60616 (800) 282-2541.

The All-American



ATARI EXPLORER PREVIEW!

TT



As this article is going to press, staff at Atari's Sunnyvale, CA, headquarters are feverishly preparing the exhibits, new material, and hardware that will be shown at Las Vegas Comdex beginning November 12th. Over the past several months, Atari's hardware and software divisions have worked overtime to ready several new projects for this watershed date. Looming large among these: the long-awaited American version of the Atari TT computer.

Currently selling well in European markets, the TT represents a big step forward in Atari's race to stay on the leading edge of affordable personal computer and workstation technology. Four years in the planning, it

By Atari Explorer
Technical Staff

represents the present culmination of Atari's desire to present business and the mass-market with a complete, vertically-integrated line of computing systems for every application. Sam Tramiel, Atari's President, has spoken of the TT in this context. "Atari equipment now covers the whole spectrum, providing platforms for home computing and entertainment, to small-business word-processing and basic productivity, through single-user executive workstation and DTP, and now, with the TT, into high-end desktop-publishing, CAD/CAE, presentation and video graphics, multiuser applications, and networking."

Atari Explorer's Technical Staff has recently been permitted to go hands-on with the latest, greatest revision of the proposed American TT. Helping us with our research have been Leonard Tramiel, Atari's V.P. of Software Development, and Terrea Thompson, arguably one of the most knowledgeable people in the world on the subject of the Atari TT from the user's perspective, and author of major sections of the TT's English-language manual.

A Bit of History

The name of the Atari ST derives from the nature of its microprocessor, the 68000 — a so-called "sixteen/thirty-two bit" processor (hence "ST"), by virtue of its 16-bit-wide data bus and 32-bit-wide internal registers. Though capable of exceptional performance and sporting a rich instruction set, the 68000's 16-bit-wide data path imposes certain restrictions. Most important among these, the chip cannot read a 32-bit quantity from memory in fewer than two bus cycles. Thus, although the chip's internal data registers and operations accommodate 32-bit numbers, filling them with such numbers requires twice the time it should. Moreover, most 68000 assembly-language instructions are four bytes (32 bits) in length, meaning that the processor requires two bus cycles to read the majority of steps in its own software. The 68000 also suffers somewhat from the fact that although its address registers and program counter are theoretically 32 bits wide, only 24 of these 32 bits are actually used. The chip is thus limited to addressing a total of "only" 16 Mb of memory.

As early as 1986, therefore, Atari realized that

it would have to begin taking steps to exploit the added power offered by successor chips in the 68000 series. At the time, the most important of these was the 68020 — the first "thirty-two/thirty-two bit" chip — capable of fetching a 32-bit quantity in one cycle, and of addressing four gigabytes of RAM. The first TT (from "thirty-two/thirty-two") was prototyped around this chip.

As time went on, however, Atari realized that the 68020 was not an ideal stopping-point for the TT technology it was developing. Though powerful, the 68020 still lacked certain important features offered by the next successor in the 68000 line, the 68030. This chip features full 32/32-bit address/data bus and internal registers; separate Supervisor, User, Program, and Data virtual memory spaces; built-in memory-management hardware; and 256-byte, on-chip instruction and data caches.

What does all this mean? In layman's terms, the 68030 can run like a bat out of hell and can directly address a huge amount of RAM: theoretically up to 4 gigabytes. Though no affordable current machine architecture would ever include this much physical memory, the 68030's memory-management hardware is capable of using hard-disk space to create a usable "virtual" memory map that is indeed this large; simply by swapping program code and data "pages" in and out from disk, as required. The on-chip instruction cache allows the chip to store up to 256 bytes worth of instructions ahead of the current program counter address, decoding and executing these instructions from chip RAM instead of from main memory. Pre-fetch functions semi-concurrently with other on-chip operations, further streamlining the 68030's performance.

Atari knew it had a winner with the 68030 architecture: a chip capable of running not only optimized versions of the ST operating system, TOS, but of cooperating with the demands of popular multi-tasking/multi-user operating systems such as Unix. A machine based on the 68030 would be able to serve a wide variety of needs — serving as an ultra-high-performance ST, while offering business, industrial, and academic users access to one of the world's most popular and best-supported operating systems. Realizing this, they decided to gamble bravely; scrapping the 68020-based TT1

architecture in favor of one more powerful, on the surmise that by the time the design was ready for production, 68030 chips would be available in quantity, at reasonable prices. The gamble, as we'll see, paid off.

The TT030

Over the next three years, several revisions of the TT architecture surfaced in Atari's R&D labs, designed around chips spec'ed between 8 and 16 Mhz. At the same time, Atari's Industrial Design Division, under the direction of Ira Velinsky, began developing the aesthetic that would mark Atari's new top-of-the-line flagship system as unique. From the beginning, Velinsky steered away from the "gray wedge" and "gray box" aesthetics that dominate the ST line. Even very early case designs suggest the glimmerings of a more sophisticated sensibility, drawn from classical architecture.

Over time, Velinsky's vision for the TT — now referred to as the "TT030" — grew more complete, informed by the demands of the Technical Division to provide space and ergonomic conveniences that had never found their way into the earlier ST designs. Space for an internal hard drive was added, expanding the case laterally by several inches. Edges were sharpened and sloped more aggressively — ornamentation reduced to a minimum.

Velinsky's final production designs show an ST vastly transformed: a bipartite housing (CPU/hard disk) that functions as a single desktop unit, set upon a pedestal and colored marble-white. The keyboard, an ST-compatible 94-key detachable unit with mouse connector, can be rested on the pedestal, creating the appearance of a one-piece system. The image is one of substance and cool elegance, equally at home in the design studio or the executive suite. TT monitors, currently in the final design stages, will rest on tilt-swivel pedestals that integrate with the upper surface of the TT030 housing, creating a

seamless system for the desktop. A 14-inch diagonal color monitor, among other options, is planned.

Velinsky states: "The design of the TT was driven by the desire to have each part of the system express the form of what it contains. The hard-disk enclosure expresses the form of the hard drive; the floppy section the form of the floppy drive; the "connectors section," — or pedestal slab — isolating and emphasizing the I/O connectors it contains, and acting as a keyboard support. We wanted, and I think succeeded, in making something unique."

The All-American TT

The Atari TT030 is essentially an ST, fully back-compatible both in hardware and systems software with current ST designs. Jim Tittsler, one of Atari's lead engineers, explains that Atari went to great lengths to preserve ST compatibility in the TT. "We bent over backward, in fact." He relates. "The biggest hardware-related problem we anticipated was with current ST software, written for the 68000, that didn't handle the high bytes of addresses correctly. The manuals for the 68000



The Atari TT constitutes a step forward in affordable, high-performance computing that is nothing short of revolutionary.

clearly state that all software that hopes to run on later versions of the chip should be sure to set the high byte of an 32-bit address to zero. But a lot of compilers and assemblers set this byte to \$FF. The result was that we had to add circuitry to the TT, capable of intelligently decoding addresses, and sending them to the proper places in memory."

The result is that a TT030 will run most ST software without modification, the exception being programs that use the high bytes of address

fields in illegal ways (for example, as a type field for a pointer). Other problems may result from the use of the 68030's instruction cache, particularly with self-modifying 68000 code that doesn't know it's been read into an on-chip buffer. For this reason, the TT boots with the 68030 caches turned off, though they can be turned on, much like the Blitter on a Mega ST, with a desktop control.

Other minor problems may result from a slight difference between 68000 and 68030 architecture: the fact that the "move from Status Register" instruction is accessible from user mode on the 68000, but privileged on the multi-user 68030. Certain compilers use this instruction, which will cause a privilege violation exception if executed from user mode on the 68030.

To solve the hitch, Atari has incorporated a customized exception-handler in the BIOS that traps this error, replaces the offending instruction with a "move from Condition Code Register" instruction, and executes the passage again. This is said to reliably solve most problems of this kind, without significantly affecting software performance.

The main difference between the TT030 and an ST, of course, is speed. Running flat out, a 32 MHz TT030 is potentially better than eight times faster than an ST! (The developer's documentation laconically points out that ST software that employs software timing loops will not run correctly.)

By and large, however (and Atari has spent months testing software to prove the point), the TT030 will run every major piece of ST software on the market. Moreover, software that properly follows GEM standards in addressing such facilities as the screen, will immediately be able to make use of the TT's improved graphics resolution and color palette. Software written to exploit STe-quality sound-generation hardware will find similar facilities in the TT platform. Software currently under development, of course, will be designed with the capacity to exploit all of the TT's advanced capabilities.

Fast RAM, and Faster!

There are three kinds of memory in a TT030. ST RAM is dual-purpose, shared (as in a standard ST) between the CPU and all ST devices, includ-

ing video, ACSI DMA, and DMA digital sound (see below). Present versions of the TT come with 2 MB of ST RAM, expandable to 4 MB total, just like a Mega 4, though the final installed/expanded numbers remain a marketing decision. We note that no German TT is presently being sold with less than 4 MB of RAM installed. Programs executing in ST RAM force the TT CPU to share clock cycles with video and other devices, somewhat slowing the central processor; though execution will remain significantly faster than is possible on a standard ST.

TT RAM, by contrast, is single-purpose RAM, not shared among ST-compatible devices. TT RAM is not visible to ST devices. It is, however, visible to the TT's SCSI (Small Computer System Interface) DMA subsystem, meaning that it can be employed directly as a source or destination for hard-disk (or other SCSI device) data transfers. The TT030 presently has room for one TT RAM board containing 4 MB of RAM in 1 Mbit chips, expandable to 16 MB with 4 Mbit chips, when these become available. Again, final configuration is as yet in the hands of Atari's Marketing Division.

A third type of RAM may be installed on a board plugged into the TT's VME socket. VME-interfaced RAM is visible only to the CPU. However, use of it incurs a single wait-state per bus cycle, meaning that this RAM is somewhat faster than ST RAM, but somewhat slower than TT RAM.

New software, written expressly for the TT, will naturally take advantage of the distinction between ST RAM and TT RAM, likely doing much of its high performance calculating in the latter, where it can enjoy full processor speed, while leaving screen data, sound data, and other I/O-bound components in the former. However, although the present generation of ST software, written before there was any concept of "slow" (ST) or "fast" (TT) RAM, is not inherently designed to take advantage of the distinction, there is a way in which much of it may be made to do so immediately without significant revision.

Depending on what a current program is designed to do, it tends to fall into one of two categories: 1) programs that must run entirely from ST RAM, 2) programs that can execute from

TT RAM but must satisfy mass data-space requests (Malloc() calls) from ST RAM. Much entertainment software, dependent as it tends to be on display and sound, falls into the former category, while a portion of productivity and other less graphics-dependent software falls into the latter. The TT's revised operating system is capable of treating programs in either way, depending on the setting of bits in the header of the program's executable disk file. There is thus hope that by changing a single byte in the program header — something that may be done by the user with a simple utility program — certain present-generation software may be able to take full advantage of the TT hardware, without further modification.

TT Video

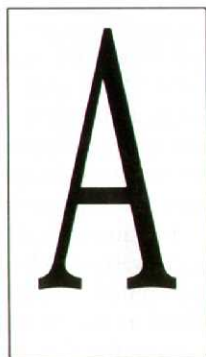
The TT030 supports all of the ST's normal graphics modes (low resolution, 320 x 200, 16-colors; medium resolution, 640 x 200, 4-colors; and high resolution, 640 x 400, 2-colors), while enhancing ST monochrome so that it can employ any two colors — not just black and white. In addition, the TT adds three new graphics modes of its own: TT low, 320 x 480, offering 256 colors (significantly exceeding the capabilities of standard IBM VGA); TT medium, 640 x 480, with 16 colors; and TT high — a special black and white mode offering stunning 1280 x 960 resolution. This latter resolution is available only on special monitors. All the TT's color modes draw from a palette of 4,096 possible colors, as on the STe. Because of the new graphics modes, the TT's video RAM requirements have increased from the ST-standard 32K to 150K.

New XBIOS calls have been implemented to give access to the TT's larger color-tables, while back-compatibility has been maintained with ST norms for ST video modes. In addition, AES and VDI, the Application Environment Services and

Virtual Device Interface software packages that make up the bulk of GEM from the programmer's perspective, have been enhanced and will work transparently with the TT's new graphic modes. Currently-available software that has adhered rigorously to GEM programming standards (and that has used only calls to GEM (VDI) to determine system configuration) will work in the new graphics modes.

I/O and Networking

The TT030 has hardware to support a total of four serial ports. Port 1 is ST-compatible, obtained from the 68901 Multi-Function Peripheral chip. That chip also supports Port 2, which works like the ST-compatible port, except that it has only transmit, receive, and ground signals. The remaining two ports are drawn from the TT's new 8530 Serial Communications Controller, and support full handshaking. One of these ports shares hardware with the LocalTalk-compatible 8-pin female mini-DIN (Deutsche Industrie Normung) LAN connector on the TT's side (see below). Thus if one elects to employ the LAN, serial Port 4 is unavailable. The BIOS has been enhanced to provide



*s an affordable UNIX platform,
the TT030 may leapfrog machines
from IBM, Apple, NeXT, and Sun.*

support for all these ports, including flow control. Physical serial ports themselves are of the AT-style 9-pin variety.

This proliferation of serial ports means that it will be easy to use the TT in a variety of network-based and single-user telecommunication contexts. Hooked to modems, the serial ports can be employed to support multiple telecommunication sessions, either under the control of Unix or special TOS-based multitasking software.

The TT might be used as the telcom server on a LAN. Under Unix, terminals can be attached to these ports, and the TT employed as a multi-user server.

The TT's network interface facilities are impressive. As noted above, the TT comes with a LocalTalk connector installed. This medium-speed, industry-standard LAN protocol is designed for file and peripheral sharing in small networks. High-speed network interfacing is provided via two routes. The TT's industry-standard VME Bus slot offers room for a single-Eurocard-sized (3U) VME-based Ethernet board; and SCSI-interfaced Ethernet units can be added via the TT's external SCSI port or internal SCSI ribbon-cable connector.

SCSI Support

The TT030 will support the industry-standard Small Computer System Interface (SCSI) completely. In hardware, the TT will ship with both a motherboard-mounted 50-pin internal SCSI connector (plus space for mounting an internal SCSI hard drive); and a 25-pin, external, Mac-compatible SCSI connector, to which up to seven SCSI devices can be daisy-chained. Atari hard disk utilities can recognize, format, partition, and render bootable, almost any standard SCSI drive. The TT's SCSI direct-memory-access subsystem can send and receive information equally well, both from ST RAM and faster TT RAM, meaning that present and future software will be able to exploit SCSI peripherals efficiently.

The result of this level of support is that TT owners will be able to buy almost any SCSI hard drive "off the shelf," and attach it to their TT with a minimum of trouble. Other SCSI peripherals, such as streaming tape drives, 9-track tape, etc., are also "plug compatible," though device drivers for these units must be provided by a value-added-reseller or by the user.

Other System Facilities

Adding to the power of the TT030 as an engine for number-crunching, CAD/CAE, videographics, and other math-intensive applications; the machine will ship with a 68882 floating-point math coprocessor installed. The interface between the TT's 68030 CPU and the 68882 is via the

68030's "direct" routing, rather than the slower and clumsier method of peripheral I/O, such as was used in the Atari Mega ST-compatible floating-point peripheral daughterboard. The result, says Atari's Jim Tittsler, is "a vast increase in speed and simplicity of programming."

Sound on the TT030 is via stereo DMA, just as in the STe. Left and Right audio RCA jacks are provided on the TT backplane for output to stereo amplifier. An internal speaker is also provided. Additional standard ports will include most of the hardware found on STs, including MIDI IN and OUT, a port for attaching an external floppy disk, ST-compatible mouse and joystick ports, and a cartridge port. The TT's internal floppy drive is a 720 Kb ST-standard unit. At press time, it was also decided that TT030's would initially ship with both floppy and internal hard-drives installed, though the size of these units was still an open question.

System Software

The TT030's native operating system is Atari's ST-standard TOS/GEM, an enhanced version of which is burned into the TT's ROM. According to Leonard Tramiel, Atari's V.P. of Software, the specified TT enhancements to TOS, GEM (AES/VDI), and — in many ways most impressively and visibly — to the desktop, took several man-years to implement. So striking are the changes to the desktop that we've elected to describe them in a separate hands-on article (see page 36).

To summarize them, briefly, the TT's windowing system has been completely, if compatibly, redesigned, being rendered faster, more colorful, and more informative. A method for adding extensions to the Control Panel has been standardized. The Control Panel itself has been updated to handle the TT's new video modes and STe-compatible audio hardware. Finally, the system by which applications are installed on the system at start-up has been completely revised.

As an alternative to TT TOS, the TT030 is capable of running UNIX, the popular multitasking/multiuser operating system. Atari's initial UNIX product offering will be UNIX V.4, which is fully compatible with POSIX, and the X/Open Portability Guidelines. The X/Window System, one of the most popular UNIX Graphical User In-

terface packages, will also be provided, as will an actual graphic user interface, running on top of X/Window.

Unlike TOS, UNIX is truly a multi-tasking operating system, capable of supporting numerous simultaneous processes. Single-users can employ multitasking in a variety of ways to improve productivity: ranging from maintaining multiple simultaneous telecommunications sessions, to working and printing in parallel. Task-to-task communication facilities available under UNIX make relatively simple the task of sharing information between programs. UNIX is also multi-user, meaning that the TT will potentially be capable of acting as server to several independent workstations, each with multi-tasking capability. UNIX offers a wide variety of facilities for insuring the safety and security of data in multi-user installations. Moreover, unlike TOS, UNIX can exploit the 68030's built-in memory-management subsystems to create large "virtual" computing environments.

