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Features and Columns

3	The Editor's Page	Robert C. Lock & Tom R. Halfhill
7	ST News & Notes	Arlan R. Levitan & the Editors
15	Readers' Feedback	The Editors & the Readers
55	Programming in C: Choosing a Compiler	Sheldon Leemon
62	New Products	The Editors

The Disk

22	MollyScope: A Graphics Demo	Philip I. Nelson & Tim Victor
24	File Lister	Richard Smereka
28	Desktop Clock	David Plotkin
32	Mouse Editor	Guy Davis
38	Snapshot NEO/DEGAS	Philip I. Nelson
45	Extended Formatter	Richard Smereka
50	Picture Puzzler	Douglas N. Wheeler
60	Atari Art: Finnish	Steve Rehrauer
64	How to Use the Disk	The Editors

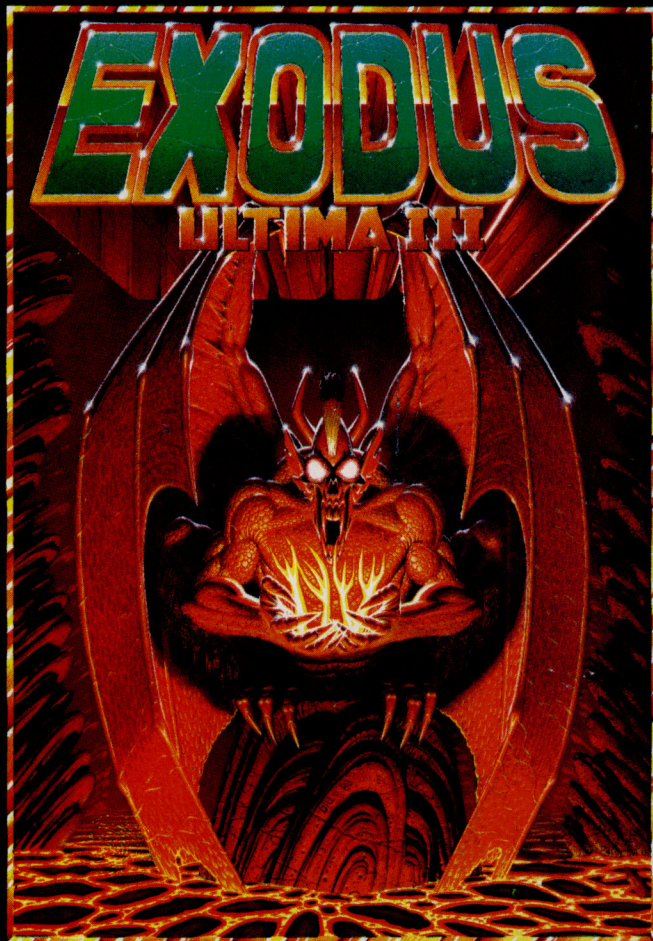


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Reviews
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Calendar and Cornerman	Thomas M. Castle
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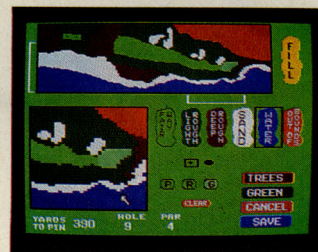


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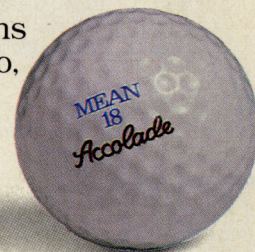
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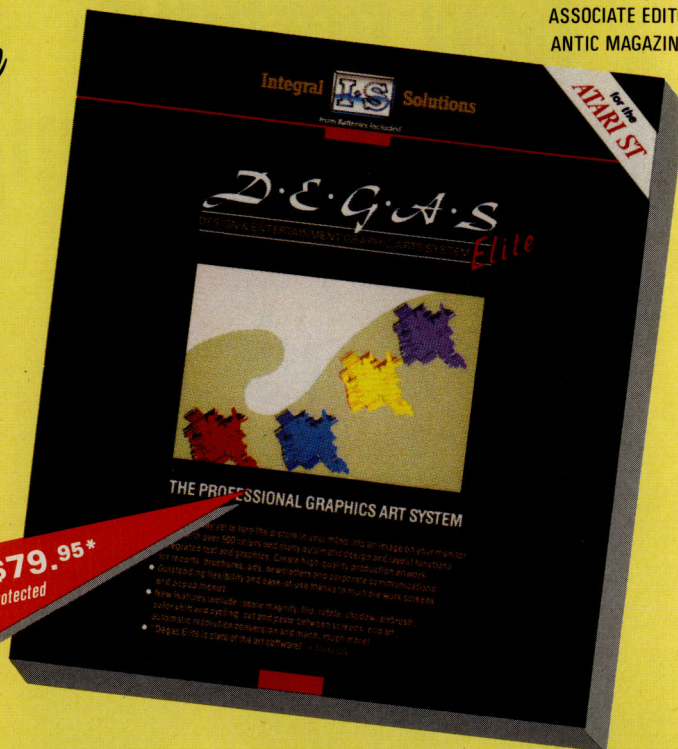
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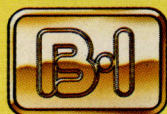
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The Editor's View

\$10,000.00 Programming Contest Winners

Given the amount of time you had to work on entries for our ST programming contest, and given our expectations that we would receive some truly great submissions, you'll be pleased to know that we have been overwhelmed by some rather exceptional entries. You, the readers, will ultimately be the real winners, because you can look forward to issues and issues of them in the coming months.

Our First Prize winner is Mike Duppong of Pocatello, Idaho. At 19, Mike is the youngest of the major prize winners, and we're sure he'll put his \$5,000.00 to good use. He's a second-year student at Idaho State University majoring in electronic technology. Mike has been programming since the seventh grade; he used to work with his brother's Atari 800. His winning entry, *Laser Chess*TM, is an exceptionally challenging strategy game as well as an outstanding program. For creativity in both concept and programming, Mike was selected the overall grand prize winner.

Robert Birmingham of Miami, Florida won the Second Prize of \$2,500.00 with his excellent entry, *Art-ST*TM. This sophisticated drawing application is a programming masterpiece. Birmingham is a free-lance programmer whose hobbies include astronomy and cycling.

Karl Schweitzer of Roslindale, Massachusetts won the \$1,000.00 Third Prize for an extremely useful RAM disk utility that is almost indestructible. Schweitzer is the technical support manager for Stop & Shop Companies, a retail chain in New England.

We also awarded three Honorable Mentions at \$500.00 each: to Richard Smereka of Toronto, Ontario, for *ST-Shell*TM, a command-line DOS interface with batch file capabilities, published in our December 1986 issue; Mike Kerekes of Austin, Texas, for *3D-Edit*TM, an impressive computer-aided design program; and Douglas N. Wheeler of Travis Air Force Base, California, for *Picture Puzzler*TM, which turns any *NEOchrome*- or *DEGAS*-format picture into a jigsaw puzzle which can be reassembled with the mouse. *Picture Puzzler*TM appears in this issue.

Beginning next issue, we'll start publishing the remaining winners as well as other contest entries. Thank you all for your enthusiasm, support, and interest. In the meantime, though the contest is over, keep those article submissions coming.

—Robert C. Lock, Editor in Chief

Atari Goes Public

Last September, the Atari Corporation announced it was going public with an offering of 4.5 million shares of common stock at an anticipated price of \$11.50 to \$13.50 per share. As a signal of Atari's comeback, it was a significant announcement—but even more interesting was what it revealed about the new Atari's past, present, and future.

For one thing, it was further evidence of Atari's dramatic corporate turnaround and the growing confidence in Atari as a player in the personal computer industry.

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But even if you don't follow the stock market—much less invest in it—there are plenty of reasons for paying attention to this development. When a privately held company goes public, all kinds of information that used to be secret suddenly becomes a matter of public record.

One requirement of a company making the transition from private to public is that it must file a prospectus with the U.S. Securities and Exchange Commission. This document basically provides a snapshot of the company's current status: its financial history, its business goals, and its outlook for the future. Atari's prospectus makes fascinating reading, both for the information it reveals and for the frankness with which it evaluates Atari's position in the microcomputer marketplace.

In a section entitled "Risk Factors," for instance, the prospectus describes the unpredictable nature of the industry; Atari's extremely short history of profitability (only two quarters when the document was filed); stiff competition from such companies as IBM, Apple, Commodore, Tandy, and Compaq, which have well-established product lines; Atari's current incompatibility with MS-DOS—the leading operating system for business applications—and the resulting software gap; the onslaught of low-priced MS-DOS clones; the need for constant technological innovation to keep pace with the industry; the intense competition for distribution channels; and Atari's dependence on a single overseas manufacturing plant, which subjects the company to possible economic or political disruptions.

Of course, most of these risk factors were widely known before. Not so well known were the specifics of Atari's financial history since Commodore founder Jack Tramiel acquired the failing company from Warner Communications in mid-1984.

Through December 1985, the new Atari lost a total of \$77 million. During the first six months of 1986—the most recent period for which data was available when the prospectus was filed—Atari showed a net income of

\$12.4 million. This was quite a turnaround from the net loss of \$26.6 million during the same period in 1985. As the prospectus admits, however, this does not necessarily indicate how Atari will fare in the future.

One of Atari's stated goals for going public is to repay debts, including \$36.1 million still owed to Warner. Another goal is to raise working capital. Research and development expenditures have been steadily increasing. In one section, the prospectus says, "Within the next 12 months, the company intends to introduce additional microcomputer enhancements using the current ST operating system and compatible with current ST applications software, including products offering additional internal memory capacity and substantially enhanced color resolution and spectrum capacity; a dedicated graphics coprocessor that will generate graphics at up to five times current speeds; and a Unix-based multiuser, multitasking microcomputer system."

Another part of the prospectus which discusses the upward compatibility of GEM software mentions that "If the company were to introduce a monitor with 1280 × 960-unit resolution, the same word processing program would operate on the improved system." Since it's no secret that Atari is also working on a low-cost laser printer, it appears that Tramiel is serious when he declares that Atari is aggressively pursuing the desktop publishing market created by Apple.

Here are some other items of interest from Atari's prospectus:

- Although Atari was claiming last June that it had sold more than 200,000 STs worldwide, and was expecting to sell 500,000 by the end of the year, the actual worldwide sales as of September 15, 1986 were more conservatively pegged at "over 150,000."

- The new Atari inherited from the old Atari a vast inventory of leftover products valued at more than \$135 million—mainly videogame machines, eight-bit computer hardware, software, and other odds and ends. You know what's happened to this inventory

if you've been watching the mail-order ads for the last year or so. The closeout sales of 800XL computers, VCS 2600s, and other paraphernalia have brought Atari more than \$200 million and have played a major role in keeping the company afloat while it launched the XE and ST lines. Although the leftovers once accounted for as much as 97 percent of the new Atari's sales, they now make up less than 9 percent.

- All Atari products—except for such devices as disk drives and monitors that are bought from other sources and relabeled—are manufactured at a single 200,000-square-foot plant in Tam-Shui, Taiwan.

- Atari has about 1180 employees, including around 800 at the Taiwan plant. About 80 Atari employees are involved in engineering and product development, mostly in the U.S.

- Four Tramiels help run Atari. Jack Tramiel (age 58) is chairman of the board, chief executive officer, and director. His sons are Sam (36), president; Leonard (31), vice president for software development; and Garry (26), secretary, assistant treasurer, and vice president for administration.