The availability of UNIX — particularly in such a complete form — is a significant development that may well affect the impact of the TT on business, in research, and in the academic sector. To start with, UNIX is a mature operating system that is exceptionally well-supported with software (several thousand packages are available, covering every conceivable category of application). TT UNIX adopters will thus immediately have a large library of applications on which to draw, many of which are available at low or no cost through academic and shareware distribution channels. UNIX is OS/2's major competitor for the office multi-tasking market, and is established as the operating system of choice in programmer training and computer science curricula, worldwide. As a UNIX platform, the affordable TT030 may leapfrog machines from IBM, Apple, NeXT, and Sun, as the best choice for mass installation of UNIX systems in these environments.

The TT Upshot

As the TT nears American release, Atari Explorer will be staying on top of developments, bringing you the first word on final production configurations and other details of the system. At the moment, however, certain things are already abundantly clear.

First, the Atari TT constitutes a step forward in affordable, high-performance computing that is nothing short of revolutionary. Though final system prices have not yet been established, it is certain that the cost of a TT with power approximately equal to that of a Macintosh IIC or fully-loaded high-speed 80386 PC clone with VGA will cost several thousand dollars less than the former, and on the street, perhaps a thousand dollars less than the latter.

Second, judging from the TT's architecture, which is optimized for throughput in math-intensive applications, the machine is an ideal platform for high-end desktop-publishing, computer-aided design, and computer-aided engineering applications. As such, it constitutes an ideal "top end" for the upward-compatible suite of

T

he TT will be an ideal platform for business, software development, and education, all markets that place a strong emphasis on low cost, connectivity, and standardization of resources.

hardware platforms Atari has fielded to serve these important vertical markets.

Third, the availability of industry-standard network interfacing, SCSI support, and UNIX compatibility suggest that the TT may be an ideal platform for business, software development, and education, all markets that place a strong emphasis on low cost, connectivity, and standardization of resources. These, indeed, are what the TT offers in abundance. ■

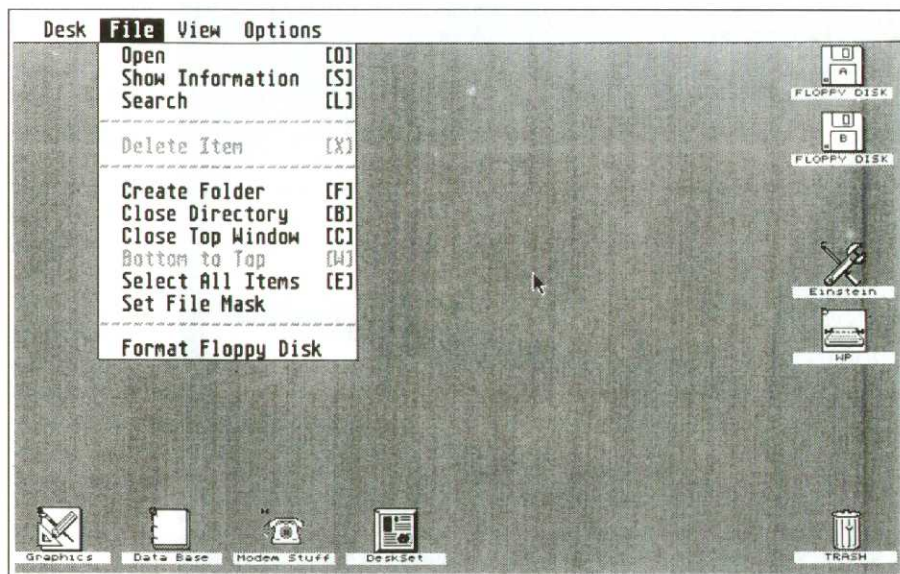
The TT Desktop: Hands-on

Since the introduction of the revolutionary ST computer in 1985, Atari has maintained a growing commitment to the use of graphic user interface technology in powerful, low-cost personal computers. GEM, the GEM desktop, and the underlying TOS operating system have been consistently updated over the past five years, becoming ever more powerful, sophisticated, and easy to use.

Some improvements, such as the ability to auto-start GEM applications, have come about in response to customer demand. Others, such as the improved File Selector implemented in Rainbow TOS, have been prompted and influenced by third-party products, such as Gribnif Software's NeoDesk and A&D's Universal File Selector.

In general, the process of improving the mechanics of the ST's user-interface, and enhancing the functionality of its

A stunning new version of the GEM Desktop debuts on Atari's new flagship system



The new Desktop, showing both device and application icons. Note the clarity that new icon types and customized icons add to the Desktop environment. Also, note the new Search and File Mask functions in the File menu.

metaphoric center — the ST Desktop — has by and large been gradual and evolutionary.

That's all about to change. With the release of the TT030, Atari will take a quantum leap forward in the amount of power it can offer the savvy personal computer user. And, as is only fitting, the advent of the TT has prompted a top-down reassessment of the system software that makes the ST line go.

Driving the changes has been the desire to offer greater access to information and greater power from within the desktop's basically familiar framework. As the metaphoric center of the TT working environment, the Desktop is a crossroads through which the user passes many times in the course of an average session with the machine. Most file- and disk-management; the majority of global system configuration work; device installation; application launching; and other important tasks are carried out within this domain.

The changes to the Desktop are many and various. In keeping with the TT's enhanced graphics capabilities, the Desktop now offers greater flexibility in defining the color of on-screen objects. The problems inherent with file proliferation on more and more capacious

mass-storage media have been challenged by a new array of functions for defining the character and layout of items in a window, and for locating objects buried deep in complex subdirectory trees. All these new commands work to render simpler the kind of file-maintenance tasks that make up the majority of Desktop work.

Cosmetics, and More

The View menu, which defines the look of things on the Desktop, has been enhanced with several effective changes. In

addition to the usual range of options by which the order of files on display can be controlled (i.e., sort by Name, Date, Size, Type), a new option, "No Sort," has been added, which shows the files in the order in which they actually appear on the disk.

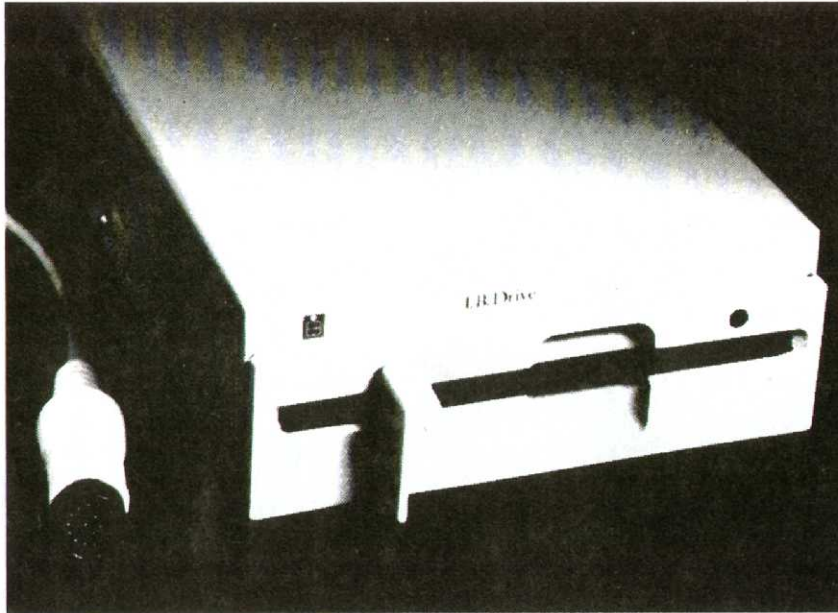
Having access to this information can be important in certain circumstances; for example, when trying to arrange files in an /AUTO folder so that they execute in appropriate order on system startup.

The Size to Fit command prevents icons from being hidden beyond the left and right boundaries of a window. When this command is selected, icons automatically reshuffle themselves into rows that fit within the window's current width, as it is resized.

Set Color and Style lets you define background fill pattern and overall color for windows and for the Desktop itself, adding a level of coarse control to the finer control permitted by the new Control Panel "Window Colors" extension (see below). Pattern and color changes may be previewed before being imposed, reducing the chance of suddenly "losing" Desktop objects by setting them to the same color as their present background.

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Volume Management

The Search command, new to the File menu, performs a file search on a floppy disk, logical drive, or folder. Highlighting a disk or folder icon and selecting Search causes a dialog box to appear, into which you may enter a wildcard expression denoting all or part of a filename. Clicking on OK begins the search, which proceeds in depthwise tree fashion through the current directory and all subdirectories within the selected volume or folder. If the Desktop finds a file that matches your search criteria, it opens a window and displays that file, then asks if it should continue the search. If you elect to do so, the same window is used to display additional files matching the same criteria. When all matching files have been found, an alert box is displayed.

The Set File Mask command also helps in gaining control over proliferating files, implementing a capability that users of NeoDesk have long enjoyed: the ability to display in a window only those files whose names match certain defined criteria. When you select Set File Mask, a dialog appears to let you enter a standard file-masking wildcard expression (for example, *.DOC), which is then imposed to define which files are displayed in the active window (the foregoing example will cause only those files with .DOC extenders to be displayed). The file mask remains in effect until changed, or until the active window is closed, at which point the mask is cleared and replaced with the "show everything" mask, *.*.

Window Management

A command called Bottom to Top has been added that is useful when you are working with multiple, overlapping windows. It causes the currently-active desktop window to be sent to the back of the window stack, and the one currently there to be brought to the top and made active.

File Maintenance

The command Select All Items causes all files and folders in the active window to be selected — very useful for doing mass deletes or file-by-file copies. Files hidden beyond window boundaries are also selected by this command, though files not displayed because they do not match file mask criteria are not selected, and will not be affected by subsequent global operations.

A universal Delete command has been implemented that permits mass deletion of groups of highlighted items: be these files, folders, or the contents of entire disks. Naturally, the command can be set to prompt before carrying out its function.

Several other, more global changes have been made to increase the amount of information about file history that is available to the user. Notable among these, read-only files are now marked with a triangle symbol next to their names.

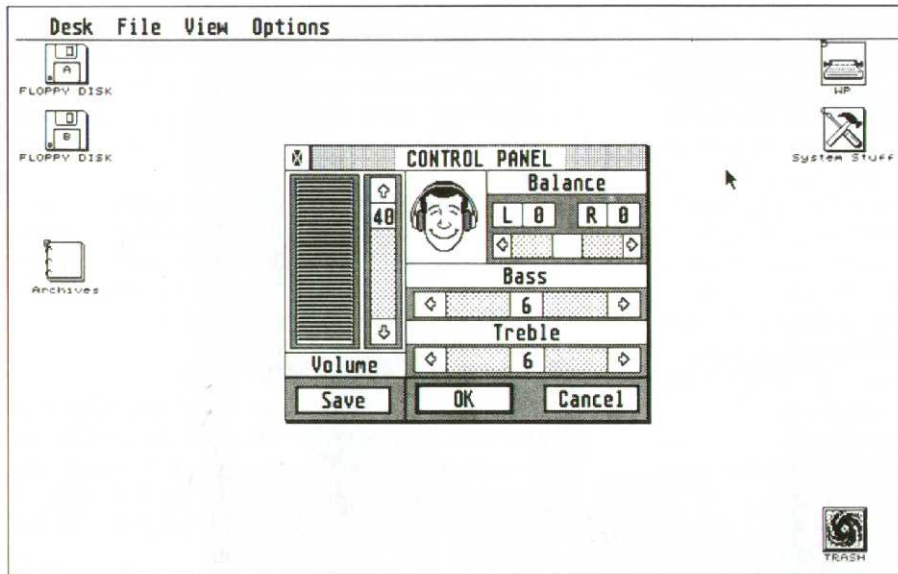
Icons on the Desktop

In keeping with the character of a graphic user interface, which treats files, disks, and other abstractions as if they were physical "objects," the new Desktop gives the TT user total flexibility in defining the appearance of Desktop icons and symbols.

Part of this freedom is granted through the new Install Icon functions in the Options menu. When Install Icon is selected, a dialog box displays, allowing you to select whether the icon you wish to install (or modify) is pertinent to the desktop itself (i.e., a disk, trash can, or printer icon), or to the display within a window (i.e., a file type icon).

In the case of the Desktop, sixteen detailed icon shapes are at your disposal, ranging from hard disks to printers. You can assign individual shapes to different objects, or by rubber-banding, to groups of objects, all at once. The point, of course, is to make the graphics on your Desktop more representative of the configuration of your system: making floppy disks look like floppy disks, hard-drives look like hard-drives, and printers look like printers. Individual files, or selected groups of files, can be dragged to printer icons for "text-dump" type printing.

For windows, even more freedom is at your disposal. The idea here is to permit you to define the icon display in such a way that not only file types (e.g., folders, executable files, document files, etc.), but arbitrary file categories are clearly distinguished from one another. Whereas the old default desktop icons would only distinguish between executable files and "documents," the new desktop will let you assign a unique icon to any single window item, specific group of selected files, globally to any file type (for example, assigning a "scroll" icon to word-processor docu-



The Control Panel's "Sound" CPX, one of several Control-Panel extensions included with the redesigned Control Panel. The image of the head turns left and right to graphically indicate stereo balance. Also note the customized "Black Hole" icon used for the trash can function. The "black hole as galactic epicenter" motif is more descriptive and accurate than similar "black hole" icons on competing GUI's.

ments and a "grid" icon to spreadsheet files), or even assign unique icons to arbitrary subgroups of files of the same type. For example, if you use the same word processor for both documents and correspondence, you can adopt a file-naming convention that distinguishes these types (e.g., ?????DOC.DOC for documents and ?????LET.DOC for letters), hand appropriate wild-card expressions to INSTALL WINDOW ICONS, and thus assign a unique "document"-type icon to each form of document file.

The actual icon forms are drawn from a configuration file called DESKICON.RSC, which since it takes the form of a normal resource file, can be edited and extended at will to provide new icon shapes not included in the default set.

Install Application

On the present Desktop, the Install Application function is somewhat limited. Though a specific file extender may be associated with an application, allowing autostarting of the application when an icon of that type is double-clicked, the file, the application, and its various support files must

often reside in the same directory, or the application and support files must reside in the root directory of the relevant volume. The new Desktop adds significantly to this function, permitting you to control processing from Desktop level in much the same way as users of sophisticated command-line interfaces are accustomed to doing, but with far greater simplicity.

Not only can you link an application to a data file with a specific extension, but you can specify a full path for that application, so that the system can find it wherever it resides.

You can also assign a

default directory to the application, so that when executed via an installed link, it knows where to find its own support files (e.g., .RSC files), even if that differs from the current directory (top window). Certain current programs can make use of this information, while other's can't — all future software should be compatible.

The problem of programs that maintain partial paths, assuming, for example, that all text files are saved in a folder called "TXT", is solved by a "parameter" assignment function that supplies only the filename of the relevant document, rather than the full path, to the auto-executed application. Again, this fix has been included to maintain compatibility with older software.

Arguments can also be passed to an application as a function of execution by installed link. While on the ST, arguments could only be passed to .TTP (TOS, Takes Parameters) programs, the TT now recognizes a new file type — GEM, Takes Parameters — that can also be used in this kind of transaction.

Further enhancements to Install Application include the ability to assign an application to open

from a function key-press (or shifted function keypress, permitting up to twenty applications to be so installed). As before, a single application can also be assigned an autoboot status, so that it starts automatically when you switch on your computer.

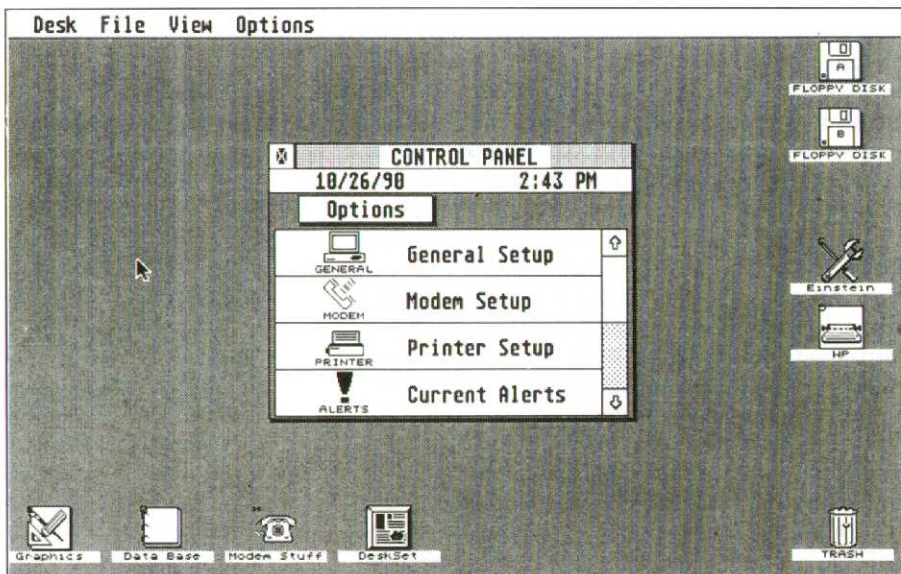
Desktop Configuration

Establishing general control over these parameters, and adding further functions of its own, is the new Desktop Configuration dialog. The first set of buttons in this dialog

let you tell applications system-wide to treat either the top window or their own directory as their default directories. The second set of buttons lets you control globally whether installed applications are handed only the filename, or the full pathname, of document files. Both of these global parameters, of course, are overridden by any individual, application-specific parameters defined when you install an application. Desktop Configuration also lets you review — again globally — the assignment of function keys to programs for one-touch execution.