- The most highly paid Atari executive in 1985 was Sam Tramiel, who received \$162,000 in cash compensation. None of the other Tramiels received more than \$89,000 in cash compensation, but Jack Tramiel owns 12.7 million shares of Atari, Sam owns more than 560,000 shares, and Garry owns more than 750,000 shares.

- Since May 1984, Jack Tramiel has loaned a total of \$12.3 million to Atari out of his own pocket. All of the loans were repaid with 12 percent interest by June 30, 1986. He also helped bankroll the development of the ST computers with \$500,000 in 1984, and sold his interest in the technology back to the company for \$575,000 in 1986. In addition, he bought more than \$3 million in promissory notes which Atari had issued to the Tandon Corporation for the purchase of disk drives. About \$2.7 million had been repaid by September 1986.

—Tom R. Halfhill, Editor

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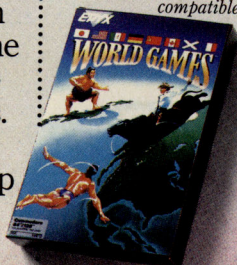
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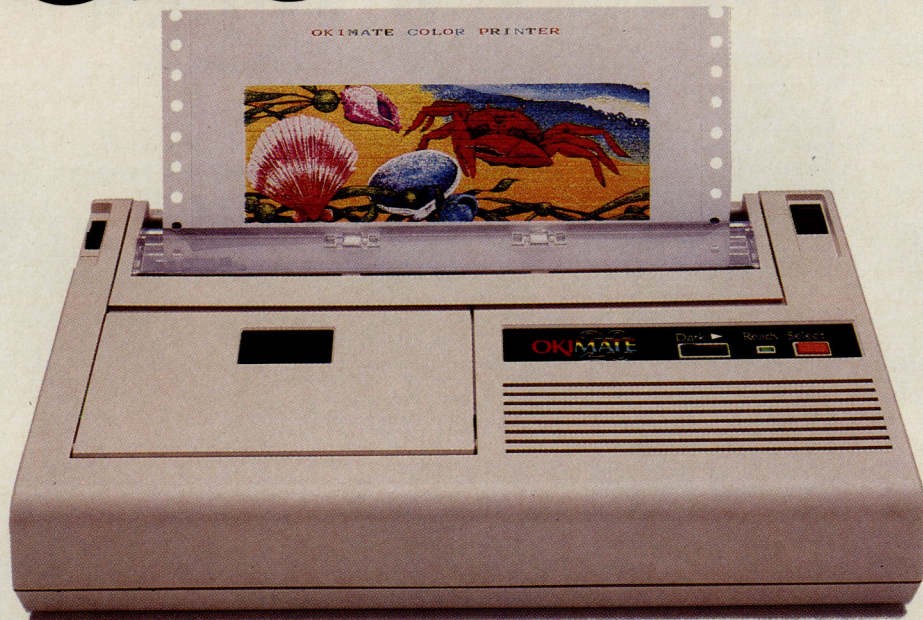


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The Atari Expo Big Mac Attack

Thousands of Atari enthusiasts crowded into the San Jose Convention Center last fall to see the latest Atari hardware and software at the 1986 Northern California Atari Expo. The continuing success of the Atari ST was evidenced by the large number of new products and by the increasing sophistication and power of programs and peripherals.

But the biggest noise at the show, paradoxically, had more to do with Apple Macintosh software. The Expo marked the first public appearance of the Magic Sack, a Macintosh emulator for the ST formerly known as the MacCartridge or M-Cartridge (see "ST News & Notes," *COMPUTE!'s Atari ST Disk & Magazine*, October 1986). A plug-in cartridge engineered by David Small, the Magic Sack lets you run Macintosh software on an otherwise unmodified Atari ST. When you plug a set of Macintosh operating system ROMs into the Magic Sack cartridge, then stick the Magic Sack into the ST's cartridge port, you get what appears to be a fully functional Macintosh—and an improved one at that. The Magic Sack runs Macintosh software 20 percent faster than a Macintosh, and the ST's larger monochrome screen gives Macintosh applications over 46 percent more screen area.

Significantly, the Macintosh screen is not merely expanded to fit the larger monitor; you actually get additional resolution, an increase from the Mac's 512 × 342

pixels to the ST's 640 × 400. Many Macintosh programs can increase their window size to take advantage of this additional elbow room, just as they do when running on the larger screen of Apple's Lisa (later renamed the Macintosh XL). In addition, the Magic Sack can use all of the memory in an ST—up to four megabytes, compared to the 512K normally found in a Fat Mac.

The price for all this is \$129, or \$149 for the Magic Sack Plus, which includes an onboard clock that also works in ST mode.

A Rose By Any Other Name?

For several months after Small designed the cartridge, its release looked doubtful because of potential copyright infringement problems with Apple. It was simply too close to the real thing at a significantly lower cost. Since the cartridge is useless until Macintosh ROM chips are inserted, Apple promptly informed its dealers that Mac ROMs were for repair purposes only—not for sale to ST owners or anyone else. For a while it looked like the cartridge might be left out in the cold.

However, Apple realized that people could make illegal copies of the Macintosh ROMs by using EPROMs (Erasable/Programmable Read-Only Memories). So Apple and Small negotiated a truce. One condition of the truce is that Small is not allowed to publicly talk about it. However, the product changed in three ways after Apple and Small made peace. First, the name was changed from MacCartridge or M-Cartridge to Magic Sack. Second, the cartridge was modified so it would no longer

work with EPROMs—only ROMs. Third, and most important, the cartridge is being marketed as a *Macintosh* enhancement, not an ST enhancement.

The official line from Data Pacific—David Small's Denver-based company—is that Macintosh owners can now buy a Magic Sack cartridge and an Atari ST, transfer the ROMs from their Macintosh into the cartridge, and enjoy greater speed and a larger screen. Meanwhile, presumably, the ROMless shell of the Mac sits useless, deprived of its brain.

Despite the official line, many ST owners are obviously very interested in buying the Magic Sack to run Macintosh programs, but there's the problem of getting those ROMs. At the Atari Expo, Small sold about 200 Magic Sacks in two days for a special show price of \$100 each. Since the Atari Expo was sparsely attended by Macintosh fans, it's pretty safe to assume that most of those customers were ST owners. So where did they get their ROMs?

Right next door. Set up next to the Magic Sack exhibit was a booth sponsored by a computer store that was selling (among other things) Macintosh ROMs for \$30 a set. So for about \$130, ST owners were turning their STs into high-powered Macintoshes.

Nothing's Perfect

If all this sounds too good to be true, keep in mind that there are still some drawbacks to the Magic Sack. Perhaps the biggest problem is loading Macintosh software into a Magic Sack-equipped ST. Even if you can get your Mac ROMs, the ST can't read Macintosh disks.

Both computers use 3½-inch microfloppies, but the Macintosh drive motor runs at varying speeds so it can slow down when writing to the more tightly packed inner tracks of the disk. The ST drive runs at a constant speed, and thus cannot access these tracks.

The Magic Sack cartridge can format an ST disk to make it compatible with the track and sector format of the Macintosh, but the data is still written at a constant speed. As a result, you have three formats to deal with: the unreadable Macintosh disk, the Magic Sack Macintosh-like format, and the ST's own format, which is not readable by the Magic Sack (and vice versa).

The best solution may be to use the special Magic Sack disk drive, which plugs into the ST and can read standard Macintosh disks (although some copy-protection techniques might cause trouble). However, this drive is not expected to be ready until early 1987. Also, the first version will not be able to read double-sided Macintosh disks.

Lacking the Magic Sack drive, you have to transfer Macintosh programs to the ST via a special cable that comes with the cartridge. Even with this cable, however, you can't transfer copy-protected programs, so this limits your choice in software.

Another drawback is that the Magic Sack does not work with the new 128K Macintosh Plus operating system ROMs. Also, early customers have been reporting frequent crashes when using the Magic Sack.

Nevertheless, most agree that the Magic Sack is an intriguing, even tantalizing product.

The Blitter Is Coming

Another attention-getter at the Northern California Atari Expo was Atari's own exhibit, which dominated the center of the show floor. Although there was no sign of the two- and four-megabyte STs shown at a computer show in London (see "New STs Debut In

Europe" elsewhere in this section), there were a pair of STs equipped with blitter chips. (The blitter is a coprocessor that significantly speeds up the ST's screen display.) One modified ST was running a demo of five flapping eagles winging across a seashore scene. An unmodified ST can animate only one eagle as smoothly. The other blitter-enhanced ST bounced colored balls quickly around the screen, mimicking a demo for the Commodore Amiga.

Indeed, the addition of the blitter chip gives the ST the high-speed image animation that is the Amiga's hallmark. A blitter (short for *bit-block transferrer*) is a chip specialized for high-speed memory moves, relieving the main microprocessor of that burden. Since all screen images (including text displays) are stored as numbers in memory, a high-speed memory mover yields high-speed graphics and text scrolling.

The ST's operating system has been enhanced to take advantage of the blitter at a basic level known as the *line A trap*. This means that all of the higher-level operating system functions which rely on these line A traps will automatically work with the blitter, with no modification required for application software. For one

thing, GEM is far smoother. Lines, circles, and icons are drawn much faster. Windows move and resize at a zippier rate.

To confirm that application software should be compatible with the blitter, we tried running the "AstroPanic!" action game published in the October 1986 issue of *COMPUTE!'s Atari ST Disk & Magazine*. It ran noticeably more effectively, with less flicker. It didn't run much faster, though, since the speed of this particular game is more constrained by the fact that it was written in a compiled language (C) instead of machine language. Programs which write directly to screen memory will not take advantage of the blitter, so their speed will be unaffected. On the other hand, some programs may run *too* fast.

At this writing, it is expected that the blitter will be included in the new STs and will be offered as a dealer-installed upgrade for existing STs by late 1986/early 1987. The upgrade is a small piggyback board containing the blitter chip and a few ROMs. This board is soldered to the pins of the 68000 microprocessor on the ST motherboard. A new set of operating system ROMs is also required.

—Contributed by Charles Brannon

Games People Play

Watch for two exciting new games to be out soon for the ST. Both of them create game environments unlike anything else currently available for Atari computers.

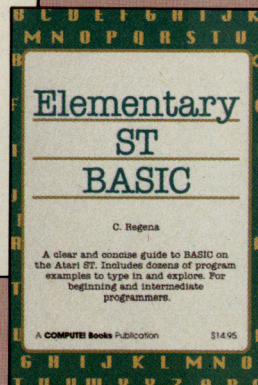
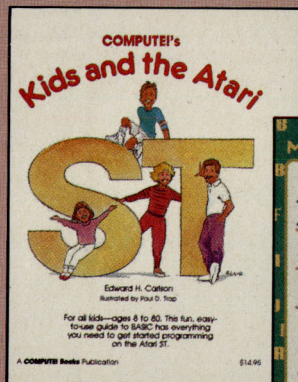
XANth, the folks behind the Fuji Boink demo, were showing an ST-based version of *MazeWars* at a show in San Francisco last fall. This multiplayer 3-D maze game can tie up to 15 STs together via the MIDI ports and allow participants to sneak up on and zap one another. If the ST version of *MazeWars* is marketed like the Macintosh version, you can expect a public domain *MazeWars* plus a full-featured version that will be sold commercially.

Meanwhile, Michtron is releasing an ST version of the animated arcade classic *Dragon's Lair*. This is the real thing—not a translation of the coin-op version. To play *Dragon's Lair* on the ST, you need a *Dragon's Lair* videodisc and a laserdisc player (Michtron recommends the Pioneer LD-700). The *Dragon's Lair* disc is available from video stores or from Michtron for \$29.95. Also required is Michtron's *Dragon's Lair* software (\$49.95) and an interface cable (\$29.95).

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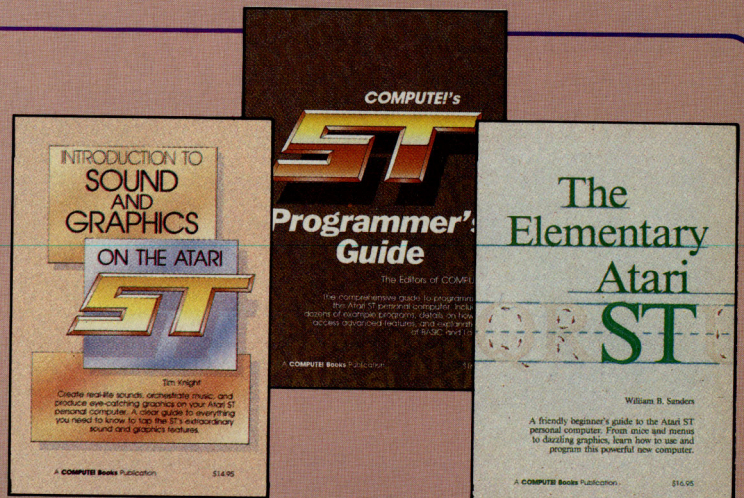
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"0300 Hours. Two hours until dawn. Radar picks up convoy, escorted by two destroyers. We believe that one of the enemy's valuable oil tankers is part of convoy formation."



"0400 Hours. Lookouts on the bridge. Target identification party reports one tanker, 6,000 tons, troopship of 10,250 tons, with two *Kaibokan*-type escorts. Moving into attack position."



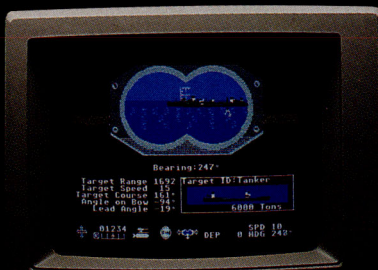
Atari 520ST screens shown



"0500 Hours. Sound General Quarters! Battle stations manned. Preparing for torpedo run. Gauge Panel OK. Periscope OK. Charts and Attack Plot Board OK. All mechanical systems OK."



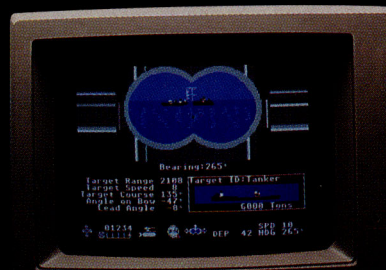
"0525 Hours. Torpedo rooms report full tubes forward and aft. Battery at full charge for silent running. We hope water temperature will provide thermal barrier to confuse enemy sonar."



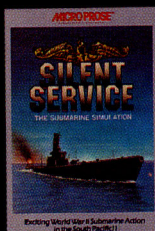
"0600 Hours. We are at final attack position. Convoy moving at 10 knots. Target distance decreasing rapidly... Crash Dive! Escorts have spotted us and are turning to attack! Rig to run silent."



"0700 Hours. Depth charged for one hour. Some minor damage, but repair parties at work. Destroyer propeller noises receding. We'll come to periscope depth for our return punch"



"0715 Hours. Torpedo tubes 1, 2, 3 fired. Two destroyers hit and sinking. One of the enemy's last tankers coming into 'scope view - an ideal target position. On my mark... Fire Tube 4! Fire 5!"



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New STs Debut In Europe

Atari introduced two new ST models in September at the Personal Computer World Show in London, England. The 2080ST and 4160ST, with two and four megabytes of RAM, respectively, were displayed but not functioning. Sources report that the motherboards of the new machines do indeed have sockets for the blitter chip, but may not ship with blitters installed. Instead, the blitter will likely be an option priced at about \$130-\$150 for some time to come. Although no prices for the computers themselves were announced, insiders peg the 4160ST at about 1300 pounds (\$1820) in the United Kingdom. Final U.S. price tags will depend a lot on the fluctuating dollar/yen exchange rates and RAM chip prices.

Overseas sources also report that the price of the 1040ST in Germany has been slashed to spur sales. A 1040ST now lists at DM 2498 (\$1250), down almost 25 percent from its previous price tag of DM 3298 (\$1650). That puts the 1040ST at about \$200 less than a 520ST (DM 2898) in Germany. It seems that Europeans have been shying away from the 1040ST in favor of the 520ST because they prefer separate power supplies, disk drives, and consoles. U.S. buyers, on the other hand, tend to prefer consolidated systems, which is one reason why 1040STs remain in relatively short supply in the U.S. while 520STs abound.

Less Is More

According to the classic biblical story, Noah managed to fit two of every kind of animal aboard his ark. Now there's a program called ARC for the ST that isn't quite as astonishing, but is pretty impressive just the same.

ARC (short for ARCHIVE) is a utility that can crunch and squeeze a bunch of long files into a single, much shorter file. ARC is a mainstay of telecomputing buffs in the MS-DOS and CP/M worlds because it drastically reduces the time required for downloading lengthy files. Harvey Johnson, of Palm Bay, Florida, spent two months creating an ST version of ARC, and it appears to work like a miracle.

Distributing programs like the ST-CP/M emulator would be much less easy without ARC. The emulator software consists of 29 files totaling 212,122 bytes in size. When crunched with ARC, they become a single file of only 126,336 bytes. Not only is there then half as much data to down-

load, but you also save time because there's only one file to request. Once you've downloaded a compressed file, ARC lets you reverse the compaction and consolidation process, expanding and separating the files into their original form.

Better yet, ARCCed files are completely transportable between different types of computers. For example, someone could use the Amiga version of ARC to pack several *Deluxe Paint* pictures into a single file, transfer the file to an ST via modem or null modem cable, unpack the file with the ST version of ARC, and then load the pictures with a program such as *DEGAS Elite* that supports the Amiga's IFF screen format. Or vice versa.

As the authors of other versions of ARC have done, Johnson has released his ST version of ARC as shareware. For more information, write to Johnson at 2398 Oakland Street NE, Palm Bay, FL 32907.

Free CP/M Emulator

Atari has made its CP/M (Control Program/Microcomputers) emulator for the ST available at no charge. Previously it was believed that the emulator would sell for about \$50.

Implemented entirely in software, the emulator allows the ST to run most programs written for version 2.2 of the CP/M operating system. Until it was superseded by PC-DOS/MS-DOS a few years ago, CP/M was the most popular microcomputer operating system for small business and hobby applications. There are thousands of commercial and public domain programs that run under CP/M, including word processors like *Wordstar*, spreadsheets, database managers, small-business accounting programs, programming languages, utilities, and even some simple games. Of course, since the vast majority of CP/M programs are on 5¼-inch floppies, they have to be transferred to the ST via modem or special cables. But by the time you read this, some enterprising user groups will probably have collections of public domain CP/M programs available on 3½-inch disks at nominal cost.

The emulator's performance is roughly equivalent to a Z80-based CP/M system running at two megahertz—a tad on the slow side. The speed difference is less noticeable with programs that rely heavily on disk input/output, however, because they benefit from the ST's higher data transfer rates. The emulator can be downloaded from most electronic bulletin boards and information services and is also available through Atari user groups.

ST



The Ear

*News, rumors, and gossip
heard around the ST community.*

New ST BASIC

As this is written in late October, Atari is **finally ready** to ship the new ST BASIC. Revamped by MetaComCo, the new BASIC is two to three times faster than the old BASIC, has more accurate arithmetic functions, supports BIOS, XBIOS, and GEMDOS system calls, and adds additional graphics commands. MetaComCo is the British company that designed **AmigaDOS and ABasiC**, which was replaced by Microsoft's Amiga BASIC soon after the Amiga was introduced. Not surprisingly, there are similarities between MetaComCo's ST BASIC and ABasiC. The price of the new ST BASIC is expected to be \$19.95 with manual.

GDOS At Last

Ever since the Atari ST first came out, many owners who are familiar with the way the Apple Macintosh works have missed having a variety of character fonts and GEM-supported external device drivers on the ST. The problem has been that the ST's operating system is **missing a critical part**: GDOS, or the Graphics Device Operating System. After months of delays, Atari finally shipped at least three different "release" versions of GDOS to software developers in early October, and they've been showing up in such packages as *DEGAS Elite*. The forthcoming *Microsoft Write* word processor also will rely heavily on GDOS for such things as variable-sized proportional fonts. Since it's **too late** to build GDOS into ROM with the rest of the operating system, it will be **loaded into RAM** by a program in the AUTO folder. Fonts and device drivers may reside elsewhere. At this writing, GDOS was expected to be generally available by December 1986.

No Insecticide For TOS

Contrary to recent rumors, we now hear that **no existing bugs will be fixed** in the revision of TOS (Tramiel Operating System) that supports the new blitter chip. Programmers had hoped that Atari would take the opportunity to correct some longstanding bugs in TOS, but apparently the only changes made were those necessary to insure the proper interaction of existing software with blitter graphics routines.

Where's Amy?

The on-again, off-again Amy sound chip is said to be **on again**. But whether it will ever grace the circuit board of an Atari ST is a matter of conjecture. Amy is a project left over from the days of the old Atari—a **potentially fantastic** sound chip that has been hampered by persistent hardware bugs. Now the latest story is that Atari has either sold the design outright or turned development over to a company called Sound Creations in Madison, Wisconsin. Sound Creation's first pass at making Amy work was **not entirely successful**. A second pass is now in progress, with NCR—the cash register and minicomputer company—in charge of chip fabrication. If Amy's troubles can finally be rectified, the chip will probably surface in a number of synthesizers and other musical devices. Roughly half of those in the know claim that Atari **retained exclusive rights** to Amy for use in personal computers.

Thunder, And Now Lightning

Never let it be said that Batteries Included turns a **deaf ear** to customers. Recently the Toronto-based software publisher received a complaint about *Thunder!*—the realtime spelling checker that instantly beeps when you misspell a word. The customer complained that he **couldn't hear the beep** because of a severe hearing impairment. So *Thunder!* author Mark Skapinker got to work and came up with a modified version of the program that **flashes the screen** when a word isn't recognized. The lightning version of *Thunder!* is now available for free to hearing-impaired purchasers who wish to exchange their regular version.

More Hard Luck

Owners of Atari SH204 hard disk drives who have used the edit partition feature supplied with the utility software may be **courting disaster** if they don't make regular backups on floppies or tape. Versions of the utility software prior to Revision 8 reportedly create partitions which can overlap—which may cause files to jump into the bit bucket. A fix should be available from local dealers by the time you read this.

Holiday Blowout?

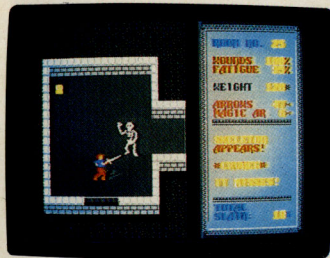
One of the many rumors circulating this fall was that 520STs with single-sided drives would be going out the doors of Toys "R" Us stores for a **holiday blowout price of \$250-\$300**. Up to this point, the toy chain has been selling the computers at full list price.