More significantly, Desktop Configuration adds a totally new feature to the Desktop: one-touch menu-item selection. The function lets you assign a single key to any menu item, allowing you to execute it with a keystroke, instead of via the mouse. The Configuration dialog also displays system free memory.

All configuration details: colors, patterns, display characteristics, icon assignments, function-key entries, etc., are saved in a single configuration file, NEWDESK.INF, when the function Save Desktop is selected. Another new function, Read .INF File, has also been added, that permits multiple .INF files to be saved on disk, and imposed without having to reboot the system. As before,



The new Control Panel's main CPX menu. Available Control-Panel Extensions are visible in the window.

the default .INF file, now NEWDESK.INF, defines the auto-start configuration.

Finally, two additional convenience menu items have been implemented. Print Screen performs the screen-dump function now performed by pressing ALT-Help, and requires that SDUMP.PRG be installed from the /AUTO folder if an SLM laser printer is being used. Finally, there is a menu item called Cache, that permits the TT's 68030 on-chip instruction and data caches to be turned on and off — a feature important in preserving compatibility with certain present-generation software.

The Control Panel

Desk accessory programs, ranging from the Control Panel to on-screen calculators, disk formatters, terminal emulators, and other "instant-access" utilities, have always been important features of GEM and the ST. In fact, one of the few consistent gripes against GEM is the fact that it lets you install a maximum of only six desk accessories at one time.

Back in the old days, when 520K systems were the norm, this limitation made some sense. Too many desk accessories could eat up the RAM space quickly, squeezing out normal applications.

These days, however, when 2 and 4 Mb ST's are commonplace, the memory requirements of DA's are less of a concern. Another reason for the limitation is that accessories are passively multiprocessed by the operating system, hence too many of them can consume an excessive amount of processor time. This objection is more cogent, though the high speed of a machine like the TT suggests it may be partially invalid, as well.

So why not simply increase the number of desk-accessory slots? Because that's only half a solution. For one thing, it doesn't provide an answer to the problem of accessory management. In any given work session, the average user will only call on one or two of his DA's, so why waste memory and processor time loading and multiprocessing the others? And what about the problem of always having to store accessories on the root directory of the boot volume? Almost all ST power-users resent the annoyance of having to copy DA's from a storage directory to the boot drive and rebooting in order to install them, or having to pull down Show Info and change the extensions of three or four accessories from .ACC to .ACX (or similar), in order to prevent them from being installed on the next go-round.

There are other problems with GEM Desk Accessories, notably the fact that DA's are not informed correctly when video resolution changes occur without rebooting. So clearly, adding more DA slots isn't the way to go. Instead, Atari software engineers have come up with a more elegant solution that answers admirably to three opposing needs: the need for more desk accessory space; the need to conserve system resources; and the need to facilitate management of add-on programs. Their idea was to redesign the Control Panel, turning it into a manager for a new class of programs called CPXs, or Control Panel Extensions. The idea is loosely based on that of the Apple Macintosh's CDEV (Control DEVICES) concept, though Atari's implementation is far more flexible, orthogonal, and extensible.

CPXs come in two flavors: resident and non-resident. They can be named active or inactive. Active, resident CPXs are loaded at boot time and remain in memory, instantly accessible through the Control Panel and its associated window for the duration of the session. Non-resident CPXs can also be accessed rapidly through the

Control Panel, though these must be loaded from disk prior to execution — the advantage being that they can also be UN-loaded and/or RE-loaded without rebooting. Under normal circumstances, it's assumed that most of a user's CPXs will be non-resident, their memory requirements while inactive being thus reduced to an amount of RAM sufficient to store their icons and their names. And even resident CPX's are not multitasked, so if the user prefers — and has the RAM to spare — a large number of them can be loaded without imposing on system throughput.

The management problem is solved by the fact that CPXs can be stored in their own folder, distinct from the root directory of the boot drive. Managing them, through the Control Panel CPX menu and Setup dialog, plus the Configure CPXs CPX (note: a CPX that helps manage CPXs), is thus reduced to a series of procedures not unlike those used to manage resident fonts under GDOS.

Naturally, the fact that CPXs are not multitasked prevents them from doing some of the things that DA's can. For example, a CPX can't, while inactive, monitor and respond to GEM timer events. But a majority of DA-type applications don't require these facilities. A calculator DA, for example, does background processing sufficient only to determine when the user wants it to wake up and be a calculator. How much more efficient, then, to save processor time (and perhaps memory), by recasting such a program as a CPX, and pulling it into memory only when it's needed? Once activated, the CPX can take over the Control Panel window as long as it's required, and can be made to work more or less exactly like a normal DA.

When selected, the new Control Panel accessory (XCONTROL.ACC) displays a window full of CPX icons or filenames, any one of which can be activated by a double-click. The Panel itself has its own pull-down menu, whose first two selections are About (which displays copyright information for the Control Panel), and Setup, which gives access to additional system and CPX-management functions. When a CPX is highlighted in the Control Panel menu, three more menu selections are made active: Open CPX (which works the same as a double-click on the CPX name or icon), CPX Info (which gives version and status information about the highlighted

CPX), and Unload CPX (which causes a non-resident CPX to be removed from the CPX menu).

Clicking on Setup reveals another dialog box, bearing several items. One of these is a button that allows you to switch the displayed system time between 12 and 24-hour (European) format. The remainder of the Setup dialog is concerned with further aspects of CPX management. You can set the minimum number of slots available for CPX identifiers to any number between 5 to 99. Another editable object lets you enter a directory path for CPXs. Finally, buttons in the Setup dialog permit immediate reloading of all CPXs (under the assumption that you've changed the status of a CPX or made some other change), and permit access to a further dialog that allows you to move CPXs between the active and inactive list.

All further functions normally associated with the Control Panel are actually performed by CPXs. Five of these are included with the TT. The first standard CPX actually manages CPXs, letting you change their names, associated text and icon colors, and define them as RAM-resident or not.

Window Colors enhances the Desktop's own color and pattern-select functions. Window Colors lets you assign different colors to different elements of desktop windows (scroll-bars, bar backgrounds, full box, size box, etc.). In all, different colors can be assigned to each of the 15 elements of an active window, and up to five elements of an inactive window.

Window Colors includes ten preassigned color sets (as Leonard Tramiel says: "these range from very pretty to 'we couldn't think of any more pretty combinations.'"). The CPX also lets you select whether text in a window will be printed transparently over any background pattern, or will appear surrounded by solid color.

Further color sets can be custom-designed using the second CPX, Color Setup. The challenge of designing this CPX lay in figuring out a method for organizing selections from the TT's huge color range. The final design organizes the TT's 4,096 potentially-available colors in banks of 16 "inks", letting you scroll through ink-banks until you find one that approximates the set of colors you want. Individual inks can then be further modified, via a set of conventional RGB scroll-bars, before assigning the inks to a set of "pens" (actual color registers). Low-resolution, which can display up to

256 simultaneous colors, is an exception — when in low-res, Color Setup lets you scroll through the 256 available "pens" directly, modifying the color of each as you desire.

The General Setup CPX actually contains most of the functions that used to be associated with the Control Panel. It allows you to set the keyboard response and repeat rate, the mouse click response rate, and lets you turn keyclick, bells, and the internal speaker on or off. General Setup also includes a Cache select button, that gives global control over whether the 68030's caches are active or inactive at powerup. A cute "double-click test box" has been included that lets you experiment with changes in mouse response.

Sound Setup is particularly charming, letting you adjust the balance, volume, bass and treble quality of the TT's STe-compatible stereo sound output. Balance adjustments are done with reference to a little animated head, wearing ear-phones, that actually turns from left to right as sound pans from one speaker to the other. Finally, there's the Accelerator CPX, the latest and greatest version of Ken Baedertscher's Mouse Accelerator program. As in earlier versions, the program lets you select mouse speed from among three options and introduce a time-based screen-saver utility that changes screen colors after a period of inactivity, in order to prevent image burn-in. As in the Stacy, the "modem recognition" feature is included in the screen saver, which forces the system to monitor both modem and keyboard activity to determine what constitutes "inactivity."

Conclusions

Though the new Desktop and CP were designed for the TT, much of the software is fundamentally compatible with current ST systems, particularly the STe. It is likely, therefore, that within the next several months, the entire Atari ST community may benefit from its release.

Atari has succeeded in creating a successor to the original ST Desktop that very much parallels, in software, what the TT is designed to accomplish in hardware. Considered together, the new Desktop and Control Panel work within basically familiar contexts to extend, in economical, meaningful, and striking ways, the power of the ST line. ■

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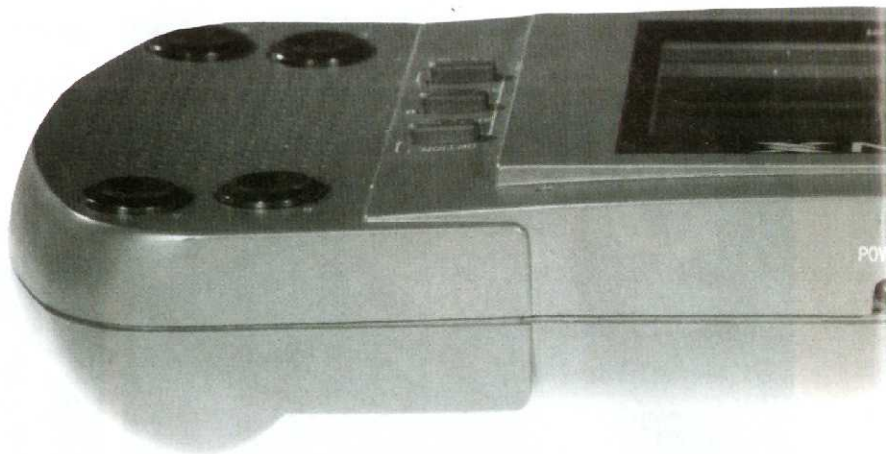
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The excitement begins the minute you see a Lynx for the first time. Elegantly small, contoured to fit the hand, discreet (in Atari's new signature colors of charcoal and light grey), the Lynx radiates an aura of precision, miniaturized power, and deliberate design. But the fireworks really start when you first pop in a game card and turn Lynx on.

Color. Brilliant graphics, displayed with the artifactless purity that only a solid-state LCD can provide. Fluid animation, amazing zoom effects, wide-screen scrolling. Sound, synthetic and digital: voices, hand-claps, crowd noises, electric guitars. And that unbeatable play-action! A sensitive



By AE Technical Staff

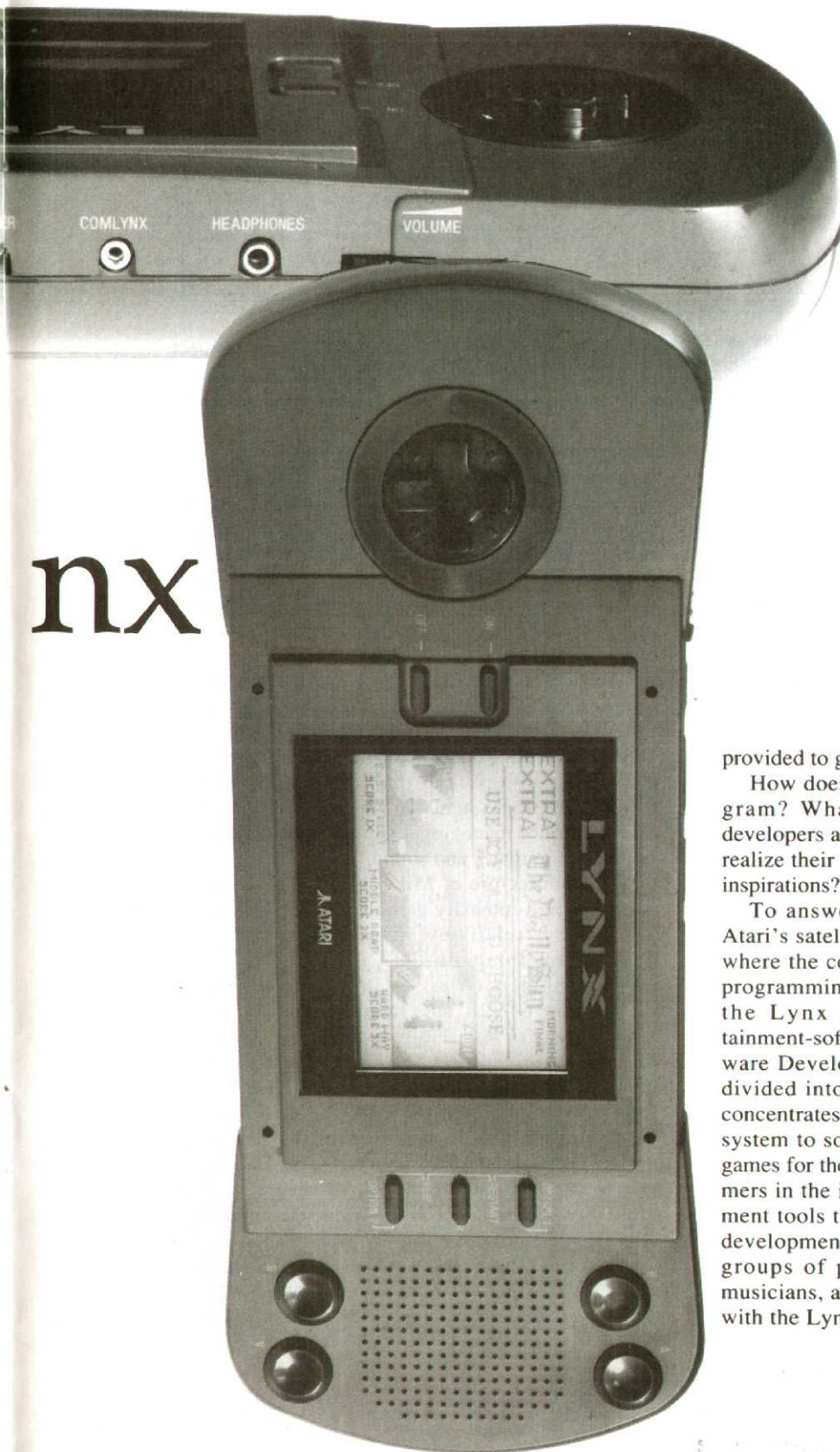
Inside Ly

The Programmer's View

joypad and dual fire-buttons, all "flippable" under hardware control, make it possible to employ Lynx in a wide variety of entertainment contexts with maximum comfort and efficiency.

Playing with Lynx is a magical experience. Under the control of some of the most sophisticated

nx



Custom VLSI technology and a sweet development system make Atari's new Lynx a game programmer's dream come true!

gaming software ever devised, Lynx' numerous special features meld together in a happy congruence of technology and fun. Yet like any good magic act, the Lynx show is backed up by a good deal of hidden apparatus. A dizzying array of hardware and software facilities both inside and outside the box make Lynx possibly the most well-supported platform ever

provided to game programmers.

How does Lynx work? What is it like to program? What kind of a learning-curve can developers anticipate before they can use Lynx to realize their most outrageous and original gaming inspirations?

To answer these questions, we traveled to Atari's satellite installation in Lombard, Illinois, where the company has concentrated part of its programming and developer-support efforts for the Lynx system. Headed up by entertainment-software veteran Larry Siegel, VP/Software Development, the Lombard Lynx staff is divided into two divisions. Developer-support concentrates on marketing the Lynx development system to software companies eager to produce games for the machine, and on educating programmers in the intricacies of Lynx and the development tools that exist to support it. The program development division, comprising several work groups of programmers, designers, testers, musicians, and graphic artists, works "hands on" with the Lynx: porting over top-selling titles and

developing the gaming hits of tomorrow. Of particular help in our quest for technical information was Scott Williamson; three-year veteran of the Lombard group, and one of Atari's able and knowledgeable Lynx programmers.

Lynx Electronics

The Lynx was developed at Epyx, Inc., over two years of intense work by dozens of hardware and software engineers. Notable among the system's developers are Dave Needle and Craig Nelson, who together were mostly responsible for the Lynx hardware. Needle, a long-time friend of Jay Miner (designer of the original Atari 800 chip set), directed the design of Lynx's two main custom chips, Mikey and Suzy. Nelson, himself formerly an Atari employee, concentrated on the rest of the system: LCD drivers, case technology, controls, the ComLynx system, and other features. Software development for the system was headed up by RJ Mical, and Steve Landrum contributed heavily to the design of the developer's software suite and notably to the ComLynx communication protocol.

Throughout the development cycle, Nelson says, Epyx' engineers were guided by the wish to serve the application programmers who would eventually develop games for the system. They recognized the fact that many game systems on the market (he mentions the Sega Genesis as a good example) have a good deal of potential power — but that their power is never used in games because programmers are put off by aspects of the system's design. With Lynx — so Nelson says — they had a chance to create the kind of system that programmers would want to use.