Whisper To The Ear

Got something you want to get off your chest? The Ear wants to hear. Mail missives to The Ear, c/o COMPUTE!'s Atari ST Disk & Magazine, P.O. Box 5406, Greensboro, NC 27403. Or send electronic mail to CompuServe ID 70675,463, Delphi ARLANL, or The Source TCT987. All sources treated confidentially.

ST

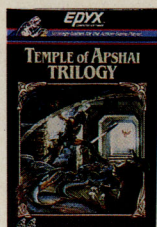
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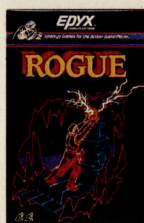
Rogue.™ This is one classic that's definitely not for beginners. Thousands have explored its 26 ominous levels. Maybe two have made it out in one piece. It's a world of underground mazes, bizarre places and magical treasures. Rogue has a mythology



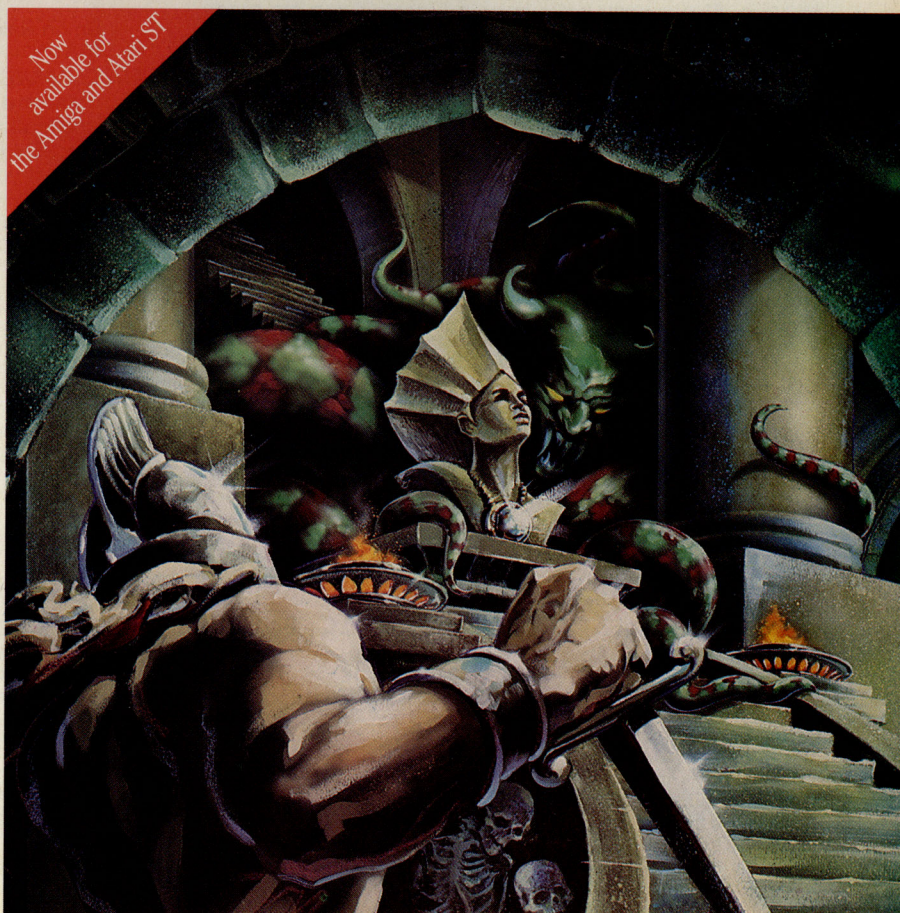
all its own, with one fatal reality. It's never the same game twice. So forget mapping. This one's on pure intuition and brainpower.

Enter the Dungeon of Doom. Your challenge is to recover The Amulet of Yendor, and make it back to Level 1. Not so simple, is it?

Oh, and just so you won't think we're bad sports, here's an enchanted sword. Hope you know how to use it.



Amiga
Atari ST
IBM/
Compatibles
MAC
Tandy 1000



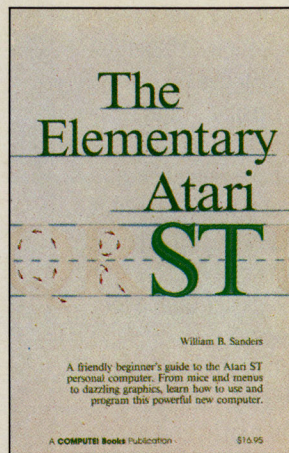
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Temple of Apshai Trilogy screen from Commodore 64®/128™ version of the game.
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* A product of Batteries Included.



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Simon Field, Kathleen Mandis, and Dave Myers
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COMPUTE!'s ST Applications Guide: Programming in C is your complete tutorial to designing and writing effective ST application programs. Practical examples show you how to use GEM routines to develop professional-looking applications of your own. Explore topics such as disk files, menus, icons, the mouse, sliders, dialog boxes, programming desk accessories, music, and much more. For intermediate to advanced C programmers.

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Do you have an ST-related question or problem? Have you discovered something that could help other ST users? We want to hear from you.

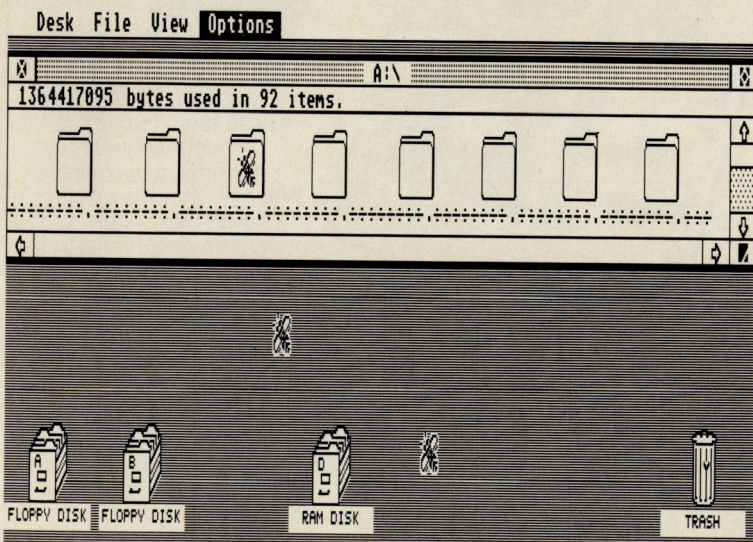
Write to ST Feedback, COMPUTE!'s Atari ST Disk & Magazine, P.O. Box 5406, Greensboro, NC 27403.

A Gigabyte On A Floppy

Attached is a screen dump from one of my latest sessions with the Atari 520ST. Something apparently went wrong with the disk drive. I'm not looking for the reason it happened; I figured it was gremlins or digital voodoo. After rebooting and reformatting, the disk worked fine.

Dan Kurilla

Things like this happen, especially if you're experimenting with writing directly to disk sectors. Strange directories can be caused by overwriting the directory sectors or the file allocation table. Sometimes it's just a computer crash; if you reboot, the disk might be OK. In any case, your disk is past the realm of megabytes. If you believe the screen, your disk has 1.4 gigabytes and the ST has three mouse pointers. (The latter effect, at least, is explicable: The mouse was moved while the screen dump was in progress.)



A Cluster Of Questions

I have several questions I would like to ask:

1. I am having a problem when I reset my computer; the screen becomes blurred and distorted. After fiddling with the power supply connections and resetting several times, the problem goes away. What is causing this problem?
2. Can the 520ST be upgraded to one megabyte without additional boards?
3. Was most of the GEM environment written in C?
4. I've heard a lot of talk about switching between resolutions on a color monitor without going to Set Preferences. Can this be done? How does *The Pawn's* combination of resolutions work?
5. Is the new ST BASIC going to cost us? If so, how much?
6. Is there any way the old SF354 drive can be made as quiet as the new drives?

Scott Johnstone

Here are your answers:

1. It's hard to diagnose this problem, but it sounds like the power-supply connections may be defective. The best way to

isolate a problem of this type is to find someone else with an ST (such as your local dealer) and try substituting various components one at a time—the power supply, the computer, and the monitor. The only other possibility we can think of is that the external power supply or line cord is too close to the monitor, which could distort the video image.

2. It's not possible to upgrade a 520ST to one megabyte of random access memory (RAM) without adding an extra memory board. In other words, it's not as simple as inserting a cartridge or plugging RAM chips into vacant sockets. An additional board must be piggy-backed onto the existing motherboard (main circuit board). This requires some tricky soldering and is best left to a qualified technician.

3. Most of GEM was indeed written in the C programming language. When Atari transferred the operating system to ROM (Read Only Memory) in late 1985, parts were rewritten in 68000 machine language to improve performance and reduce code size. The entire operating system had to fit into 192K of ROM, and word is that this was accomplished with only a few bytes to spare.

4. It is possible to switch between the color screen modes under program control without selecting Set Preferences from GEM's Options menu. A typical example is NEOchrome, which always forces the ST into the low-resolution mode, even when run from medium resolution. When you exit NEOchrome, it returns you to the mode from which it was run. It's also possible for a program to display more than one mode on the screen at once, as you've noticed in Firebird's *The Pawn*, a graphics adventure game that uses the low- and medium-resolution modes simultaneously. This requires a programming trick called a raster-scan interrupt. When the electron beam inside the monitor's cathode ray tube reaches a certain point on the screen, the program tells it to switch to the different resolution. NEOchrome uses a similar trick to display more than the usual number of simultaneous colors

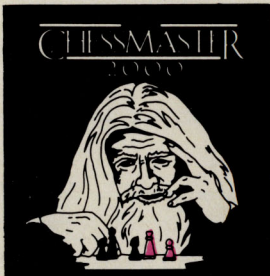
The rumor is not true...

Electronic Arts supports Atari ST!



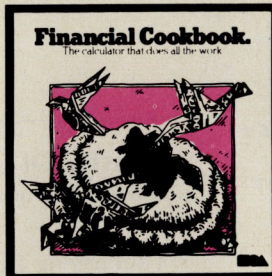
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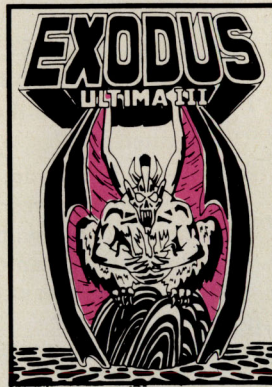
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in its palette box. (Normally, only 16 colors can be displayed at once in low resolution.) Raster-scan interrupts are also used on the Commodore 64 to display more than the usual number of colors or sprites. You'll also find a similar technique—called display list interrupts—on the eight-bit Atari computers.

5. The revised version of ST BASIC was expected to be available by September 1986, but at this writing (late October) it has been delayed again. At this point, Atari hasn't announced its upgrade policy for the new BASIC, but we hear rumors it may cost around \$20.

6. Among the several drives we use, we haven't noticed much variation in noise level, except that the 1040ST's internal double-sided drive is somewhat noisier than the external drives. (This could be due to resonance within the computer's case.) Atari apparently did switch suppliers for its floppy drives sometime in the first half of 1986, though, because earlier drives had a somewhat small disk-eject button and later drives have an eject button that is about half the width of the drive slot (as seen on the 1040ST). The earlier drives were manufactured by a U.S. company (Tandon), and the current drives are made somewhere in the Far East, according to information in the public stock prospectus released by the Atari Corporation in September. In any event, we haven't noticed any difference in performance among any of the drives. If your drive is unusually noisy, it's possible that a technician could quiet it down by lubricating the head rails.

Windows And Page Breaks

The following ST BASIC command works, although it's not documented in the manual:

OPENW WN,PX,PY,VX,VY

where WN is the window number (0-3), PX and PY define the top left corner of the window, and VX and VY are the bottom right corner.

Also, I've found a trick to prevent 1ST Word from advancing an extra page at the end of printing. First, put a hard page break at the end of your document (press F7 or click on the bar with the page numbers). Remember how many pages your document contains. When you print it, click on the box that says the last page is 999 and change it to the number of pages you want to print.

Alain Dussault

Thanks for the tips. Your discovery about OPENW could be used in a short program that moves the windows around the screen. After loading BASIC, just run the configuration program; the windows will take the size and shape you've chosen.

Four-Meg Floppy

I would like to inquire about the new four-megabyte 3½-inch disk drive for the ST. When will it be released and at what cost?

Geoff Langdon

We haven't heard anything about a four-megabyte floppy drive for the ST. It's unlikely that Atari is preparing to release one, because Atari buys its drives from independent suppliers and no microfloppy drives currently available can squeeze that much data on a single disk. The technology for that kind of storage density is still experimental, though not unheard-of.

There are plans, however, for a new four-megabyte ST computer. At a trade show in London last fall, Atari exhibited versions of the ST with two and four megabytes of RAM. These should be released in the U.S. in late 1986 or early 1987.

If you need more disk storage than is available with the existing floppy drives, you might consider a hard disk drive. Hard drives are available from Atari and other manufacturers with capacities of 10, 20, 30, 40, and even 60 megabytes.

Highlighted Lines

When I'm using the 1ST Word word processor, the fluorescent yellow background for cut-and-paste operations sometimes turns red. Although this doesn't seem to affect the program's performance, I would like to know what is causing this. Is there a problem developing with my computer?

Ronald R. Weldin

There's nothing to worry about. The highlighting color sometimes metamorphoses from yellow to red. There is, though, a reason for it. In medium-resolution mode, four colors are available. The default colors when you first enter medium res are black, white, red, and green. 1ST Word changes the four colors to black, white, yellow, and green. Yellow replaces the usual red.

If you happen to boot the system with a disk containing the CONTRO-

LACC accessory, the Control Panel will be available in the far-left menu under the Atari logo. If you open the Control Panel while working on a 1ST Word file, the accessory remembers that the four default colors are black, white, red, and green, and resets them. Thus, even if you don't change anything, merely opening the Control Panel changes yellow to red. To return to yellow, open the Control Panel again, click on the red color box, and move the R and G slide controls all the way to the top.

Copying Between 1ST Word Files

The ST is my first computer. I've already gotten a lot of use from 1ST Word, but really haven't taken advantage of all its features. I know I should be able to edit from one document to another, but I'm unable to figure it out and it apparently wasn't important enough to be explained in the documentation.

Can you help me out? Assume I don't know anything and you won't be far off.

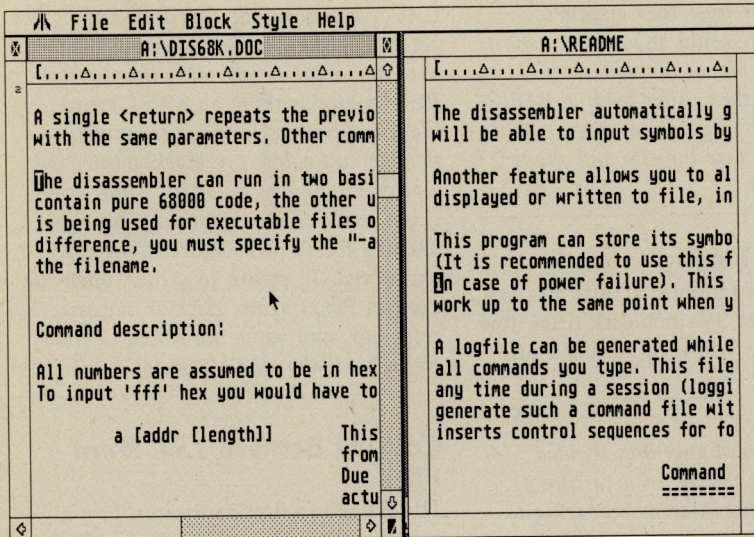
Zane Smith

To copy text from one document to another, it's necessary to have both documents opened at once in separate windows on the screen. This requires only a few simple steps.

To begin, run 1ST Word and load the first document into memory as usual. Next, drop down the File menu and select Open. You'll see the standard file selector that lists the available 1ST Word files on the disk in the drive. Pick the second document and load it, just as you loaded the first one.

At this point you should see two text windows on the screen, each with a different document. (Actually, it's possible to have the same document in both windows by loading it twice, but you'll probably have no reason to do this.) You can switch between the two documents by clicking once anywhere within the inactive window, just as you can switch between directory windows on the GEM desktop. If the inactive window is hidden behind the active window, use the sizer in the lower right-hand corner to change the dimensions of the window, or click and drag the title bar of the visible window to a position where the second window can be seen. (See the accompanying figure.)

Now you're ready to copy some text from one document to another. The section you want to copy is called a block,



and you have to define and cut it before you can copy. One way to define a block of text is to position the cursor at the start of the block, drop down the Block menu, and select the Start Block option. Then move the cursor one character past the end of the block you want to copy, drop down the Block menu again, and select End Block. If you're using a color monitor, the defined block should change color. On a monochrome monitor, the defined block is marked by a shaded background.

A faster way to define a block is to bypass the menus altogether. Using the mouse, position the cursor at the desired starting position; then click and hold the left mouse button. While holding down the button, drag the mouse to the line that marks the end of the block. A pointing hand and dotted-line "lasso" indicate the area you're defining. (See figure below.) When you release the mouse button, the area is defined. You

can define parts of lines or groups of lines this way, but for odd-shaped blocks you'll have to use the previous method.

If you make a mistake while defining a block, drop down the Block menu and select Hide Block. This undefines the text.

Once you've defined a block of text, the next step is to cut it. Drop down the Block menu and select Cut Block. This does not remove the defined text from the screen; instead, it copies the block into a buffer (a temporary holding area in memory). An alert box will inform you that the block has been copied into the buffer.

Now move to the other document and position the cursor where you want to insert the block of text. Drop down the Block menu once again and select Paste Block. This copies the text from the buffer into the other document.

If you want to remove a block of text from a document after defining it,

drop down the Block menu and select Delete Block.

An annoying quirk of 1ST Word's cut-and-paste operation is that special type styles such as boldface, italics, lightface, and underlining are changed to roman (normal text) when the block is copied. You can change the text back to a special type style by defining the desired block, selecting the style you want with the Style menu or function keys, and then selecting Restyle from the Style menu.

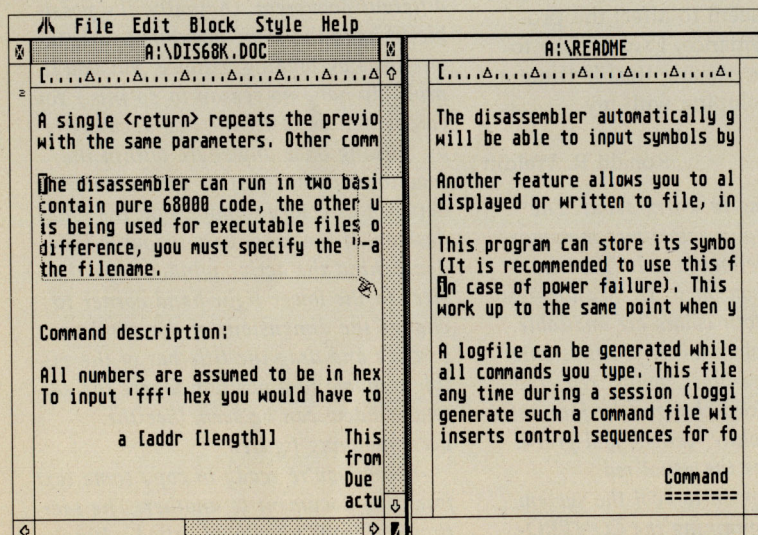
Are Mice Nice?

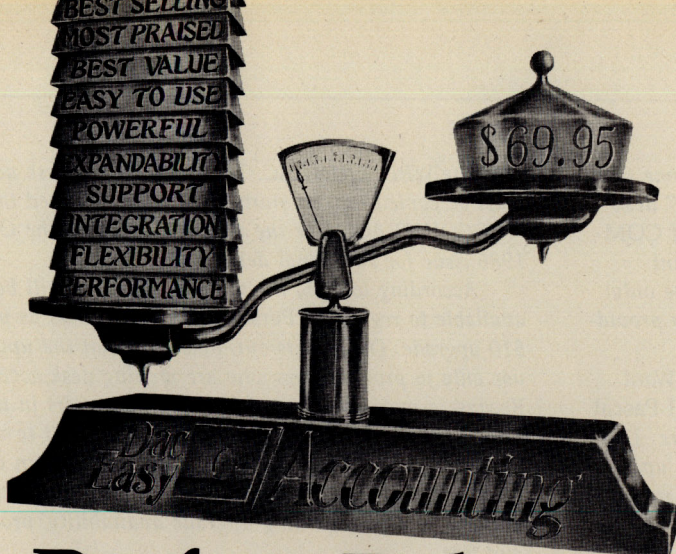
We have owned a 520ST for approximately one year. After trying various word processing programs and reading many articles, comparison charts, and ads in your magazine for word processing programs, we have the following comments as to the nature and quality of the programs now available for our machine.

Our primary question is: What makes the mouse/GEM system so great that it is used in the majority of ST programs? We purchased our ST primarily for word processing, and we have discovered that using a mouse is Mickey Mouse. Having tried six programs, and having looked at two others, our conclusion is that the software companies must think that the average ST user wants a word processing program for letters home to Mom or book reports for school. A truly professional word processing program should be written for the serious writer; the user's hands should remain on the keyboard at all times. For instance, in order to use the underlining feature in a mouse-driven program we tried, we had to go through the following steps:

1. Stop typing.
2. Find the mouse.
3. Locate the arrow on the screen and move it to the drop-down menu (and hope the right one is triggered).
4. Click the appropriate choice.
5. Follow the instructions in the box.
6. Move the mouse to the appropriate selection in the box and click the choice.
7. Return to typing (if everything was done right).

And those were the steps necessary just to *begin* underlining. To end underlining, the steps need to be repeated! One or two keystrokes could easily replace these steps.





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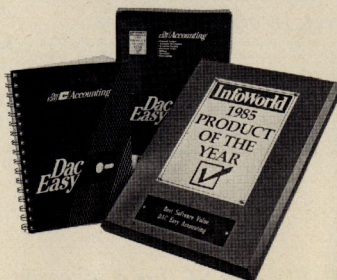
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Word Count Fix

Editor's Note: As mentioned in our last issue, some readers experienced problems with the "Word Count" desk accessory published in the October 1986 issue of COMPUTE!'s Atari ST Disk & Magazine. Word Count wouldn't work unless installed as the first (or the only) item on the Desk menu. As promised, we're now providing a fix for the problem.