At the heart of Lynx are two custom chips: Mikey and Suzy, which handle almost all of the work of executing a game program. Mikey — which stands for "microprocessor" — incorporates the Lynx' CPU, a 65C02 microprocessor. It also contains the Lynx' sound system, video DMA (Direct Memory Access) drivers for the LCD display, the system timers, the interrupt controller, and the UART (Universal Asynchronous

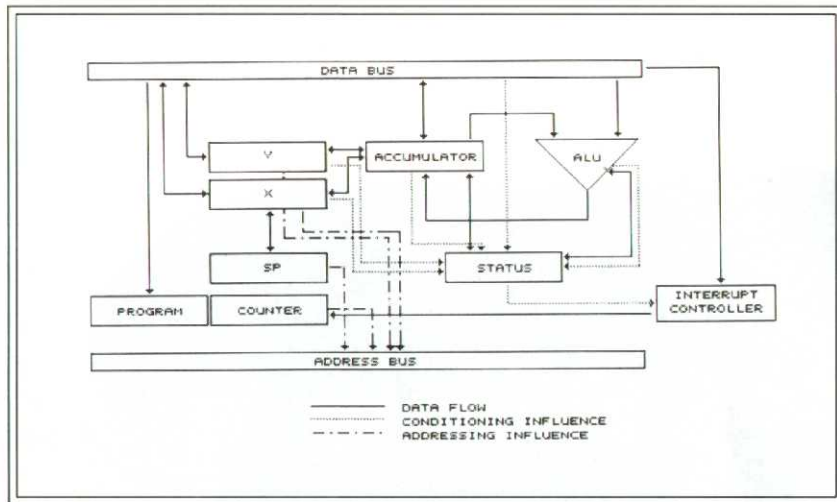


Figure 1. Architecture of Lynx' 65C02 CPU, showing data and signal routing. The microprocessor is a subsystem of Mikey, one of the Lynx' two custom VLSI chips.

Receiver-Transmitter) that provides ComLynx Lynx-to-Lynx network communication support. Suzy is essentially a high-speed blitter (bit-map block-transfer chip) with numerous intelligent drawing functions. She also incorporates a math coprocessor. Both chips employ CMOS (Complementary Metal-Oxide Semiconductor) technology for low heat of operation and low power drain.

Considered together, Mikey and Suzy form a cooperative set of co-processing subsystems that maximize the Lynx' performance by sharing the work of executing a game program. This approach is vastly more efficient than that employed by single-processor systems, in which a CPU must do all the work of managing a game scenario, as well as produce graphics and sound.

The architecture of Mikey's 65C02 is ideally suited to high-intensity gaming applications. The processor is relatively simple; and since it is back-compatible with the CPU found in most home computers (Atari 8-bits, Apple II series, Commodore 64/128, etc.) many programmers are already more or less familiar with it. (In addition to 6502 features, the 65C02 has additional addressing modes and instructions.) Engineers have found the simplicity of the 6502's basic design to be advantageous in developing higher and higher-speed versions of the chip. The 6502 has, as a result, become the model for several of the most powerful RISC (High-speed, Reduced Instruction Set) systems currently available.

Most 65C02 functions center around a single, eight-bit register, called an "accumulator," which serves as the main "storage spot" for values being

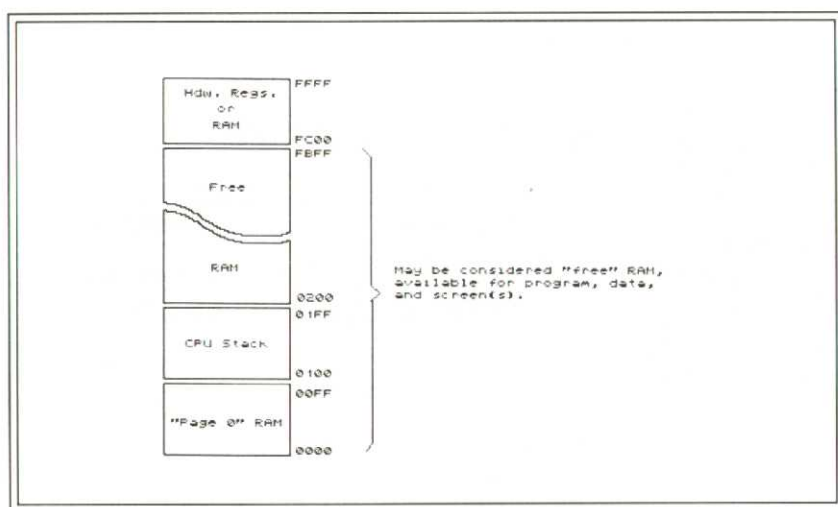


Figure 2. Lynx memory-map, showing the major subdivisions of RAM space. Note the 65C02 zero page and hardware stack areas in low RAM, and the hardware control register area in high RAM.

operated upon, loaded from, and stored to memory (see Figure 1). This is in contrast with certain other chips (such as the MC68000 in Atari's own ST), which incorporate numerous, on-board registers, used for storing values and addresses. In addition to its accumulator, the 65C02 sports a sixteen-bit "program counter" register, which stores the address of the current instruction; an eight-bit "stack pointer" register, which stores an offset into the fixed stack (a RAM memory area used to store both data and return addresses pertinent to subroutine calls); and two eight-bit "index" registers, 'X' and 'Y,' used to "point" to different offsets within a given memory "page."

A memory page is the term used to describe a single block of 256 contiguous memory locations within the 65C02's 64K (65,536 byte) memory address space. Arithmetic and logical functions are performed by a single, central ALU (Arithmetic and Logic Unit). A "status register" is automatically conditioned by most 65C02 instructions, and may be tested by a wide variety of "compare" and "test-and-branch" instructions, simplifying the job of managing program flow.

To make up for the lack of on-board registers, the 65C02 employs a scheme in which the first 256 locations in memory — the so-called "zero page" — can be accessed at high speed using special "short-form" instructions; half the (normally two-byte) length of those used to access standard

RAM. Routines making heavy use of zero-page can thus run at up to double normal speed, while occupying approximately half the space of conventional software. Moreover, while in a normal, full-service computer, much zero-page space is reserved by operating-system functions (all but eight bytes in the Atari 8-bit design); the Lynx' simpler, more basic system leaves much more of this useful space available to

application programs.

The overall clock speed of the Lynx is 16 MHz, providing a basic system cycle time of 62.5 nanoseconds. This pulse is divided by four to produce a cycle rate for the 65C02, which therefore functions at 4 MHz overall. This is more than twice as fast as a standard home-computer — by comparison, the Atari 8-bit's 6502 functions at "only" 1.72 MHz. To further improve performance, Lynx' designers elected to exploit a

*Lynx is the best-supported
platform ever offered
to game designers!*

little-used function of the 65C02 that permits sequential memory accesses within a single, 256-byte memory "page" to occur at 8 MHz — double the normal rate.

Though normally transparent to the programmer, the capacity for this higher-speed "page mode" memory access may be switched off if an unvarying memory-access time is required for time-critical applications. Like most modern computing devices, the Lynx employs 120 nsec RAMs. When the processor is in high-speed "page mode," a single memory access costs only 125 nanoseconds — very close to the hardware limit for access speed. Normal memory accesses require 250 nanoseconds.

Lynx Memory Map

Though the Lynx' 65C02 CPU is actually contained within Mikey, it communicates with Mikey's other facilities, and with Suzy, through a set of hardware registers mapped into addresses contained in the upper 1K of Lynx' RAM.

By setting bits in the Lynx' memory-map control register (location \$FFF9, see Figure 3.) the hardware register set can be swapped in and out of high memory, revealing usable additional RAM. This swapping scheme is relevant, however, only from the point of view of the CPU. Mikey and Suzy can always access this "hidden" RAM, regardless of the current state of memory control.

This sophisticated scheme makes it possible to locate screen memory or sprite data in high RAM, under the hardware registers. Since sprite drawing, collision testing, and other graphics functions are generally performed through Suzy, the CPU can normally leave the hardware registers "switched in," while still making good use of underlying conventional memory.

Below the register area, the remaining 63K of Lynx RAM is essentially free for application programs. As noted in Figure 2., the 65C02's "zero page" area is mostly unoccupied (a great convenience to programmers!), while the CPU's processor stack occupies page one. Physical screen memory — the memory area actually displayed by Mikey's video-DMA controller and LCD driver — may be located anywhere in RAM, provided it begins on an even-numbered address (Mikey's screen-start address register is 15 bits wide). The amount of memory taken up by the screen is 8160 bytes.

In the strictest sense of the term, the Lynx does not employ an in-memory operating system, though Mikey contains its own small ROM which holds bootstrap and game-card loading code. Such hardware facilities as a game designer wishes to employ are supported by macro libraries distributed with the Lynx developer's kit, discussed below.

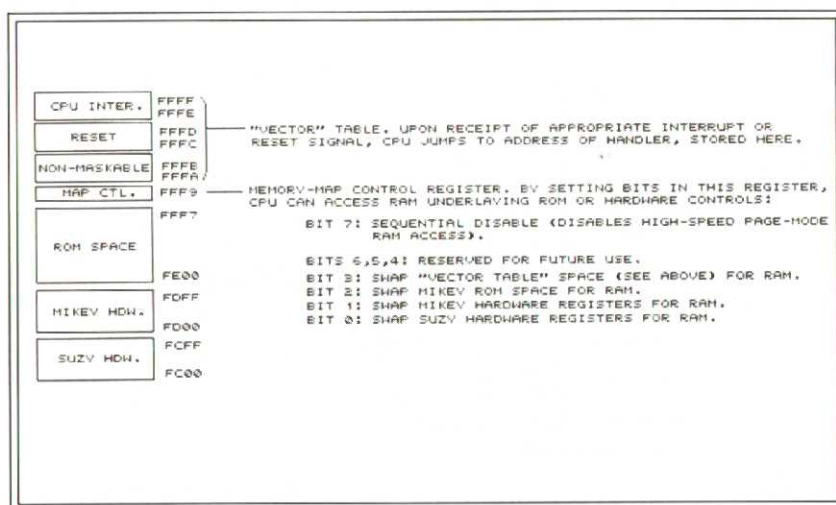


Figure 3. Detail map of the upper 1K of Lynx RAM, showing hardware register layout. Even when "swapped in," registers are visible only to the CPU. Other subsystems always see this address range as containing normal RAM.

Graphics

The Lynx' LCD screen is 160 "triads" wide by 102 lines high, each triad consisting of one red, one green, and one blue LCD element. Each LCD element may assume one of 16 intensity levels; a triad formed from three such elements can thus display $16 \times 16 \times 16 = 4,096$ different colors.

Each triad is represented by four bits of screen RAM, allowing it to assume one of 16 simultaneously-available colors drawn from this larger palette (see Figure 4). RGB intensities for the 16-color palette are stored in a 32-byte-long buffer beginning at address \$FDA0. The palette layout is a bit peculiar: green intensities are stored in the low nybble of the first 16 bytes in the buffer; blue and red intensities as the high and low nybbles, respectively, of the next 16 bytes.

For all practical purposes, programmers can work with the unit triad as if it were a single "pixel," and system drawing functions are designed to work at this level. However, certain ambitious experiments have employed color manipulation to light single pixels within the triad, forcing the LCD to function at an artificially high resolution (480 x 102).

Physical screen RAM as a whole occupies (4 bits per triad x 160 triads per line x 102 lines) = 65,280 bits / 8 = 8,160 bytes, and may be located anywhere in memory, at the programmer's discretion. Additional "virtual" screen RAM buffers may be allocated in support of special functions such as collision detection and double-buffered animation.

While the actual translation of screen memory data to the LCD is handled by Mikey's video

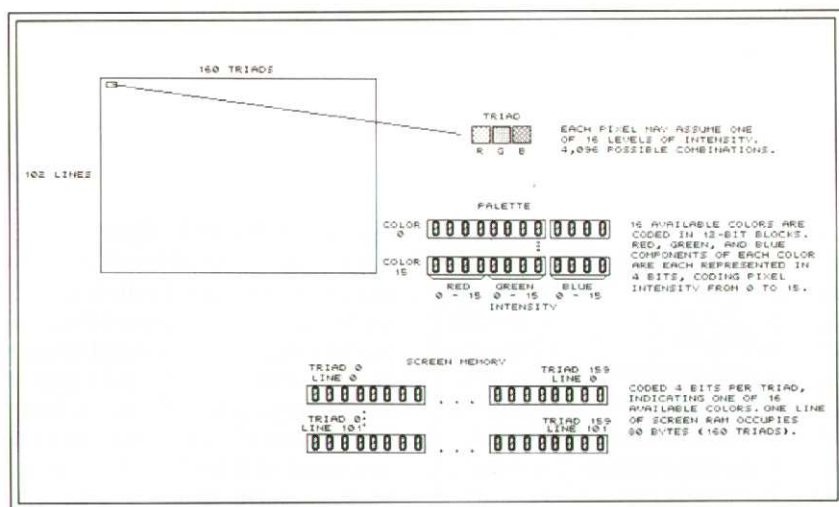


Figure 4. The Lynx LCD display, color palette table, and screen RAM layout.

DMA circuitry, the Suzy chip is the real powerhouse behind Lynx' extraordinary graphics. Essentially a blitter (bit-map block-transfer chip) incorporating high-speed sprite-drawing and scaling functions, Suzy can also "stretch" and "tilt" sprites and perform highly-intelligent decoding of compressed sprite data, on the fly, meaning that sprite definitions need not occupy excessive amounts of memory.

Actual sprite data is contained in a system of structures called "sprite-control blocks," which Suzy is built to understand. SCBs contain pointers to sprite bitmaps, bitplane values, location, priority, data-compression, and other information. The control blocks themselves are organized in lists of lists, permitting the sprites they define to be drawn in logically-associated groups of differing priority.

Suzy can scale sprites from 1/256th of defined size to 256 times defined size, making it easy to generate "zoom-in" effects and depthwise 3-D displays. Her "tilt" and "stretch" functions make it possible to cover large areas of screen using very little sprite definition data: a sprite defined as a single-pixel point (4 bits) can be "stretched" into a line or color field with ease.

When Suzy draws a sprite, she places it — not in physical screen RAM, per se — but into a "virtual" screen map called "the world," which may be up to 65,536 units high by 65,536 units wide. The

physical screen acts as a window on this "world" map, and may be scrolled across it simply by changing its start location.

Clipping and scrolling thus become more or less automatic features of the Lynx hardware. Collision-detection — so important in arcade games — is handled by setting up a "collision" buffer into which Suzy draws sprite priority, rather than color data. When one sprite is drawn over another,

Suzy returns the priority of the highest-priority sprite involved in the pile-up.

By contrast with Lynx, conventional game systems and computers tend to place strict limitations on the number of sprites that can be defined, as well as their color and size. In the past, this has forced programmers to employ sprites only where absolutely needed — typically as small,

Lynx engineers worked to develop the kind of system for which programmers would enjoy writing software.

fast-moving objects and projectiles.

But Suzy's exceptional sprite-management, drawing, and data-compression functions are causing Lynx programmers to re-evaluate the way they use sprites. Several of the current crop of Lynx games, for example, use sprite groups to define entire screen backgrounds, as well as moving foreground objects.

Because sprite data must be defined in structured fashion, this permits a greater degree of generality and order in program design. It also impacts on productivity: the Lynx development system permits the automatic generation of sprite-data structures from graphics produced on a standard paint-program.

Suzy's notable "other feature" is her hardware multiply-and-divide system, which makes up (and then some!) for the lack of multiply and divide instructions on the 65C02 CPU. To perform a parallel hardware math operation on Suzy, the programmer need only load initial values into Suzy's hardware registers, issue a command for the appropriate operation, and wait for a flag to show that a result has been generated.

Indeed, if the Lynx programmer is moderately careful, he can devise code that employs the CPU with other work during this waiting period, achieving true parallel processing in math-intensive applications. Suzy can handle a 16-bit by 16-bit multiply producing a 32-bit result, producing a result in only 44 ticks (a signed multiply requires 54 ticks); or a 32-bit by 16-bit divide producing a 32-bit result and a 16-bit remainder, producing a result in $176 + 14 \times N$ ticks, where N is the number of leading zeros in the divisor. This speed is ideal for the kind of geometric computations required by 3-D game scenarios.

Sound!

Lynx' sound engine, a component of Mikey, comprises a sophisticated system of audio electronics providing four independent sound channels. Simple tone/noise generation is performed by "shift-register-feedback," as in the Atari 8-bit sound driver, and the system can produce tones from a low of 100 Hz to well above the range of human hearing. Additional electronics provide full stereo pan controls for each channel of audio. A sophisticated set of output volume-control registers permits the deliberate setting of the speaker cone to one of 127 possible states — ideal for the production of subtle, digitized sound and voice synthesis.

ComLynx — The Lynx Connection!

One of Lynx' most impressive features is its ability to communicate with other Lynxes — making multi-player games a reality. ComLynx (or "RedEye," as it is called in-house) employs a

For more information, contact:

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standard UART (Universal Asynchronous Receiver- Transmitter) chip, running bi-directional serial communications over a 3-wire cable (+5V/Ground/Data). The network can send and receive data at varying rates of speed, from a minimum of 300.5 baud up to a maximum of 62.5 Kbaud — about 7K per second. The system frames messages in terms of 11-bit words, each consisting of a start bit, eight data bits, a parity bit, and a stop bit.

The parity bits, which are automatically calculated by and checked by the hardware, are vital to the integrity of ComLynx communications. To improve throughput, the ComLynx system functions as a "listen and send" network, wherein a Lynx is obliged to listen to the line and transmit data only when the line is silent. In such a system, there is always the possibility of data collision, making parity, overflow, and other checks necessary as a matter of course.

Luckily for the Lynx programmer, the Lynx development system contains a pair of macro modules (designed by Steve Landrum) that eliminate any need for concern with low-level aspects of ComLynx communications.

The first module, which can be loaded, executed, and then discarded from RAM, serves to establish initial handshaking among ComLynx-connected Lynxes. The second module manages communications. Using it requires the programmer simply to set up a framework of short I/O buffers — one for each Lynx on the network. Lynx-to-Lynx communications can then proceed automatically, simply by reading from and writing into this set of buffers.

Program Cards

Lynx program cards can presently contain up to 256K of information. A program card is a solid-state device: essentially a ROM. However, its contents cannot be addressed directly by the 65C02, nor can it be bank-switched into the CPU's memory space.

Instead, the Lynx program card functions like a disk on which up to 256 files of arbitrary size can reside. A single block at the beginning of the

disk's "memory space" acts as a directory. At system start-up, Mikey's bootstrap ROM initializes communications with the card and reads in the init file, stored at file block zero. From then on, communication with the card is under program control. Mikey's 512 bytes of ROM contains code for loading files from card to system RAM via DMA.

Although the card must be read from sequentially, the process is fast enough so that programmers have been able to use card storage much as they might use additional RAM, enhancing game functionality in a variety of imaginative and non-standard ways.

Several of the new crop of Lynx games employ the program card to store digitized sound until it is needed, thus saving on dynamic RAM space. *Electrocop* (see review page 64) stores character data on the card, reading it in dynamically, as required. These and other applications testify to the speed of the Lynx pseudo-DOS.

Developer's Tools

Backing up the Lynx' amazing hardware is a full suite of development tools, designed to make Lynx programming a breeze. The centerpiece of the developer's system is the so-called "Howard board," a parallel-interfaced module that embodies the electronics of a Lynx, in addition to a variety of sophisticated debugging tools. In documentation, this "puppet Lynx" is referred to as "Howdy."

For production work, the Howard board/Howdy is interfaced with a desktop microcomputer capable of running the Howard board's support software (currently, the developer's suite runs on an 3 Mb Amiga with hard disk).

Using the master computer, a programmer can write code for the Lynx using a standard editor, assemble it to 65C02 object code using the supplied cross-assembler, then download it directly to Howard/Howdy for execution.

The Howard board contains a sophisticated bus-monitor system capable of watching the Lynx' three internal buses. It is supported on the master computer by an exceptionally powerful debugger — called "Handy-Bug" — that can memorize 148K of program activity, creating a long history of program execution.

Handy-Bug understands the data-structures normally used in Lynx programming (and can be

taught to understand the developer's own data-structures and symbols), and is capable of displaying and altering Howdy memory in these symbolic terms. Handy-Bug also contains a disassembler, and permits single-stepping, traced execution, and the installation of conditional and unconditional breakpoints in a wide variety of contexts.

The developer's kit also contains a variety of utilities that simplify the task of creating graphics and sound on the Lynx. Handicraft, a graphics translator, turns .IFF files into coded Lynx sprite definitions, complete with sprite control blocks and associated data-structures. HSFx, the sound editor, allows programmers to experiment freely with the Lynx' complex sound generation apparatus.

To further facilitate access to the Lynx' numerous special hardware features, the developer's kit includes several extensive macro libraries, which together comprise a full operating system for the device. Developers simply include as much or as little of this code as their particular application requires.

Also included in the developer's code package are numerous, fully-documented example programs that can be modified and included in production code. Availability of these examples is said to make programmers capable of doing substantial production work on Lynx within a week of startup.

Finally, developers receive a thick notebook of system documentation ("about 3 1/2 inches thick... we've stopped counting pages," says Atari Lombard's Craig Erickson), plus the guarantee of frequent updates from both Lombard and Sunnyvale.

The cost for all this? \$5,000, though lower-cost alternatives are being explored, among them an abbreviated hardware interface that lacks the Howard Board's sophisticated monitor capabilities, but that will place Lynx developer status within the reach of serious amateurs.

As of this writing, Atari Explorer's Technical Staff is awaiting their very own Lynx Developer's Kit. In coming issues, we'll be talking more about Lynx internals, and revealing our own discoveries as we follow that long road to game-programming immortality! Meanwhile, we think Lynx is hot ... take a look at the software reviews on the following pages, and we think you'll agree! ■

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LYNX

Programmers at Epyx and at Atari's Sunnyvale, CA and Lombard, IL installations have

been working around the clock to produce the most faithful arcade translations, and the hottest, most innovative new products for Lynx! Herewith, a sampling of reviews of just some of the wide variety of entertainment software now available for everybody's favorite portable gaming system.

Included are some reviews of "classic" Lynx games no joypad-jockey should be without, from the high-tech shoot 'em ups *Electrocop* and *Blue Lightning*, to the arcade favorite, *Gauntlet*.

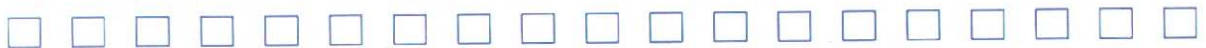
GAMES

We've

also included reviews of three brand-new Lynx hits, now in stores, everywhere. Check out the bizarre environs of *Slime World*; blast bloodthirsty aliens in *Xenophobe*; and tic-tac-toe your way to glory with *Klax*! The reviews on the following pages can help you learn how many different ways there are to have fun with your Atari Lynx Portable Entertainment System!

Including reviews of just-released *Slime World*, *Xenophobe*, and *Klax*!

EXPLOSION





Xenophobe, new from Atari for the Lynx, is based on one of the most reliable scenarios in science-fiction. You know the one I mean ... "Mayday! Mayday! We're being overrun! Can't hold them back! Guns out of ammo! Oh, God! No! They're multiplying! Aaaargh ... (gurgle, gurgle)" [Message Ends.]

In Xenophobe, you're one of a tiny team of interstellar exterminators, out to rid a series of space-stations from infestation by Xenos ("Aliens" for those of you who don't read Greek).

Each space station (there are 23) is a unique maze of rooms occupying from one to four floors. Rooms lead into one another via sliding doors, and the floors are circular, meaning that if you continue walking through a floor in the same direction, you'll eventually end up where you started. The floors themselves are connected by elevators and drop shafts. Though not com-

XENOPHOBE

PROGRAMMING:

Gil Colgate

ART:

Phil Vaughan

SOUND DESIGN:

Chris Grigg

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plex enough to really add a "maze" aspect to the game, the terrain is sufficiently varied so that it's hard to be sure if you've cleared a level of Xenos or not; a fact that adds considerably to the player's nervous tension. Further complicating your search-and-destroy mission are problems peculiar to each space station: self-destruct mechanisms accidentally left "on"; sealed rooms filled with Xenos,

for which you must find keys to enter; defense robots that shoot at you until reprogrammed; equipment fires; and other hassles.

Regarding the Xenos themselves: by some extraordinary coincidence, they bear a strong

resemblance, both in character and in biology, to the "Aliens" immortalized in Ridley Scott's very scary movie. Xenos gestate in pods (which are ugly, but recommend themselves by the fact that they're the only organic objects in the game that don't try to kill you). The larval Xeno, or "Critter," resembles a squid grafted onto a hermit crab. The Critter's goal in life is to jump on you and suck your skin off. Ugh.

Critters eventually mutate into Rollerbabies; slightly larger, slug-like Xenos that are harmless and vulnerable as long as they creep around on their bellies, but have the habit of rolling up into invulnerable balls and knocking you over at unpredictable intervals. Rollerbabies metamorphose into

Snotterpillars: huge, lizard-worms that spit corrosive phlegm and try to tackle you. As if this weren't enough, there are also tentacles — the malevolent appendages of uncertain parentage, creeping around inside the walls and floors, that try to wrap around you and choke you to death. Overseeing all of this mayhem are Festors: huge, green, big-brained lizards that peer around doorways, paralyze you with their telekinetic gaze, then lob pod spores at your head.

Doubtless, researching the life-cycle and reproductive behavior of Xenos would be a rewarding topic for a PhD thesis in Exobiology. Unfortunately, there's no time for note-taking when playing Xenophobe. Your initial character is drawn from the usual set of alien, robotic, and human misfits (this time around, the token female's name is "Dr. Pink" — I kid you not), is transported into the first space station, holding a phaser pistol (the 21st-century equivalent of a BB gun), and the game is on!

The Lynx joystick is used to walk your character left or right, aim up

or down, or drop into a crouch and shuffle along at floor level. This latter posture, though slow and undignified, is the one you should immediately adopt, as it lets you zap Critters on the ground. It also permits you to avoid hanging tentacles, and prevents you from meeting the telekinetic gaze of the Festors, who poke their heads around doorframes and wave to you. Button A is used to fire your weapon — there's no auto-fire function, so your trigger-finger will get a real workout; while button B is used to jump; occasionally useful for clearing obstacles and avoiding Rollerbabies. Option 1 causes your character to flail at a Critter tearing his flesh (or, if there's no Critter tearing his flesh, to throw a bomb, see below). Option 2 is used to switch on a jetpack, if your character is wearing one.

As you move through the maze, shooting Xenos left and right, you come upon valuable objects (vitamins, vials, lab equipment, ropes, keys, computer cards, disks,

etc.) that you're supposed to pick up. Most objects are only good for points, but some, such as vitamins, increase your health rating (something that goes down rapidly when you're, for example, fighting your way through a roomful of Snotterpillars), while others, such as jet packs, let you negotiate obstacles such as drop-shafts with ease and safety. Bombs, which are plentifully scattered throughout every station, are very useful. These are capable of destroying any Xeno, even an "invulnerable" Rollerbaby, with a single blast. Finally, there are weapons, which come in a wide variety of forms: laser pistols, electro-guns, "poofer" guns (which fire a cloud of toxin and are very powerful), and others. Learning the different kinds of weapons, and determining when to "trade up" to more powerful armament, is essential to survival. Happily, if you ever lose your weapon (weapon's sometimes explode when you get zapped by a Festor's telekinetic gaze), a little robot usually appears and hands

you a new one

Your initial character begins life with 2,000 health points — a number that erodes to zero rapidly until you develop the habit of shooting first and asking questions later. Once that character dies (graphically ... it's very frightening), you can choose another. Up to four adventurers can be slaughtered in this fashion before the game is over.

Graphics for Xenophobe are terrific: the animation of both character and creatures is fluid and natural, adding to the realism and general scariness of the game. Sound effects, I'm sorry to say, are not up to the Lynx's usual high standards. The music is pretty thin, and except for a variety of fairly-good digitized Snotterpillar growls, the creatures mostly sound like high-frequency feedback loops. The game as a whole, however, is very strong — we'd call it addictive. And with 23 infested space stations to sterilize, you'll be playing and enjoying Xenophobe for a long time. ■

(TODD'S ADVENTURE'S IN) **SLIME WORLD**

Most electronic games are real mathematical, you know? They tend to have very regular aesthetics. Clean. Simple. Everything at right angles. Know what I mean? Well ... not this one. Slime World — due out this Autumn from Atari for the Lynx — is based on a very, very gross-and-irregular concept.

I'm talking Slime. That's right. The star of Slime World is ... well, slime! Slime that pulses wetly,



Slime that glows greenly. Slime that drips and slithers and bubbles in putrescent, viscous pools. Acid

slime that gushes forth in loathsome, puking parody of waterfalls. Toxic slime that bursts from vile

fungal growths and erupts from the blasted bodies of huge, parasitic mites, like ichor. Oh my God! It's all over my face! I can't breathe! Ak, ak, ak ... Gag ... (thud).

Outrageous! The basic scenario: you play the part of Todd, a blonde-haired interplanetary adventurer and profiteer waging a one-man battle against the obscene caverns and cloacae of a living planet. Your nominal tools: a water-gun capable of blasting slime-dwellers and a computerized map that helps you keep track of where you've been; these, plus common sense, a strong stomach, and whatever tools you pick up along the way.

Your goals are various ... starting with survival. As Todd moves through the slime-caves, he tends to pick up ... well ... a certain amount of slime. Hard to avoid, really, since he's marching through it. It's also dripping like pus from the walls and ceiling (drip, drip, drip); not to mention coagulating in awful pools that Todd has to slog through (goosh, goosh, goosh). And slime — as we all know — is toxic. Some varieties of slime are worse than others, of course, but any slime will turn Todd green and kill him if he doesn't bathe or otherwise refresh himself at regular intervals.

Luckily, there are a variety of ways for Todd to get deslimed. One way is to gather a lot of slime gems — the normal, blue variety. Another way is to wash in one of the pools of clear water

Todd frequently encounters. A third way is to find and don a slime-shield, one of many scattered throughout the caves.

Unfortunately, you can't carry more than one of these so slime-spelunkers should take note of where they are, for possible later use. The best way of removing slime, of course, is to gather a super-slime-gem — the red variety. Super slime gems are worth lots of points, and gathering one cleans Todd off and shields him from further contamination ... for a short while.

Of course, staying clean is only part of the problem. Slime World is inhabited, you see. And not by little chipmunks and bunny rabbits. In fact, I can't remember a computer game that featured a wider, more grotesque and lethal cast of monsters. Starting with the least nauseating, there are little fungus

pods that grow to bursting as Todd passes, splattering him with toxic "boogers." Then there are the little flying things that drip poison. And the mutant butterflies that whip up and down vertical passageways. And the flying fleas that buzz through the air. Weird, unicellular life-forms and bizarre parasitic mites that suck the vital juices from your body. Horrible, multi-segmented worms and their vile larvae, thrashing from the walls like

something out a Ridley Scott movie. Giant, razor-toothed jaws that lurk in the bottom of pools. And that's not even half of the species you'll encounter as Todd penetrates deeper into the oozing guts of the planet.

Luckily, Todd is armed with his water-gun, with which he can usually blast or otherwise neutralize your average bloody-minded slime-dweller. Yet, even blasting the aliens is not without its risks ... most species explode in a shower of toxic boogers that spread far and wide. Depending on species, the toxin either works its vile effects slowly or kills instantly — in the latter case, regardless of slime-shielding ... so Todd has to be careful even in defending himself.

Among the other useful objects that Todd encounters in his quest are cleanser bombs, capable of turning a slime-pool into fresh water; mega-bombs, capable of clearing out an entire monster-infested chamber (and of killing Todd too, if he doesn't seek shelter in time); gun refills, which keep Todd's water-gun in ammunition; slime-bait, which can be thrown to attract monsters into an appropriate configuration for low-risk blasting; jet-packs, which can be used to gain access to otherwise inaccessible regions of the cavern; and the aforementioned slime-shields.

Objects are not scattered at random. While the order in which they must be gathered and the manner in which they must be used is usually more or less the player's call, this is not always the case. Occasionally, Todd will encounter a sticky wicket in which he must use objects in a particular way to avoid serious injury. Certain parts of each maze, for example, are inaccessible except by climbing through clots of very toxic slime. Having a slime-shield is a necessity for getting in, and you'd better have one on tap for getting out, as well.

Continued on Page 66

SLIME WORLD

GAME AND CODE:
M. Peter Engelbrite

ART:
Matt Crysdale
Phil Vaughan
M. Peter Engelbrite

SOUND DESIGN:
Chris Grigg

MUSIC:
Eric Vanhee

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KLAX

Of all the games people have amused themselves with, down through the centuries, among the simplest and most satisfying are those played on a two-dimensional grid. Think about it: from tic-tac-toe, to "five-in-a-line," to the Japanese "go," to chess, to Tetris. All these games derive their appeal — at least in part — from the peculiar satisfaction players feel when solving problems within a confined, regularly ruled domain. In the latter cases, rhythm — perhaps as a temporal extension of the grid's aspects of confinement and regularity — is also important. Almost any grid game can be played to a beat (chess masters frequently play timed matches in which each

move takes less than a second), and the pressure of time makes Tetris an exciting game, instead of just an exercise in piece-fitting.

Klax, new from Atari for the Lynx, inherits its appeal from a variety of different grid-games, including tic-tac-toe, five-in-a-line, and Tetris — wrapping it all in a wild, pinball-machine cosmetic framework that's simply magical!

In Klax, you're presented with a kind of ramp, twenty steps high and five columns wide. At the base of the ramp is a kind of "catcher-flipper" that moves from side to side under the control of the Lynx joystick. The game is designed for play with the Lynx held lengthwise; with joystick above the screen and buttons below, or the reverse.

As play begins, brick-shaped pieces of various colors begin rolling towards you down the staircase, one step at a time. Your first task is

to bring the catcher in line with the falling block in time to prevent it from overshooting the end of the ramp and tumbling end-over-end into oblivion.

Then you can move the catcher left or right into one of the five column positions, pressing the fire button to flip the caught block onto a platform, below. As more blocks are caught and flipped they begin piling up into a wall five blocks wide and a maximum of five blocks high. (see screen shot).

The object is to catch and deposit blocks in such a way that patterns are formed in the resulting wall. A point-making pattern (or "Klax") consists of three or more blocks of the same color, stacked vertically, lined up side by side, or arranged diagonally. Making a Klax earns points relation to the number of blocks in the figure and the way they're arranged — a five-unit diagonal Klax is worth far more than a three-unit vertical Klax, etc.

In this sense, Klax borrows from both tic-tac-toe and five-in-a-line. It also borrows from Tetris: when you form a Klax, the affected blocks disappear, and any blocks above them fall down into the vacated space, shortening the wall and lengthening the game.

It sounds simple, but in practice, Klax is both challenging and addictive. Considerable attention to strategy is required to form higher-order figures and earn impressive scores, and several features have been added to give the player more freedom in responding to the game's demands. One complicating factor is the catcher, which can hold as many as five blocks before one must be flipped off.