This issue's disk includes a new version of Word Count which was linked using updated Personal Pascal libraries provided by Optimized Systems Software. These new libraries correct problems related to setting up and maintaining desk accessories that existed in the previous versions of the libraries.

You'll find the revised Word Count on disk under the

filename WRDCOUNT.AC. To install it as a desk accessory, it must be copied to your startup disk and renamed to WRDCOUNT.ACC. See the original article in the October 1986 issue for additional details.

According to OSS, the updated libraries will be made available to registered Personal Pascal owners as part of a \$10 upgrade. OSS points out, however, that the upgrade is of use only to programmers who are writing desk accessories. Because a major revision of Personal Pascal is in the offing, OSS suggests that most programmers will want to wait until that time to avoid paying for two upgrades. When the new release is ready, all registered Personal Pascal owners will be notified by mail regarding upgrade availability, procedures, and fees.

Encryptor Update

Editor's Note: The October 1986 issue of COMPUTE!'s Atari ST Disk & Magazine included an article and program entitled "Encryptor." If you want to protect a file for security reasons, Encryptor lets you encode it so that only someone who knows the password you selected can decode and read the file.

Encryptor works correctly when ASCII files are encrypted and decrypted, but it does not correctly handle nontext files such as pictures or programs. Some readers attempted to encrypt such files and discovered that sometimes the files could not be decrypted.

If you aren't interested in C programming and don't have a C compiler, you can skip the following explanation and simply use the modified version of the program on this month's disk. You'll find it under the filename NEWCRYPT.TOS. As a bonus, it is much smaller than the original version. If you have any files encrypted with the original version, they will have to be decrypted with that version; the new program cannot properly decode them. Also, the new Encryptor cannot recover parts of nontext files which were scrambled by the earlier version.

The problem is twofold, but was relatively easy to fix once discovered. The first problem in the original version of Encryptor arises from a feature of the Megamax C language in which the program was compiled. Atari text files use two characters between lines, a carriage return (character 13) and a linefeed (character 10). The C language traditionally separates lines with a linefeed only. When a file containing a 13 plus a 10 is read into memory, the 13 is discarded. When a 10 is written to disk, it's expanded to a carriage return plus a linefeed. The trouble starts when a file to be encoded contains a 13 and 10 or a plain 10. In both cases, it's treated as a single 10. When the file is later decrypted, a 13 and 10 are written back to disk. In some cases, this is correct. In others, the 13 is spurious.

The solution is to open the file for binary reading and writing, which turns off the translation feature of

Megamax C. In the following lines from the source code, the letter b has been added to the fopen() functions:

```
file_ptr1 = fopen ( filename, "br" );  
file_ptr2 = fopen ( "qqqq", "bw" );
```

A second, more serious problem is caused by the way the original file is read. The encryption routine occurs within a while() loop which continues reading through the file until an end-of-file (EOF) character is found. Unfortunately, a program or data file may contain an EOF character before the actual end of the file. Thus, the encryption routine ends before the whole file is encoded and the last part of the file is lost.

The solution is for the encryption program to read the size of the file and then use the length within a for() loop, insuring that all bytes are read and translated. To fix the source code, declare two variables and an array at the beginning of main():

```
int dtabuff[22];  
long length, l;
```

Next, add the following lines after the prompts for the filename and password (after the second scanf()). They initialize the variable called length to the size of the file.

```
Fsetdta( dtabuff );  
Ffirst ( filename, 0 );  
length = *(long *) (dtabuff+13);
```

Finally, remove the while() and replace it with a for() loop. Note that the fgetc() function has been moved inside the braces.

```
/* while ( ( c = fgetc ( file_ptr1 ) ) !=  
EOF ) */  
for ( l=0; l<length; l++)  
{  
    c = fgetc (file_ptr1);
```

In addition to these changes, we reduced the size of Encryptor by recompiling it with Cconws(), Cconrs(), and Cconin() in place of the original printf(), scanf(), and get-char(). This conserves disk space and allows the program to load faster.

Other unnecessary and bothersome features in most word processors are the windows and icons. Why should we lose 25 percent (and sometimes more) of the edit screen to a border and some icons that, for the most part, do nothing more than get in the way? It seems that in the process of making things simple to use, as in GEM and the mouse system, we end up wasting more time than we save. There should be some balance between reason and the ease of use that allows for the greatest productivity with a reasonable investment in time to learn the system.

The type of word processor that would make us very happy is one that ignores GEM and kills the mouse. We would like to see full-screen editing without cute little windows using up one-third of the screen. We wouldn't mind taking the time to learn key commands from a well-written manual with a quick reference section. When this happens, if ever, we will be one of the first in line with cash in hand.

Ed and June Wysocki

The graphics-oriented user interface and all it entails—including the mouse controller, windows, icons, and menus—have been controversial since their debut in the world of personal computing four years ago with Apple's Lisa, and later, the Macintosh. The main arguments in favor of this approach are that it's easier to learn, easier to remember, faster to use, and uniform across different applications. The main arguments against it are that it's clumsier to use, slower, and consumes more computer memory and processing speed. There is validity to both arguments.

For someone who uses a computer for a certain application almost every day, it is faster to simply type a keyboard command rather than to drop down a menu and make a selection. On the other hand, there are those who use a computer or a certain program much less frequently, and for them it may be easier to select an option from a menu rather than try to remember which series of keystrokes invokes the command.

Ideally, an application program should provide both menus and keyboard commands. Some word processors on the ST do a fairly good job of this. For example, 1ST Word, which is included with every ST system, allows you to switch underlining on or off in two ways. You can either drop down the Style menu and choose the Underlining

option, or you can simply press the F2 key. There are similar keyboard equivalents for italics, boldface, lightface, insert mode, deleting lines, centering, indenting, paragraph reformatting, and so on. Although there are no keyboard commands for such actions as search-and-replace, this isn't something that's used very often, and it would be difficult to invent meaningful keyboard sequences for all of the options offered by 1ST Word's search-and-replace menu—forward or backward searching, case matching, and single, partial, or global searching.

Your comments about window borders wasting screen space are a little puzzling, because we're not familiar with any word processors for the ST that consume one-quarter of the screen with such borders. Also, we're not aware of any ST word processors that display icons on the screen—unless you're talking about the function-key reminders in 1ST Word, which are easily hidden by clicking on the full-screen button.

Several full-screen text editors are available for the ST. The most comprehensive that we've seen is Let's Write from Mark Williams Company, 1430 W. Wrightwood, Chicago, IL. The retail price is \$79.95. The heart of this package is the MicroEMACS editor, which originally was developed for the IBM PC. This editor has none of the GEM-based features normally found in text editors for the ST, but is the most powerful package available, if you're willing to spend the time required to learn the necessary keystrokes. However, as a spokesman at Mark Williams stated, "This is not a package for writing a letter home to Mother."

At any rate, your experience reinforces one theory about how to approach the purchase of a personal computer. If you have one important application in mind—such as word processing—and you have definite ideas about how that application program should work, it may be advisable to shop for the appropriate software first, then buy whatever computer it runs on. If you strongly object to using a mouse, menus, icons, and windows, you may be happier with, say, an IBM PC or compatible. There are a quite a few very powerful word processors available for inexpensive IBM compatibles that rely exclusively on keyboard commands. Alternatively, you can wait until Atari introduces its promised IBM emulator, which may run the software you desire.

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MollyScope: A Graphics Demo

Philip I. Nelson, Assistant Editor
Tim Victor, Editorial Programmer

Just for fun, here's an entertaining demonstration program that creates an infinite variety of twisting shapes, colors, and patterns. It runs on any ST in any screen resolution, but looks best in the 16-color mode.

Who says computing always has to be practical? Sometimes it's fun to load up a game or even a graphics demo that turns the machine into the high-tech equivalent of a lava lamp. That's why, one afternoon, we wrote "MollyScope"—as a programming exercise, true, but also just for fun.

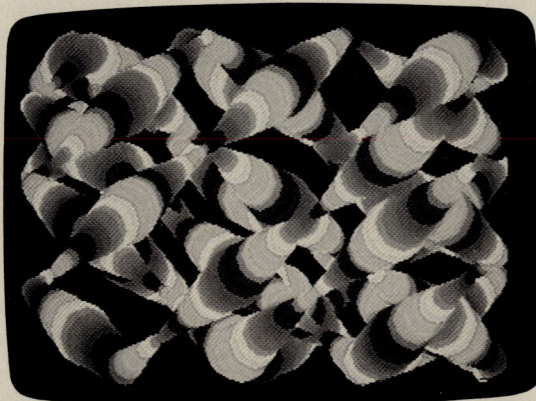
MollyScope was partly inspired by two popular graphics demos on the Commodore Amiga: the *Molly* program on the original dealer demo disk, and Electronic Arts' *Polyscope* program that is included with every Amiga. MollyScope was a quick project that's not as extensive as these two programs, but it does create somewhat similar patterns.

You'll find two files on the magazine disk for MollyScope. MOLLY.PRG is the executable program file, and MOLLY.C is the C source code. If you're a programmer, you might find the source code interesting; it's liberally commented. As written, the source file compiles and links with either *Alcyon C* or *Megamax C*; it may require slight modifications with other compilers.

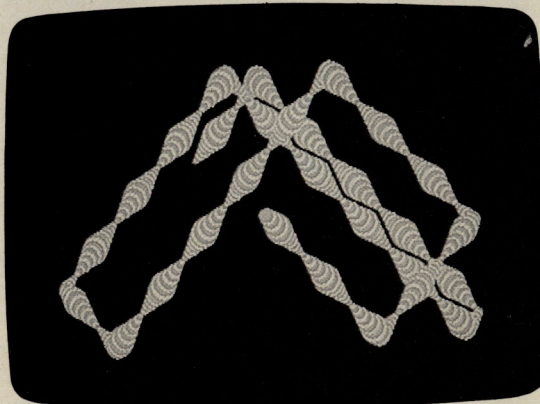
To run MollyScope, simply set your system to the desired screen resolution and execute MOLLY.PRG. The program checks the screen mode and adjusts itself accordingly. It works best in low resolution because 16 colors can be displayed simultaneously. In medium resolution it displays 4 colors, and in high resolution it substitutes fill patterns for colors. (See the accompanying figures.)

Pressing the space bar clears the screen and starts a new cycle from a random location. Each restart also randomly selects a new direction and increment value. The increment determines the amount of space between each new circle. When this value is small, the

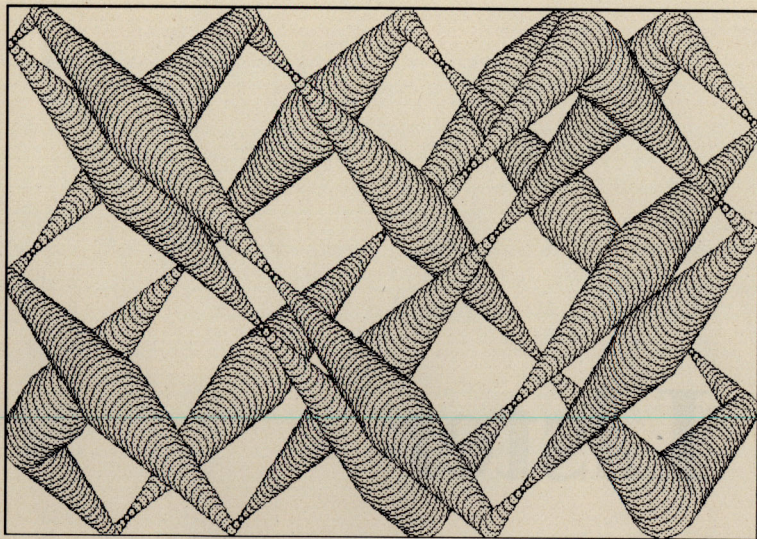
shape is rotund and slow-moving; when the increment is larger, the shape speeds up and becomes elongated. Since color cycling produces no visible effect on the hi-res monochrome screen, the program changes fill patterns as a substitute. Each time you press the space bar, the program selects the next pattern in a series of over 20 system patterns.