As in a computer's hardware stack, blocks are handled by the catcher in "last-in/first-out" order: that is, the block most recently caught is the first block to be flipped, the next-most-recently-

Continued on Page 67

PROGRAMMING:

Greg Omi

ART AND ANIMATION:

Susan G. McBride

Greg Omi

Gary Johnson

KE Rudis

MUSIC AND SOUND:

LX Rudis

MANUFACTURER:

Atari Corp.

1196 Borregas Ave.

Sunnyvale, CA 94087

(800) 443-8020

PRICE: \$39.95

LYNX

According to the dictionary, a "gauntlet" is a kind of mailed glove worn by medieval knights. It's also an ancient form of punishment in which prisoners are forced to run to their deaths between two lines of beaters, armed with cudgels. Both these meanings are operative in "Gauntlet: The Third Encounter," new from Atari for the Lynx Portable Entertainment System.

The first incarnation of "Gauntlet" was, for a considerable time, the darling of the "pay for play" arcades; and is still considered revolutionary. While the game is indeed an "adventure," in the sense that it involves lengthy exploration, map-making, and the management of character inventory (objects picked up by the character and used in various ways to enable further progress); Gauntlet emphasises quick thinking and reflexes, rather than more leisurely problem solving. It was also one of the first multi-player arcade games. In the original, arcade version, multiple controls were provided for up to four players. In this new, Lynx version, the ComLynx interface is employed to link up to four Lynxes (each of which contains a Gauntlet game card), allowing cooperative play.

The scenario of Gauntlet puts you in a 44-level haunted castle, in search of the fabled Star Gem. Opposing you in your quest are a wide variety of enemies: scorpions, spiders, beetles, ghosts, carnivorous plants, "slimes," and other horrors, all eager to feast on the blood of an adventurer.

Each level of the castle is set up like a maze, complete with trap doors, trick walls, locked portcullises, and other impediments to progress, and populated by from one to several of these enemy



GAUNTLET THE THIRD ENCOUNTER

"species." The object of the game is to find your way through the maze from level to level, picking up and using objects of value in order to keep your character alive and to help you prevail in enemy encounters.

Gauntlet lets you choose your character from among eight personae: Android, Valkyrie, Gunfighter, Nerd, Pirate, Punkrocker, Samurai, or Wizard. Each persona has its own combination of qualities: speed, strength, and missile power, that affect its ability to escape from attackers, endure attacks, and destroy monsters.

Choice of character is important—mostly because your character's qualities will control, at least to some extent, the way you play the game. Slower, stronger characters

with greater missile power (such as the Android) encourage you to play a battle-oriented game in which you make slow progress, but work vast devastation in the enemy ranks. A faster character can explore each level much more quickly—which can be satisfying—but must avoid massed enemies unless specially empowered to handle them without taking excessive damage.

It is noteworthy that both male and female characters (e.g., the Valkyrie) are available, as well as a mechanistic character (e.g., the Android, for players who resent the idea of placing a living being in danger.

A character's individual qualities can be enhanced and abetted by the use of potions and scrolls,

PROGRAMMING:

John Leupp

ART:

Paul Vernon

MUSIC AND SOUND:

Bob Vieira

LX Rudis

LEVELS:

Chuck Sommerville

Charlie Kellner

MANUFACTURER:

Atari Corp.

1196 Borregas Ave.

Sunnyvale, CA 94087

(800) 443-8020

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found in various chambers of the maze. Potions, which come in a variety of colors, can temporarily increase your character's speed, strength, or missile power; add points to your "life," or — in the case of poisoned potions — take them away.

Using the proper potion at the right time can make your character temporarily capable of handling enemies it would otherwise be overwhelmed by. Scrolls, depending on type, offer an even wider variety of powers. The proper scroll can permanently increase a charac-

ter's combat-worthiness, destroy huge numbers of enemies in a single go, let you view an entire level, heal wounds, repel enemies, render your character invisible, or even revive him if his life points drop to zero.

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BLUE LIGHTNING



Stephen Landrum was one of the Lynx's designers, so you have to figure that he knows how to get the most out of the system when it comes to game design. Blue Lightning, new from Atari for the Lynx, won't disappoint you. It's both an impressive flight simulator and a great shoot-'em-up — a real technical tour-de-force.

In Blue Lightning, you're the lucky (or not so lucky, depending on how you look at it) pilot of a prototype fighter: a hot, new machine that

PROGRAMMING:
Stephen Landrum

GRAPHICS:
Arthur "Ace" Koch

MANUFACTURER:
Atari Corp.
1196 Borregas Ave.
Sunnyvale, CA 94087
(800) 443-8020

PRICE: **\$34.95**

carries 40 radar-guided missiles, unlimited cannon ammunition, and can — at least in theory — fight equally well against ground and airborne targets. The basic idea is simple: kill everything in sight. Doing it, however, is not so simple.

Not that the game is anywhere near as difficult to play as your normal fighter simulation. In fact, Landrum has designed the plane's controls so that every-

thing is at your fingertips; he uses the Lynx' joystick, buttons, and option keys to best advantage. But the speed of the game and the variety of opponents are such that you have to learn how to respond instantly to each threat, and this skill takes a few practice missions to develop.

The plane is maneuverable, which is a good thing, since much of Blue Lightning's low-flying action takes place over irregular terrain: canyons, hills, and table-land dotted with trees. The Lynx joystick, naturally, is your control stick, and the plane responds instantly to your commands. Because the stick is switch-based, rather than proportional, controlling the plane with precision means learning how long to hold a bank, rather than how hard to bank. But aside from this, the plane is an intuitive marvel to fly.

Helping you to control Blue Lightning is a sophisticated on-board computer, which can actually keep you from hitting level ground. Unfortunately, it can't do much to keep you from flying into a hillside ... that's your job. The computer also manages the weapons systems, warning you with an audio tone and/or printed messages if your plane is threatened by incoming missiles or enemy aircraft. Offensively, the plane's targeting system can acquire multiple opponents at different levels of assurance, providing you with some information about when to fire a missile, and providing the missile with lock-on and tracking information.

In addition to the computer, Blue Lightning features a rechargeable afterburner (which, when engaged by pressing Option 1, maxes your speed for ten seconds, allowing you to catch up with bogies), and has the capacity to do barrel-rolls (both impressive and useful: a roll can break an enemy's missile lock). Firing a missile can also help in this situation, as missiles seem to function like chaff. Overall, the suite of weapons and maneuvers is impressive ... even more impressive when you consider that before too long, you're using them intuitively.

Blue Lightning offers a series of nine missions, at varying levels of difficulty. Each mission involves the destruction of a series of targets in changing terrain. You have only six planes to waste, so you have to fly carefully to complete a mission series.

Luckily, a restart feature is implemented that permits you to begin a game session at any mission for which you know the code.

Considerable attention has been given to graphic detail, and the quality of Blue Lightning's 3-D animation is extraordinary. Not only are the visuals striking, with enemy planes and missiles zooming in to fill your sights, but they're also precise. Unlike many 3-D animation games, objects in Blue Lightning really are where they appear to be. This is crucial, since mastering the art of flying low through complex terrain at high speed is absolutely essential to survival. One of the game's biggest thrills, in fact, comes when you first realize that you're not only avoiding the obstacles, but using them to your advantage, placing them between you and oncoming missile-fire while playing cat-and-mouse with your opponents.

If fighter planes excite you, and you really want to see what the Atari Lynx can do, give Blue Lightning a shot! ■



ELECTROCOP

PROGRAMMING:

Greg Omi

MUSIC AND SOUND:

Bob Vieira
LX Rudis

DESIGN ASSISTANCE:

Chuck Sommerville
Charlie Kellner
Tom Schumacher
RJ Mical

ART:

Arthur Koch
Karen Mangum
Matt Crysdale

MANUFACTURER:

Atari Corp.
1196 Borregas Ave.
Sunnyvale, CA 94087
(800) 443-8020

PRICE: **\$34.95**

President's daughter. The robot is hiding on level 5 of an abandoned Megacorp research facility. Your job: find and liberate her before an hour has elapsed.

Electrocop is transported into level 1 of the facility, and must move from level to level, fighting enemies and avoiding traps, until he reaches his objective. Each level is

While you can certainly appreciate ElectroCop without having seen Ridley Scott's groundbreaking movie, BladeRunner; Scott's breathtaking vision of a dark future surely informs the game. In ElectroCop, you play the part of Washington's most effective crime-fighting unit: a powerful robot with superhuman speed and strength, and the ability to interface directly with computers and other data-processing equipment. Summoned to the offices of Megacorp, a huge conglomerate, you learn that an evil robot has kidnapped the

a maze of rooms and corridors, displayed in 3-D from an eye-level viewpoint. ElectroCop himself is in the picture, and objects and enemies appearing between him and the screen are rendered semi-transparently.

The display works marvelously to create a sense of depth without sacrificing the cinematic quality of the game. Unfortunately, you can only see into the display from this one viewpoint. Thus, while it is easy to combat enemies deeper or shallower in the maze than ElectroCop, it is more difficult to

avoid or fight them if they appear to Electrocop's left or right.

The variety of robotic enemies and traps is astounding. Several varieties of "walker" robots (liberally borrowed from Star Wars) threaten Electrocop with collision, or menace him with lasers, disruptors, and other weapons. "Virus" robots bounce from room to room, infecting floors and turning them into traps. "Pythons" spring up from the floor, firing mines. "Stingrays" fire antimatter cannons. Traps include wall-mounted cannon, "spin floors" that spin Electrocop out of control, and electrically-charged floors that deliver nasty shocks.

Aiding Electrocop is the fact that weapons and computer terminals are scattered throughout the facility. Initially armed only with a single laser, Electrocop can acquire a variety of additional weapons, permitting him to lay down a wider and more lethal field of fire. Each weapon type has its own power, knockdown, and armor rating, and can take damage or be destroyed by encounters with enemy robots and traps.

Computer terminals, which Electrocop can stand in front of and interface to, provide a variety of additional aids. Using a terminal, Electrocop can engage one of his utility programs: Icebreaker (a toast to William Gibson), which is capable of unscrambling the locking code and opening any door; and Stasis, which is capable of temporarily freezing adversaries. Terminals also offer access to a Med Pack, which can replenish Electrocop's vitality, and to a weapons-repair facility, which can fix the weapons he is carrying.

Finally, terminals give access to information about enemies, and even let you play "stress-reducing" games (versions of Asteroids, Breakout, and a letter-puzzle) — an interesting, if bizarre touch.

Electrocop moves left, right, for-

ward (towards you) and back (away from you), under control of the Lynx' joystick. Button A fires his weapons; while button B causes him to jump (if pressed and held down), or fall to one knee and rise (if pressed and released). When Electrocop is carrying a smart-bomb unit, Option 1 causes him to fire a smart bomb, destroying all nearby enemies. Option 2 allows Electrocop to discard a weapon or pick it up again. Once these simple controls have been mastered, you can move Electrocop with considerable grace and fluency: essential for fighting effectively and avoiding obstacles. Additional options let you pause the game, and turn the music on and off.

Though a maze-oriented game, Electrocop operates under severe time-constraints (you have an hour, realtime, to finish the game or die in the attempt), so cannot be approached in the same contemplative, map-making way as a typical adventure. A bit of writing-down of stuff, however, is helpful in mastering the game. Proficient players will be able to reduce the amount of time it takes to negotiate each level by writing down the access codes Icebreaker determines will unlock each door, and entering them manually on subsequent attempts.

Additional time can be picked up by avoiding the exit points that take you to cul-de-sacs in the maze. Learning how to cut down on time is important, since Electrocop does not incorporate a restart feature.

Electrocop is a programming marvel, placing numerous moving figures on the screen with speed and great realism, while managing a complex 3-D point-of-view simulation. Great care has been taken in animating the figure of Electrocop himself. His motions are never jerky, but shade into one another through intermediate steps,

creating an effect that's cinematic while letting the player feel fully in control.

Music and sound effects are also marvelous. Bob Vieira and LX Rudis have assembled a montage of synthesized music (including at least one Bach two-part invention) and realistically-digitized machine and explosion sounds to provide an entertaining and exciting sonic backdrop to the action.

In sum, Electrocop is an exciting game that takes a while to master, but will more than pay back the player with a sense of accomplishment and continued entertainment. ■

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SLIME WORLD

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The Adventures

As you can see, Todd's Adventures in Slime World is quite a trip, and it takes a little while to master the skills needed to survive the slime-caverns for any length of time. To ease the new slime-worlder on his or her way to sliming mastery, the game's designers have implemented a basic "find the exit and get out alive" scenario that will put Todd through his paces without forcing him to deal with any real problems.

Once you've beaten this one (it took me several hours), there are five more adventures to deal with, each with its own mini-scenario. In adventure #2, Todd's own ship is destroyed, and your job is to find the rescue ship — this adventure emphasizes exploration.

Adventure #3 also involves finding the rescue ship, but emphasizes action (read "violent conflict").

Adventure #4 pits Todd against the clock...not only must he survive, but he has to gather mushrooms in order to restabilize Slime World's core, preventing planetary meltdown.

Adventure #5 emphasizes logic, forcing Todd to deal with Slime World without his water-gun, using only the native tools at hand.

Adventure #6 pulls out all the stops in an arcade-action extravaganza of sliming horror — there's no goal other than to extend Todd's miserable life a few more miserable seconds.

Actually, while the different emphases of the adventures become more apparent to the experienced Slime-Worlder (i.e., "exploration"

as opposed to "action"), the impression drawn by the novice is one of more-or-less continuous emergency. Luckily, adventures #1 through #5 permit Todd an infinite number of lives, though he is revived with a score of zero and no inventory (except for water-gun and computer map).

Play-Action

Slime World really does justice to the Lynx' simple user interface, giving you a maximum of freedom in controlling Todd's movements while employing a minimal set of controls. Basically you just push the joypad in the direction you wish Todd to go, and he goes there: slogging through pools and over obstacles, climbing up and down filthy walls of slime, and generally makin' tracks.

The only variable in controlling Todd's movement involves pushing the B button to make him jump — useful in crossing slime pools without being digested. Pushing the A button causes Todd to fire his water-gun; while angle of fire is controlled by the joypad through three degrees of freedom. You can page through an inventory of Todd's toolkit by pressing Option 1, and use any object by pressing Option 2. The only additional control is the Pause key, which pauses the game in progress and displays a code that can be entered to restart Todd at a nearby location in the next session (the only exception to this rule is the free-for-all Adventure #6, which offers no restarts).

The details and physics of Slime World are fascinating, and beautifully realized on the Lynx. Cavern walls pulse constantly in a slow, liquid dance. Sound effects are marvelous: the squishing of Todd's boots and the constant dripping of slime really add to the visceral quality of game play. Gravity on Slime World is minimal, so Todd can fall great distances without injury and climb without tiring. But

the texture of different varieties of slime and liquid do affect his progress; impeding motion in natural and expected (or sometimes unexpected) ways.

The game's designers clearly want the player to identify with Todd instead of simply to "drive" him; and no detail has been spared in creating the impression that Todd is at least partially autonomous. For example, certain sensible moves on Todd's part have been made automatic. If you permit Todd to rest while wading through a pool of clear water, he will automatically take the opportunity to wash himself free of toxic slime. Other sophisticated tricks are used to enhance the impression that Todd has a mind of his own (subject, of course, to your control).

When you press Option 2 to make Todd use one of the objects in his inventory, the object in question is always — insofar as possible — employed in a sensible way. For example, Todd will automatically toss a cleanser canister into the nearest slime-pool, without you having to worry about the details of making the pitch.

When you consult the computerized map, Todd removes his own, smaller version from his pack, and stands there consulting too (the map, by the way, is a wonderful touch ... the one thing I hate about standard "adventure" games is that they oblige you to make your own maps). The overall effect is to make Slime World almost as much of a movie as a game.

My prediction: Todd's Adventures in Slime World is going to be a monster hit. It combines all the fun of the most exciting arcade games with the challenge of strategic planning, logic, exploration offered by the best mazes and adventures. And it does all this within the framework of a basic premise totally unique in computer gaming: that there's a basic appeal to ... well, slime. ■

KLAX

Continued From Page 61

caught block is the second block to be flipped, etc. This feature forces the player to perform some interesting backward mental gymnastics in figuring out how to use the catcher to best advantage. Another feature that can be turned to advantage: by pressing the joypad, blocks may be flipped back up the ramp, giving the player some ability to reshuffle the catcher stack, as required.

Klax offers three difficulty levels, relating to the rate at which pieces are released down the board. After selecting a difficulty level, the player is permitted to select from among four "waves," which differ in the number of pieces the player is permitted to fail to catch, bonus points, and other details.

Each wave consists of a number of subwaves, in which the player is made to play towards different goals. In the "Klax" wave, the object is to form as many Klaxs as possible. In the "points" wave, one plays for points, forming the most valuable combinations by preference. In the "diagonal" waves, the object is to create as many diagonal Klaxs as you can, etc.

Klax thus presents the player with quite a bit of variation, and until the game is mastered, surviving to achieve the ostensible goal is challenge enough. Real Klax gurus, however, can play for even higher-order goals. "Secret Warp" waves challenge the player to discover the one Klax combination that will set off the Secret Warp — in one case, a big 'X'.

At the beginning of a game, the mechanics of play are reviewed in an animated graphic demo. This is a welcome feature for those who don't read instructions, and can be bypassed with the press of a button by those already familiar with the

game. Hints are given for almost every screen, sometimes referring to obscure goals (such as the big 'X' required by the first Secret Warp Wave), and sometimes to finer points of game technique.

Design, Graphics, and Sound

Extraordinary care has been lavished on Klax' cosmetic features, showing off the graphic and sound capabilities of the Lynx to maximum. The startup screen is an animated extravaganza, backed up by a digitized funk-rock score featuring guitar, bass, drums, and handclaps.

The main game screen looks like a deluxe pinball machine, with flashing multicolor chase lights and a tricky score display where numbers flicker by like fruit in the window of a one-armed bandit (it's actually entertaining to watch your score being added up at the end of a wave). Chic, "modern primitive" typography, used throughout for menus and hint screens, gives Klax a very consistent carnival look.

Nor is the use of detail and color entirely cosmetic. The mechanics of the catcher-flipper become clear very rapidly to the novice player, because the device is rendered accurately in mechanical terms. In fact, certain apparently "cosmetic" design elements actually turn out to be very practical aids to game play. For example, a bar of green sliding back and forth under the block platform seems, at first glance, to be merely a visual effect. Only later does the player realize he is using the bar — which turns out to be tracking on the catcher — to line up his flips so that blocks go into the desired columns.

Gameplay has been further enhanced by the extensive use of digitized sound, voice, and other effects. Each wave is introduced by a digitized female voice, catching the player's attention and promoting concentration.

Sounds made by rolling and flipping blocks have an intense, mechanical quality that promotes visceral involvement in the game. Sound is also used to punish failure and reward success — something that Klax always does with a sense of humor. When you fail to catch a block, it falls to its doom with a satisfying scream. A sympathetic "Aaaaaaaaaaaaaaw!" consoles the player who fails to meet the goal set by a wave, while a round of applause congratulates a successful effort. For the sake of encouragement, vocal effects have even been injected into game play.

All in all, Klax is terrific: a simple enough game for kids that provides enough of a challenge for even the most coordinated adult. ■

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GAUNTLET

Continued From Page 63

Careful use of potions and scrolls is an important part of strategy. Other objects of strategic value include pots of gold, which can be exchanged at certain computer terminals for other objects of greater utility; keys, which open doors leading to otherwise inaccessible chambers of the maze; and apples, which increase your character's "life points" when eaten.

Objects of real strategic value are almost always hidden, or surrounded by enemies. The player is thus encouraged to adopt a careful economy in playing Gauntlet — continually assessing the amount of battle-damage he can afford to sustain, and plotting for his own revival in the event of catastrophe.

A character begins the game with 20,000 "life points," which decrement slowly even when the character is idle. Life points can be increased by eating apples or by employing gold potions or "heal" scrolls.

Contact with enemies (and the accidental use of poisoned potions) cause life points to be reduced precipitously. When they drop to zero, the character begins to spin in the throes of death. At this point, only the use of a "revive" scroll can save the character, returning his original 20,000 life points. However, even if you have a "revive" scroll in your inventory, it is all too easy to flub using it during the critical few moments prior to death. Moreover, using the scroll too early, while life points remain, has no effect, except for wasting the scroll.

Within this overall economic strategy, the successful Gauntlet player must determine, on a case-by-case basis, the proper strategy for each enemy encounter.

This requires knowing your current enemy's vulnerability to shots, and method of attack — allowing you to place yourself so that your enemy will fall within your field of fire, and be consumed by shots before reaching you.

If he does reach you, he is generally consumed by the contact, but not before doing you some damage. Hallway fighting is relatively easy, since enemies are obliged to approach you one-by-one. Facing massed enemies in open areas, by contrast, is considerably more difficult. A quick hand on the joypad is required to place shots accurately. This becomes even more important when enemies are guarding treasure such as potions and scrolls, which can be destroyed by your shots.

Controls for the game are easy to master. Gauntlet is played with the Lynx held vertically. The top half of the screen always displays an image of the character in a section of the current level. In normal play, the bottom right-hand portion of the screen contains an index of the character's current speed, strength, and "shots" quotients, the number of "life points" remaining, and the score.

The left-hand portion contains a "radar" screen which shows a detailed image of approaching enemies or nearby objects. The eight-direction joypad controls the direction in which a character faces, moves, and/or aims his weapons; while button 'A' is used to fire.

In inventory mode — engaged by holding down the button 'B' — the bottom right hand portion of the screen changes to show items the character has picked up and has not yet used. Pressing the joypad left or right causes these items to scroll across the display, one by one. Pressing the pad up or down causes the object currently displayed to be used or dropped — an important distinction, particularly when han-

dling scrolls and potions. Weapons can be fired (via button A) while reviewing inventory — a useful feature in the press of combat.

The Lynx' "pause" key pauses play, and can be used strategically when it becomes necessary to think through a problem at length. Option 1 permits you to begin play at level 1, 5, 10, 15, or 20 — not quite a full "restore" feature, but one that permits you to explore the castle over several sessions.

Graphics and sound are exceptional. The characters are rendered with full fidelity in eight perspectives, and the mazes contain elements of stone, of metal, foliage, and other substances that make them beautiful as well as deadly.

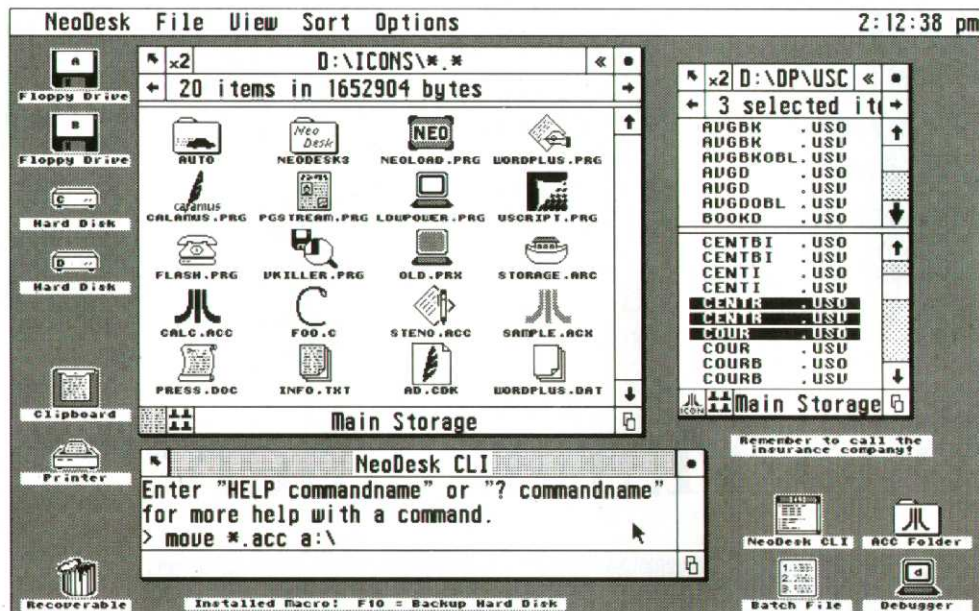
A number of pretty musical themes are used to heighten different modes of game play. Particularly noteworthy is the Renaissance theme that plays during character selection — a real treat for the ear. Sound is in stereo, and while acceptable through the Lynx' internal speaker, is far better reproduced via headphones.

Gauntlet's multiplayer capabilities will be explored next issue, when we delve into multiplayer games in general. For now, suffice to say that the multiplayer feature works well, and that playing Gauntlet in multiplayer mode is even more interesting than playing it alone.

A larger number of players can carry far more loot and fight far value include pots of gold, more effectively than can a single character, offsetting one another's weaknesses and enhancing one another's strengths in creative ways. Nevertheless, the single player — whether adventure-game lover or arcade fan — will find much to like in Gauntlet. The game is complex, though easy to play; offering much in the way of both strategic and reflex challenge. ■

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Only NeoDesk 3 allows you to look at two different parts of the same window, thanks to its amazing *Split Window* feature. Of course, each window can be set to display text or icons, independently of any other window. Each window can even have its own sorting and text options.

NeoDesk is also smart, using all of its available memory for file copying so that as many files and folders that will fit into memory are read in at once. No more useless disk swaps, even hard drives benefit from its speed and efficiency.

Add some of the other NeoDesk 3 features, such as a brand new Icon Editor, keyboard equivalents, desktop picture, file templates, *Active Icons*, and *Hot Keys* (execute your favorite program with a single key), then you have more than enough reasons to buy NeoDesk. But for those of you who need a little more, read on.

NeoDesk 3 now offers a unique *File Clipboard™* which lets you temporarily hold files and folders in memory while you are busy doing other things. In a way, you can think of it as an automatically expanding and shrinking ramdisk.

You now also have the power of *Macros*, with which you can automate any series of desktop operations like opening windows, copying files, running programs, etc. These can also have *Hot Keys* assigned to them.

NeoDesk 3 even has special support for 5 1/4" floppy drives and formats all disks with the correct information so they work on most MS-DOS computers.

From low resolution to ultra high resolution, NeoDesk 3 supports up to 10 different resolutions in each system.

Of course, these features would not be useful unless they were easy to use. Rest assured, NeoDesk 3 has been designed to be "upwardly compatible". Use NeoDesk just like you used the original desktop, no need to forget all that you have learned.

It doesn't stop there. The included *Recoverable Trashcan* lets you recover files deleted with it at any time in the future. It was created using the *NeoDesk Developer's Kit*, which opens a whole new world of possibilities. There's also the *NeoDesk CLI* (both available separately), a complete window based command line interpreter which allows you to create pop-up menus, automate file operations, and much more.

No matter who you are, NeoDesk 3 has something for you. From helpful search capabilities to a powerful file reorder function. Thanks to its ability to remove itself from memory, it only needs about 35K of memory. Of course, there's lots more, which you can discover by ordering today!

NeoDesk 3 and the NeoDesk CLI are available from your local dealer, or order toll free by calling (800) 284-GRIB and get FREE 2nd Day Air (US only). Call or write for upgrade and other information.

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A regular series on living with Atari's palmtop PC

*Itching to
program your
Portfolio?
Here's a
public-domain
BASIC that
just might
make your day!*

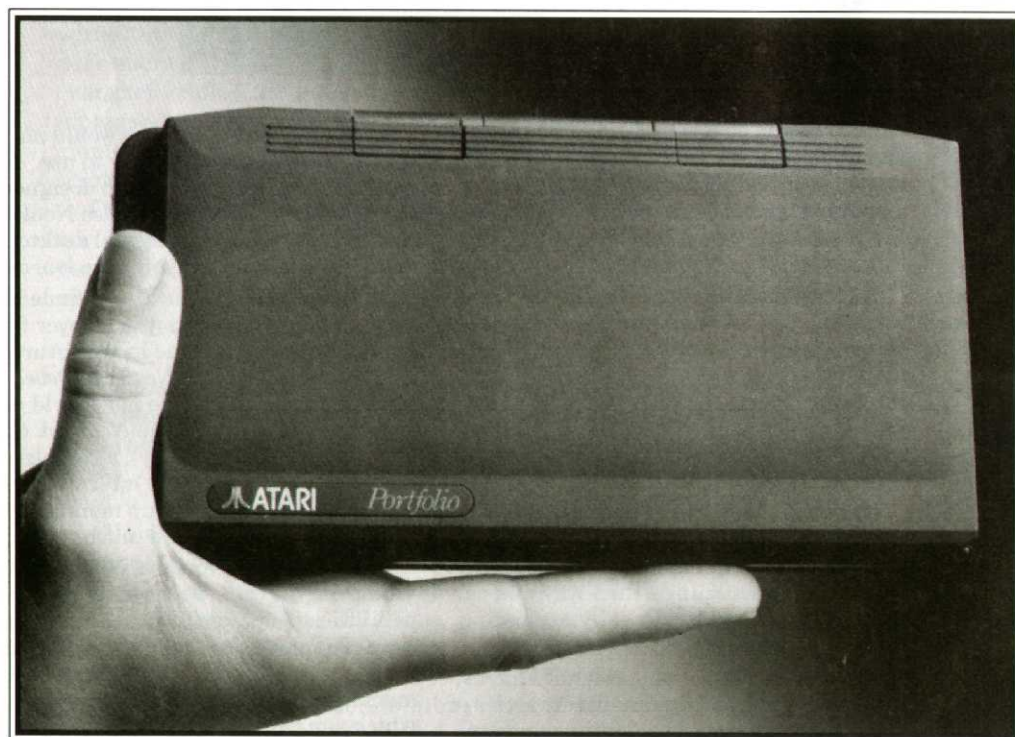
Not that I have any time for programming, these days (which is why I stay up late, nights!) but ... okay, call me a dweeb ... I see this Portfolio thingy and I just want to hack on it! Every time I use the thing, I think: Okay, okay, it's a SuperOrganizer ... it's an MS-DOS peripheral. Yeah, I keep my telephone numbers in it. Yeah, I use it to record important dates. Yeah, I use the spreadsheet to work out subscriber stats for Atari Explorer, yeah, yeah, yeah.

But if you hooked me up to a lie detector and asked me "what does the Atari Portfolio mean to you?" I still — even at this remove — wouldn't answer "Gosh, it's a SuperOrganizer, superior in every way to those loathsome toys from Psion and Sharp!" At least, not in that way.

I dunno ... maybe I'm not a company man. Maybe I ain't with the program. But when somebody asks me what the Atari Portfolio means to me, I just want to grab them by the lapels and scream, "COMPUTER! COMPUTER! OF COURSE it's superior to those loathsome toys from Psion and Sharp! (thwack, thwack, thwack!) That's because it's a ... COM-PUTER!"

Of course, I stop myself, because that's real maturity. And because it's never a good idea to (how did Bill Murray put it?) "scare the straights." Atari is, after all, correct. The Portfolio is es-

Portfolio Management



By John Jainschigg

entially a SuperOrganizer (think of a FiloFax with chrome headers, a hood scoop, and a remachined 1967 Impala V-8, and you basically get the idea) that comes with all the software the average executive will ever need, built right in. There are convenient features for storing and manipulating the data that most high-tech executives need to deal with on a daily basis: the unending flood of phone numbers, meeting notes, figures, and correspondence that would otherwise run around his head like rats in an exercise wheel.

The Atari Portfolio, in short, is much, much better than those loathsome toys from Psion and Sharp. First off, the thing's set up like a tiny version of the computer you have on your desk, not like a weird electronic calorie-counter that assumes you don't know how to touch-type.

Second, its software really works, and synergistically with the programs you use every day on that self-same desktop computer. If you're an executive, you need one. I can vouch for this: I'm an executive (check the masthead) and I need one. In fact, I became an executive partially in order to get one! It was one of the first demands I made.

But (Shhh! Don't scare the straights!) ... just because the Portfolio's so easy to use that the minute you get one you can throw away that bloody FiloFax for good and all, doesn't mean that it's not really a computer. It is. Very well-designed and unintimidating computer, mind you, but ... definitely a computer.

And one of the neatest things about computers — at least to us "not with the program" kinda guys — is that you can program them.

Figure 1. PBASIC Commands.
PBASIC-specific commands
are noted.

```
CLS
DATA
DEF SEG
DIM
END
FOR
FORMFEED (sends
           formfeed to
           printer)
GOSUB
GOTO
IF
INPUT
LOCATE
LPRINT
NEXT
ON (exp) GOTO
ON (exp) GOSUB
OUT
POKE
PRINT
PRINTER (toggle: sends
         all screen output
         to printer)
PRTSC (copies screen to
      printer)
PSET
RANDOMIZE
READ
REM
RESTORE
RETURN
SCREEN
STOP
SWAP
SYSTEM
TROFF
TRON
WAIT (waits for
     keypress)
```

Breathe There a Man...

With soul so dead that every time he opens his Portfolio he doesn't think "Wow, look at that user interface ... That suite of applications with all the hooks built-in for cooperative code ... That big-bucks executive market for software ... Hmmm ... Wonder what it would be like to program?" Atari will release its own Portfolio BASIC, a specially-optimized version of the IBM standard GWBASIC, in the first quarter of '91. But if you've got a yen to start hacking on your Portfolio in BASIC before then, there's a product in the freeware pool that's just begging for a look-see.

That's PBASIC, by BJ Gleason of The American University. Currently in version 2.1 (version 3.0 should be ready by the time this article reaches print). PBASIC is a terrific little job of programming. It doesn't support all the features of standard BASIC (strings, for example, aren't supported yet, though version 3.0 does support them), but what's there is more or less MicroSoft BASIC compatible — just sort of "scaled down" to a size and power that makes it appropriate for running on a tiny little computer. While PBASIC will run on a standard PC (it was written in Turbo C on a 286 clone), it was really designed for the Portfolio environment.

So where do you buy this paragon? Well, actually that's another nice thing about PBASIC. It's free. Or more accurately, PBASIC is in the public domain.

The current version can be downloaded from either the Atari Portfolio forum on GENie, or its opposite number on CompuServe, and doubtless, by now, it's spread nationwide on IBM and Atari-oriented BBS's as well.

Downloading PBASIC

Unfortunately, there's little point in trying to download PBASIC directly onto your Portfolio. Gleason has assumed (with some reason) that anybody who wants to program their Portfolio probably has access to a regular PC or clone, and has arranged the package with this in mind. Those who don't own or have access to a PC with modem can acquire a copy of the program on Portfolio RAM card by writing to Gleason at the address below.