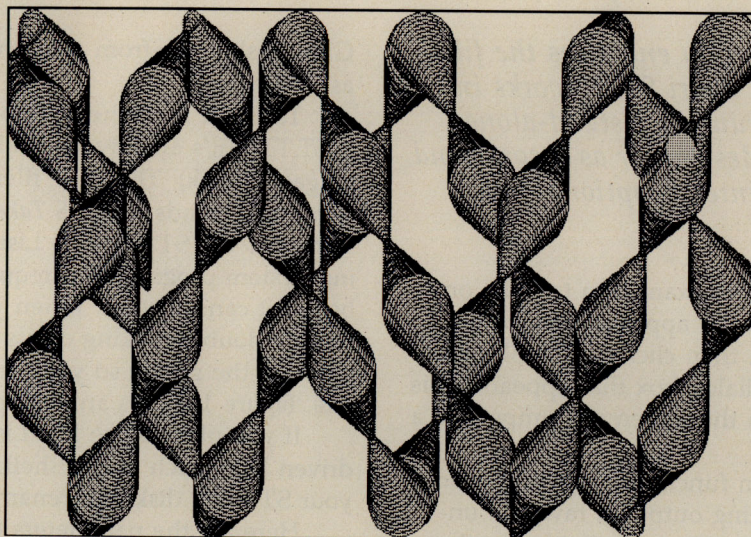
"MollyScope" looks best when taking advantage of the low-resolution mode's 16 simultaneous colors.



In medium resolution, "MollyScope" displays its twisting, flowing shapes in four colors.

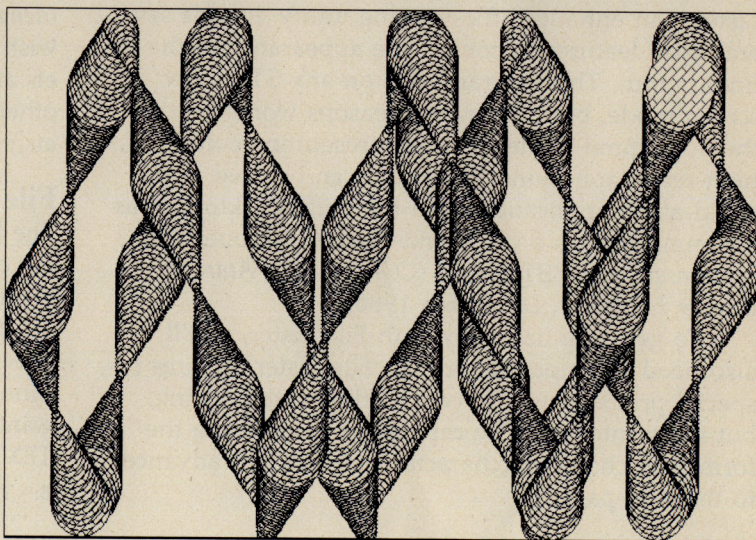


In high resolution, monochrome fill patterns are substituted for colors, as seen in these three screen snapshots.



To terminate MollyScope and return to the GEM desktop, press the Return key.

In lo-res mode, particularly, MollyScope looks as if it must be a complicated program. But in fact, it's quite simple. Though the entire screen seems to be moving and flowing, only the leading edge of the shape is being redrawn. The program simply draws a series of filled circles, one at a time. If you look closely, it's obvious that previously drawn shapes never change in shape—only in color. The flowing effect is created by shifting the color palette in just the right way to create the illusion of forward movement.



File Lister

Richard Smereka

Here's a utility that greatly enhances the file-listing functions of the Atari ST. It works in any screen mode and runs as a stand-alone program on the GEM desktop or as a command with "ST-Shell." A printer is optional but recommended.

Normally when you want to examine a text file on the Atari ST, you click on the appropriate icon or filename with the mouse, then click on the Show or Print buttons inside the dialog box that appears. This either displays the file on the screen or dumps it to a printer.

Although this built-in function is sufficient for most purposes, the resulting output is raw and unformatted. A quick look at what's available in other operating systems reveals that there's plenty of room for improvement. That's the reason behind "File Lister," an enhanced file-viewing utility. It adds several extra features to control the appearance of the final output. The program runs on any ST in any screen mode, but for obvious reasons works best in the 80-column modes (medium-resolution color and high-resolution monochrome). It can be used as a stand-alone application from the GEM desktop, or as a command with a command-driven disk operating system such as "ST-Shell" (*COMPUTE!'s Atari ST Disk & Magazine*, December 1986).

To generate hardcopy with File Lister, you'll also need a compatible printer. File Lister requires no special printer driver to control the printed listing, but the printer must be capable of interpreting the form-feed character (character code \$0C) to advance to the next page.

Preparing File Lister

There are two different ways to install File Lister, depending on whether you plan to use it from the

GEM desktop or from a command-line interface such as ST-Shell.

To use it from the desktop, name the file LIST.TTP (it's already stored in this form on the magazine disk). The .TTP filename extension is important. It stands for *TOS Takes Parameters*, which signals to the ST that File Lister is a Tramiel Operating System program that requires certain parameters before it can function. When you run a TTP application by double-clicking on its icon, a dialog box pops open on the screen so you can enter these parameters. Figure 1 shows an example of this box.

If you plan to use File Lister from a command-driven DOS such as ST-Shell, copy LIST.TTP to your ST-Shell disk and rename it LIST.PRG.

Here are the parameters expected by File Lister:

[options] [D:] [\pathname \]filename.ext

The only parameter that's absolutely required is *filename.ext*—the name of the ASCII text file you wish to view or print. The parameters within brackets are optional and must be separated from each other by at least one space. (Do not type the brackets.) Let's take a look at what these parameters do.

File Lister Options

The most obvious parameters let you specify a disk drive and pathname. If the file you wish to examine is on another drive, substitute the drive identifier for D:. If the file is in a folder, enter the *pathname* between backslash characters. For example, if you're running File Lister from drive A and the file you want to view is called READ.ME in a folder called TEXTFILE on drive B, you enter:

B:\TEXTFILE\READ.ME

If you're not sure how to use pathnames, refer to the user's manual that came with your ST, or see the "Readers' Feedback" column in the December 1986 issue of *COMPUTE!'s Atari ST Disk & Magazine*.

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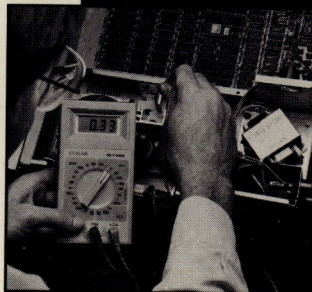
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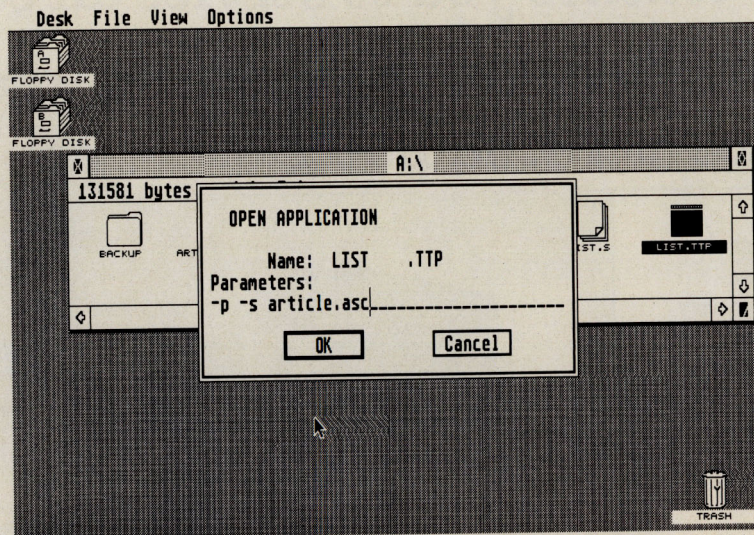


Figure 1: When run from the GEM desktop, "File Lister" opens up a dialog box so you can enter the filename and options.

To specify additional *options*, refer to the list below:

- p printer output (default: printer output off)
- n print line numbers (default: line numbers off)
- z pad line and page numbers with zeros (default: zeros on)
- s screen output (default: screen output on)
- w screen wait after 18 lines (default: wait on)
- f full printer format (default: printer format on)
- t TTP pause before returning to desktop (default: pause off)

You can use these options in any combination and in any order, as long as they're separated from each other by at least one space (except the drive identifier and pathname, which must be together with the filename). The options are like switches—by default they assume an automatic position, on or off. When included in the command line, their normal default state is reversed.

The options may be freely mixed, although some options depend on the state of others. For example, giving the *-f* option on the command line will have no effect unless the *-p* option is on because there is no sense in changing the printer format if no printer output is requested.

Detailed Examples

Following are some typical ways in which you might use File Lister. Remember to name the program LIST.TTP if you're running it from the GEM desktop, or LIST.PRG if you're running it from ST-Shell.

Desktop example: SAMPLE.TXT
ST-Shell example: LIST SAMPLE.TXT

This simply lists the text file SAMPLE.TXT to the screen, pausing every 18 lines for a keypress to continue scrolling.

Desktop example: -p SAMPLE.TXT
ST-Shell example: LIST -p SAMPLE.TXT

The *-p* option tells File Lister to send the text

file to the printer *as well as* to the screen (the *-s* screen option is turned on by default). Note that normally the printer format option *-f* is also switched on, so you get the full printer format (we'll cover option *-f* in a moment).

If, for any reason, File Lister cannot properly communicate with the printer (for instance, if the printer is not powered up or online), you'll see the error message *Trouble Communicating With Printer* and the list request will be terminated.

Desktop example: -p -n SAMPLE.TXT
ST-Shell example: LIST -p -n SAMPLE.TXT

This example lists SAMPLE.TXT on the printer *and* prints line numbers at the beginning of each line of text. Among other things, this feature is useful when you're documenting or debugging source code. The line numbers range from 1 to 9999 and are padded with leading zeros (0001, 0002, and so on; see Figure 2).

Desktop example: -p -n -z SAMPLE.TXT
ST-Shell example: LIST -p -n -z SAMPLE.TXT

This command lists SAMPLE.TXT on the printer, prints line numbers at the beginning of each line of text, but turns off the extra zeros and pads the numbers with spaces instead.

Desktop example: -p -n -z -s SAMPLE.TXT
ST-Shell example: LIST -p -n -z -s SAMPLE.TXT

This lists SAMPLE.TXT on the printer with line numbers that are padded with spaces instead of zeros, but turns off screen output. Note that since screen output is normally on, the *-s* option turns it off when included in the command line.