For those who do, the procedure is simple. PBASIC is saved in compressed, downloadable form on CIS and GENie, in a file called PBAS1.ZIP. The .ZIP extender indicates that the files making up the PBASIC package have been archived together using a version of the ZIP data-compression utility, also obtainable on CIS and GENie through the IBM forums. If you don't already have a copy of ZIP, download that first, then download PBASIC.

Using PBASIC

PBASIC is a batch-oriented interpreter, rather than an immediate-mode interpreter. For those with experience with BASIC, that means that PBASIC doesn't support its own, interactive editor from within which you can execute single-line commands like "PRINT X."

Instead, PBASIC works with the Portfolio's built-in editor to create program files in ASCII format. These files can then be executed either from within the editor, or direct from the DOS prompt using a command such as PBASIC SAMPLE.BAS, where SAMPLE.BAS is the name of a program file. While not quite as convenient as having access to an interpreter/editor, PBASIC's method preserves most of the utility of BASIC as a general-purpose programming language, particularly as regards making possible the execution of BASIC programs in-line with other DOS functions, in batch files. In addition to the name of a

Figure 2.
PBASIC Functions.

```
ABS
ATN
COS
CSRLIN
EXP
FIX
FRE
INP
LOG
LPOS
PEEK
POINT
POS
RAND
RND
SGN
SIN
SQR
TAN
TIMER
```

program for execution, PBASIC can be called with the -T switch, which turns program trace on.

PBASIC's method of exploiting the Portfolio's built-in editor also reduces the size of the PBASIC interpreter to a very manageable 30K or so, important when a standard Portfolio has only 128K of on-board RAM. If you execute PBASIC without any command-line parameters, it will automatically call the editor and load the last program file you were working on. You can make changes to this file, save it and exit the editor; then execute the file by typing a command line instruction.

Alternatively, Gleason has developed a very neat "Terminate-Stay-Resident" utility called ALTR.COM, included with the PBASIC download package, that makes it possible to execute the current text file from within the editor by pressing ALT-R (for

Run). When the program is finished, the program waits for a keypress, then returns you to the editor. Regardless of whether ALTR.COM is installed, if an error occurs during program execution, PBASIC will place you in the editor and point to the spot that caused the error if the last file you edited was the one you executed.

PBASIC Features

As noted above, PBASIC accepts BASIC program files in standard ASCII form. These files can thus be edited either using the Portfolio's built-in editor, or another editor of your choice. The PBASIC dialect is essentially a subset of MicroSoft BASIC — to the extent that PBASIC programs can be developed using MicroSoft BASIC or QuickBASIC on a PC, saved in ASCII form, then downloaded to the Portfolio for execution. PBASIC will also, in fact, run on a PC in more or less the same manner as it will on a Portfolio; though neither the PC nor MicroSoft BASIC will support the Portfolio-specific aspects of the language.

PBASIC recognizes keywords in upper or

lower case, and does not require line numbers except for flow-of-control changes (GOTOs and GOSUBs). Only 100 line numbers per program are allowed, which will further discourage the writing of "spaghetti code." Multiple statements, separated by colons (:) in the normal way, can be included on a single program line.

PBASIC supports only single-precision mathematics in floating-point format. Interestingly, PBASIC's math functions will accept constants in hexadecimal and octal format, in addition to the normal decimal format. A full set of math operators is supported, including modulo (%) and exponentiation (^). A range of mathematics and geometry functions such as SIN, COS, TAN, ATN, etc., are also supported.

Certain limitations of version 2.1 are also apparent. Currently, PBASIC will not support strings except as literals in PRINT statements; nor does it support multi-dimensional arrays. Moreover, even single-dimension numeric array elements cannot be used with total freedom, as they can in more capacious BASIC dialects (for example, as limit variables in FOR/NEXT loops). FOR/NEXT loops and GOSUB calls can only be nested 10 deep, further evidence of the lack of stack size that results from designing a BASIC interpreter to function in limited RAM space. Finally, version 2.1 of PBASIC does not support disk files.

On the plus side, PBASIC excels at screen-handling: it's capable of dealing effectively with all three of the Portfolio's display modes. And its error-reporting and trace functions, while limited, function well and effectively.

Figure 3. PBASIC's Portfolio-only statements

ALARM (beeps speaker once per second until user presses key)
 BEEP (beeps speaker once)
 BOX (draws a box on the screen)
 CLICK (makes the "key click" sound)
 DISPLAY (sets Portfolio screen to normal, static, or tracked)
 ERRWIN (draws an error window on the screen)
 GETDISPLAY (returns current display mode)
 OFF (turns Portfolio off until user presses key)
 PORT (returns 1 if running on Portfolio)
 REFRESH (updates LCD from video RAM)
 ROMVER (returns Portfolio ROM revision number)
 SOUND (activates tone generator)
 STATUS (disables status line)
 TICK (sets clock tick speed)
 VCSRLIN (returns current virtual cursor line)
 VLOCATE (moves virtual cursor to position)
 VMOVE (moves screen window over virtual screen)
 VPOS (returns current virtual cursor column)

Docs and Etc.

Though freeware, PBASIC has been professionally and completely documented; the file PBASIC.TXT, included with the download package, details all of PBASIC's commands and functions, noting particularly where differences exist between PBASIC and more standard dialects. For this reason, even those who are waiting on tenterhooks for Atari's own Portfolio BASIC may find PBASIC very useful in the interim. The program is reasonably reliable, complete, and professionally-executed — and at the present time, stands as the best alternative for casual programming on the Portfolio system.

As this issue of Explorer was going to press, BJ Gleason informed us that he had finished beta-testing version 3.0 of PBASIC, a significant revision that includes full string-handling (except for the INKEY\$ function), multi-dimensional arrays, and other upgrades. Version 3.0 should currently be available on the major information services. Alternatively, Gleason has kindly offered to make copies of the current version of PBASIC on Portfolio RAM card for interested readers of Explorer. To order PBASIC 3.0 on RAM card, send a RAM card of 64K or greater size to Gleason at the address shown below, and include a self-addressed stamped mailer for return posting.

BJ Gleason
 The American University
 CSIS
 4400 Massachusetts Ave., N.W.
 Washington, D.C. 20016

Los Angeles
hosts an
Atari-only
music
extravaganza!

MidiFest '90

For anyone interested in computers and music, the Beverly Garland Hotel was the place to be on August 9th in Southern California. Besides having an opportunity to see Mick Fleetwood, Paul Haslinger, and Jimmy Hotz demonstrate the Hotz MIDI Translator, audience members were treated to expert discussions of leading Atari sequencing and sound design applications. The free event was co-sponsored by Atari and American Music, a store with over 5,000 feet of showrooms and a staff dedicated to state-of-the-art computer music systems.

The show opened with a musical performance by Jake Flaeder, a former member of Maze. His smooth blend of rock and fusion sounded quite full despite it being a solo outing. Jake sequenced all his backing tracks using Passport Designs' Mastertracks Pro. Greg Whelchel and Mark Ritter followed with a demonstration of their compositional methods using sequencers and other MIDI devices. The SMPTE-Track II from Hybrid Arts is the sequencer of choice for this keyboard duo who works with the Pointer Sisters. Mikail Graham from C-Lab Software then covered some of the basics of using the powerful Notator package.

There was also plenty of action for those of us interested in sound design and film scoring. Ted



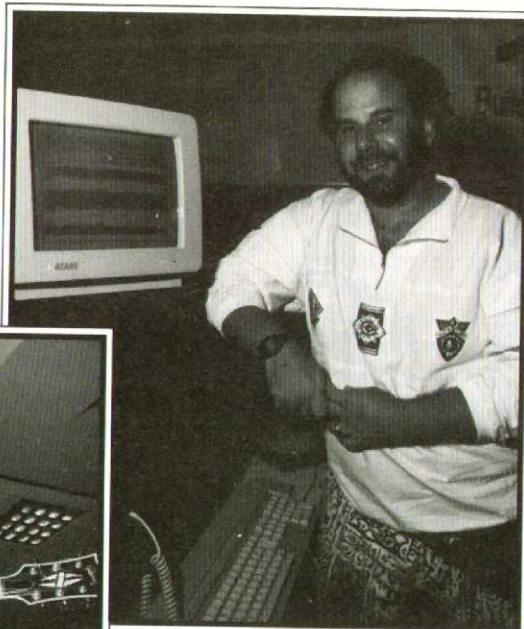
Inventor Jimmy Hotz explains his MIDI Translator system.



Paul Haslinger of Tangerine Dream recreated some of the music from the film "Miracle Mile."

Photographs by Jim Whitlow

By Mihai Manoliu



Scott Gershin of Soundeluxe.

evening when he recreated some of the musical cues from the film "Miracle Mile." He scored the intense music by using Cubase from Steinberg/Jones to sequence and lock to SMPTE.

Paul was then joined on stage by Mick Fleetwood and Jimmy Hotz; all three had comments to

make about a brilliant new musical instrument, the Hotz MIDI Translator. This visionary controller amazed many audience members who had never seen it — throughout the evening a large crowd was to be found near the area

where inventor Jimmy Hotz was demonstrating the system. Both Mick and Paul emphasized the revolutionary nature of the Translator and its incredible ease of playing — an inspiring end to an evening of technology on the leading edge of music.

The casual feel of MidiFest '90 provided a rare opportunity for audience members and guests to explore complex systems in a relaxed environment.

Many felt that it should become an annual event, a forum that could perhaps be held on both coasts on alternate years. ■



Jake Flaeder demonstrates the use of sequencing for live performances.

Bahaos from Digidesign discussed the world of direct to disk digital audio in his explanation of Sound Tools software. Scott Gershin and Wyle Stateman of Soundeluxe showed a clip of an especially complex scene from the Oscar-winning "Born on the Fourth of July." Afterwards, Scott demonstrated how they designed sound for it using the ADAP II system from Hybrid Arts. The ADAP II is a turnkey package divided into three separate programs: a Digital Recording Environment, an EDIT program, and a SMPTE-driven event list section. This powerful system can store up to 50 minutes of stereo recording time at 44.1 kHz.

Paul Haslinger of Tangerine Dream provided the most exciting moments of the



Mick Fleetwood plays keyboards.

As nerds everywhere will tell you, C is the language of choice for tweaking high performance out of the Atari ST. Indeed, the ST was documented with C in mind, and some knowledge of the language is required to learn about the system itself at any degree of depth. Unfortunately, except for a few obscure beginner books, there's been no coherent, well-paced, general tutorial that's wrapped C programming, AES, VDI, TOS, XBIOS, and the other components of the ST system together in one, neat package.

Instead, novice programmers have been forced to learn about C on the ST by assembling materials culled from widely-disparate sources: system docs, standard textbooks, and strange, paperbound volumes, ill-translated from the original German.

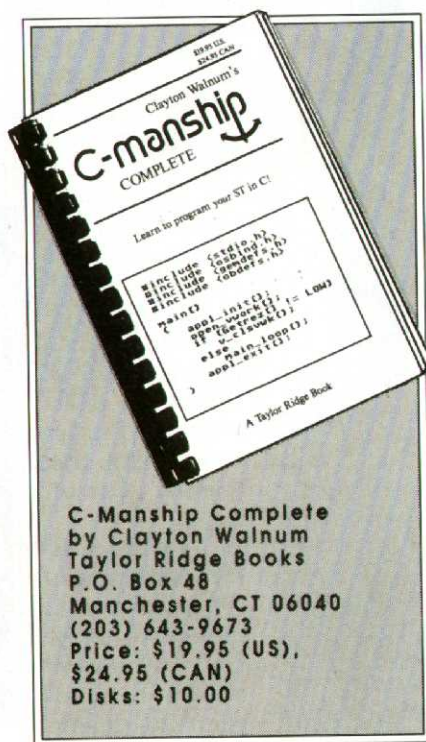
Over the years, magazine tutorials have helped fill in some of the blanks. Tim Oren's *Professional GEM*, published over some thirteen issues of STart magazine and later collected in electronic form on CompuServe, formed the basis of many programmers' knowledge of GEM from the C programmer's perspective, and even my own occasional *C Life* articles in Explorer may have helped some programmers achieve illumination, here and there. But for my money, no magazine series — indeed no ST

tutorial available anywhere — ever did as good a job of grounding the reader in both C and ST lore as did Clayton Walnum's *C-Manship* series in the late, lamented A.N.A.L.O.G. and ST-Log magazines.

Walnum began writing *C-Manship* as an associate technical editor, in 1986. He concluded the

C-ing the Light

By John Jainschigg



series as ST-Log's editor-in-chief, in the magazine's December, 1989 issue. In total, some 31 installments of *C-Manship* were published, forming a course that takes the reader from "Hello, world!" through constructing a full-blown commercial GEM application in C. This monumental achievement (the disks alone contain several hundred K of source code) has now been collected, edited and revised by Walnum himself, and reprinted in a compact, 400-page volume by Taylor Ridge Press.

Those of us who eagerly awaited each issue of A.N.A.L.O.G. will appreciate having all of Walnum's articles in unified form; while those new to Walnum's work will have the advantage of discovering him at whatever pace they choose. As those who read the original articles will remember, Walnum's style is casual and fresh — not at all like that of most writers in this genre.

Although his mastery of the subject matter is always perfect, Walnum never forgets how hard such mastery was to gain, and writes always with a pleasant humility and sympathy for the beginner.

Moreover, unlike standard texts such as Kernighan and Ritchie's *The C Programming Language*, which treat the grammar of C in the abstract, *C-Manship* respects the reality

that people learn to program best by application, and are motivated best by quick results. Topics are covered by brief discussions at the mechanical level, interspersed with practical examples. Aspects of C are introduced naturally, as they relate to real programs under construction. Philosophical issues of programming style and

structure are discussed in a relaxed and realistic manner, and, refreshingly, the writer has no personal axe to grind in these normally-highly-political areas.

As a long-time Atari 8-bit programmer, Walnum knows the routes, both formal and informal, by which Atarians arrive at C on the ST. His discussions of C and ST technology lead back into the reader's prior knowledge of 8-bit systems, Basic, Action!, and other popular Atari programming platforms. But having established the necessary connections, he gets right down to the job at hand: programming the ST.

For this reason, even dedicated and experienced ST C programmers will find small gems of great value in this book. In particular, the discussion of methods for binding resource data-structures into desk-accessory code stands as the most effective and congenial discussion of this complex topic.


Though written in Megamax, and later in Laser

C, most of the material in *C-Manship* is sufficiently generic to port fairly readily to other C-language systems. All C source examples in the book are presented in ready-to-type-in-and-compile form, and in the one instance where an external resource file must be created out of binary data, using a Basic program, a copy of A.N.A.L.O.G.'s ST-Check type-checker, written in Basic, is included to assist the enterprising reader in typing correctly. Nevertheless, the serious reader of *C-Manship* will doubtless agree that the optional source code diskettes are a real convenience, and at \$10.00, a bargain.

If you really want to learn how to program the ST, *C-Manship* must find a place on your shelf. Within its genre, it has all the earmarks of a classic text. Moreover, as the surviving remnant of one of the most influential and long-lived of Atari publications, it encapsulates the history of an era. ■

Clayton Walnum's

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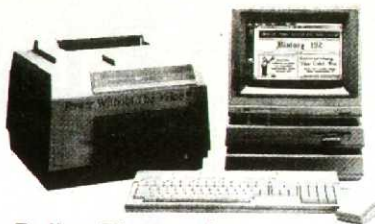
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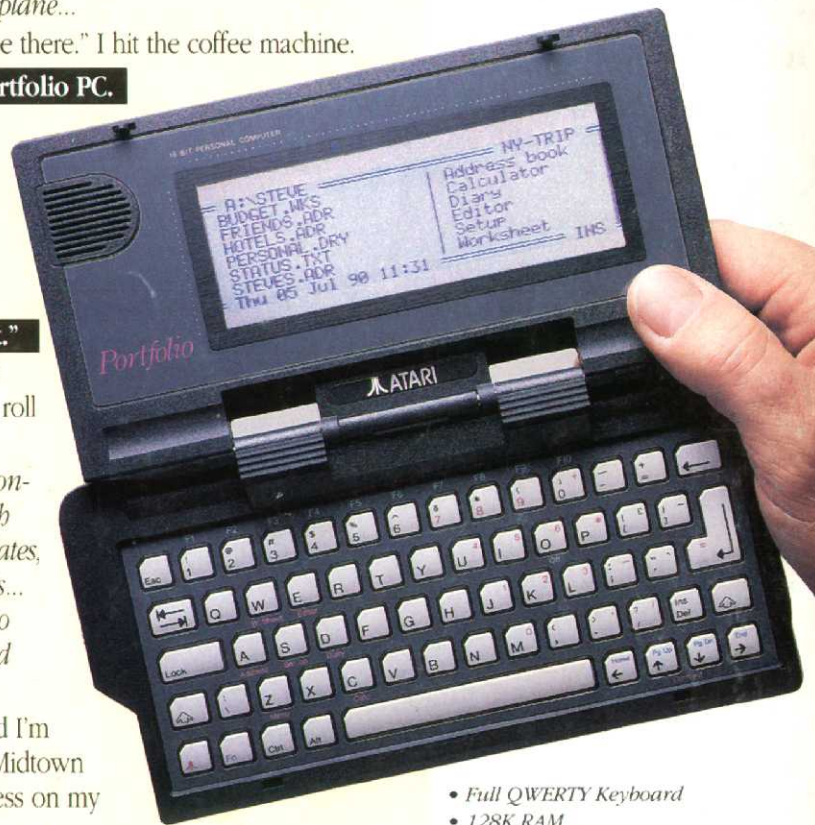
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