Desktop example: -p -n -f SAMPLE.TXT
ST-Shell example: LIST -p -n -f SAMPLE.TXT

This lists SAMPLE.TXT on the printer and the screen with line numbers padded with zeros, but the


```

File Lister
File: MOLLY.C Page 0001
0001
0002 /* MOLLY.C: Atari ST graphics demo for any resolution */
0003 /* by Tim Victor and Philip Nelson, October, 1986 */
0004
0005 #include <osbind.h>
0006
0007 int handle;
0008 int input[11], output[57];
0009 int intin[100], intout[100], ptsin[100], ptsout[100], contrl[12];
0010 int width, height, colors;
0011
0012 int xlate[] = ( /* Translate VDI colors to hardware */
0013     0, 2, 3, 6,
0014     4, 7, 5, 8,
0015     9, 10, 11, 14,
0016     12, 15, 13, 1
0017 );
0018
0019 int pal[] = ( /* Palette for color cycling */
0020     0x700, 0x720, 0x750, 0x770,
0021     0x370, 0x070, 0x072, 0x075,
0022     0x077, 0x037, 0x007, 0x207,
0023     0x507, 0x707, 0x703
0024 );
0025
0026 main()
0027 {
0028     int i, rez, style;
0029     int draw_tone, draw_color;
0030     int pal_phase, pal_tone;
0031     int pts[4], savepal[16];
0032     int xpos, ypos, rad;
0033     int xdir, ydir, rdir;
0034     int most = 20;
0035
0036     for (i=0; i<10; i++)
0037         input[i] = 1;
0038     input[10] = 2;
0039
0040     handle = 1;
0041     v_opnvwk(input, &handle, output); /* Open virtual workstation */
0042     v_hide_c(handle); /* Hide mouse */
0043
0044     width = output[0]; /* Current workstation width */
0045     height = output[1]; /* Current height */
0046     colors = output[13]-1; /* Number of colors not counting backgrnd */
0047
0048     pts[0]=pts[1]=0;
0049     pts[2]=width;
0050     pts[3]=height;
0051     vs_clip(handle, 1, pts); /* Turn on clipping */
0052
0053     /* Save current color palette */
0054     for (i=0; i<16; i++) savepal[i] = Setcolor(i, -1);
0055

```

Figure 2: Here's a page of source code dumped to a printer with the line numbers and header provided by "File Lister."

—f option turns off the full printer format. The full printer format consists of 55 lines per page with a header at the top of each page consisting of the file-name and page number. Since the full printer format is turned on by default, the —f option turns it off when included in the command line.

Desktop example: —w SAMPLE.TXT
ST-Shell example: LIST —w SAMPLE.TXT

This command lists SAMPLE.TXT on the screen *without* waiting for a keypress every 18 lines. In other words, the text scrolls by at full speed. This is useful when you want to quickly scan through a file. Note that if the —s option is off, —w has no effect.

You can also activate this option *after* you've started listing a file on the screen. Normally when File Lister displays a file, it pauses every 18 lines and prints this message: *A = Abort, N = No Wait, Any Other Key to Continue*. Pressing A aborts the listing and returns you to the GEM desktop or ST-Shell. Pressing N turns off the wait feature, and any other key resumes the listing.

Desktop example: —t SAMPLE.TXT
ST-Shell example: LIST —t SAMPLE.TXT

This makes File Lister pause after it has finished displaying a file; normally, it's useful only when you're running File Lister as a TTP application from

the GEM desktop. If you don't include this option, File Lister exits to the desktop so quickly that you might not see any messages that are generated before it quits. The —t option forces a pause. If you're running File Lister from ST-Shell, this option is unnecessary because the text remains on the screen when the command prompt reappears.

File Lister Batch Files

If you're using File Lister with ST-Shell, you can set up a series of batch files in advance with your favorite listing options. Then, rather than typing in a long list of options on a command line, you can simply execute the appropriate batch file. Note that to take advantage of this you must have a copy of ST-Shell or another command-driven DOS with similar batch file capabilities.

For instance, you could have two main batch files: one to list a file to the screen, and another to dump a file to the printer. Look at this one-line batch file:

```
list -n %1
```

Let's call it SCREEN.BAT. To call this batch file from ST-Shell, all you'd type at the screen prompt would be SCREEN SAMPLE.TXT. This would display the text file SAMPLE.TXT with zero-padded line numbers, pausing for a keypress every 18 lines.

Here's an example of a one-line batch file for listing to the printer:

```
list -p -n -z -s %1
```

Let's call it PRINT.BAT. When you enter the command PRINT SAMPLE.TXT at the ST-Shell prompt, this batch file dumps SAMPLE.TXT to the printer with space-padded line and page numbers, and suppresses screen output.

About The Program

File Lister was written in machine language instead of a high-level compiled language in order to minimize the size of the program. It also runs faster than a program written in a compiled language, although the limiting factor is more likely to be the speed of the printer and screen scrolling.

The small size of File Lister is important, because it leaves room on an ST-Shell disk for a number of utilities of this type. (See "Extended Formatter" elsewhere in this issue.) These utilities are really extrinsic or external DOS commands, just like those found in MS-DOS, PC-DOS, CP/M, and Unix.

If such utilities were written in a compiled language, they might be about 10K each. There would be only enough room on a single-sided disk for about 25–30 of them. But if each utility were a maximum of 2.5K (as this one is), there'd be room for about four times as many on the disk. Of course, shorter utilities also load faster and use less memory.

Desktop Clock

David Plotkin

With this desk accessory you can display a digital clock on your screen while running any other GEM application program. The article also lends advice on writing desk accessories in Personal Pascal. The program works on any ST in any screen mode: low- or medium-resolution color and high-resolution monochrome.

It's easy to lose track of time when working with a computer, and nearly everyone has experienced the surprise of discovering that it's suddenly three hours past bedtime. But now it's easy to keep an eye on the clock while working with your word processor, spreadsheet, database, or telecommunications program.

"Desktop Clock" is a simple desk accessory that's always instantly available within any program that supports GEM (Graphics Environment Manager). When summoned from the Desk menu, it pops open a small window with a digital clock. The clock can be repositioned anywhere on the screen and does not interfere with the main application program running in the background. It operates on a 12-hour cycle and indicates a.m. or p.m. You can make the clock disappear and reappear at will. You can even make it reappear if it is hidden behind another window.

Installing The Clock

The program file for Desktop Clock can be found on the magazine disk under the filename CLOCK.AC. *This is not an executable file*—it cannot be run from the magazine disk or by clicking on the filename or icon from the GEM desktop. Instead, it must be installed on your boot disk as a *desk accessory*, a program that is automatically loaded into memory when

you first switch on your ST. A desk accessory remains in memory even when it isn't running. To activate a desk accessory, you must select it from the Desk menu which is present in all application programs that support GEM. (Sometimes the Desk menu is titled with an Atari logo symbol; in any case, it's always the menu at the far left of the screen.)

Installing Desktop Clock requires only a few simple steps:

1. Copy the file CLOCK.AC from the magazine disk to your boot disk—that is, the disk you insert in drive A when you first switch on the computer.
2. Rename CLOCK.AC to CLOCK.ACC by selecting Show Info from the File menu. (If you're not sure how to rename a file, consult the manual that came with the ST.) The .ACC extender is important—programs with filenames ending in .ACC are recognized by the computer as desk accessories and automatically loaded into memory during bootup. If you happen to be using the disk-based version of TOS (pre-ROM), you'll have to rename the file DESKx.ACC, where *x* is a number between 1 and 6 not being used by some other desk accessory (for example, DESK5.ACC).
3. To install Desktop Clock, turn off the computer and wait a few seconds. Then switch the computer back on, making sure the bootup disk with CLOCK.ACC is in drive A. (Note that desk accessories must always be installed with this *cold start* procedure—a *warm start* triggered by pressing the reset button does not reliably install a new accessory.)

Using The Clock

That's all there is to it. When you drop down the Desk menu from the GEM desktop, you should now

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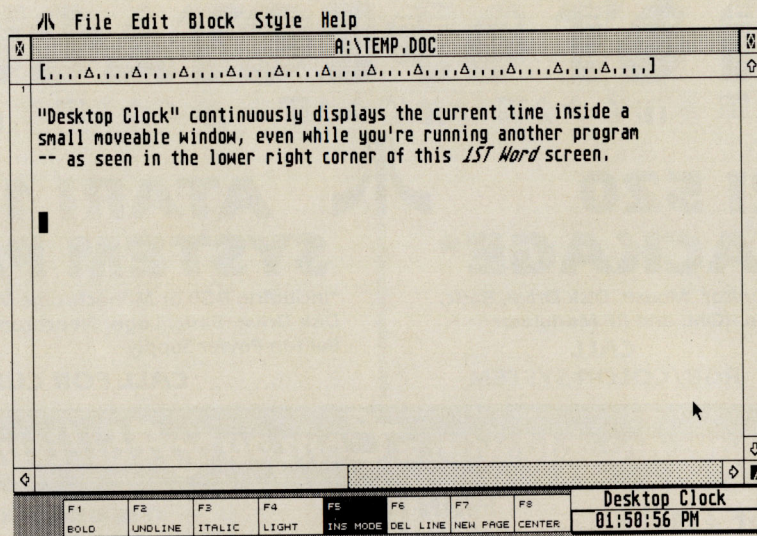
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Desktop Clock works concurrently with any other GEM application, as seen in the lower right corner of this 1ST Word screen.

see a new selection labeled Clock, along with any other accessories you may have previously installed on the boot disk. To open the Desktop Clock, just select Clock from the menu.

Desktop Clock works just like any other GEM window. You can move it anywhere on the screen by clicking and dragging the title bar. You can make it disappear by clicking on the close gadget in the upper left corner of the window. You can move the clock on top of other windows, or move other windows on top of the clock. However, there are no sizing gadgets on the clock window; it always stays the same size so that it takes up a minimum amount of space on your screen.

If you close the clock window or hide it behind another window, you can make it reappear by selecting it again from the Desk menu.

Desktop Clock has no provisions for setting the system time. Therefore, to set the clock, you'll need to install the Control Panel desk accessory that came with the ST or use a program that prompts you to enter the time and date when booting up. (To learn how to use a batch file for this purpose, see the "ST-Shell" article elsewhere in this issue.)

Writing A Desk Accessory

The following discussion is of interest to programmers who'd like to learn how to write a desk accessory in *Personal Pascal*, the language in which Desktop Clock was written. The program source code is stored on the magazine disk under the filename CLOCK.PAS.

There are some differences between writing a desk accessory and writing a standard application program. Most of these differences are detailed in a supplement to the *Personal Pascal* manual which is

available from Optimized Systems Software. If you haven't received this supplement, as well as the others detailing use of XBIOS, PORTS, and file management, contact OSS. The use of AC_Open, AC_Close, Menu_Id, and AP_ID is detailed in the OSS handout, but some other points are missing. The source code for Desktop Clock is pretty well commented to cover these points.

For example, take a look at the beginning of PROCEDURE Convert, which converts integers into strings. You'll see this statement:

```
Timeout := '          ';
```

This not only clears the string which will contain the digits for hours, minutes, and seconds, but also sets the current length of the string. Modifying the separate elements of the string, which is how Convert works, will *not* set the current length of the string.

This current length is used later by the function Concat to patch together minutes, hours, and seconds to form the string Time, which will be printed on the screen. If the current length of each string has not been set by an expression like the one above, the length is likely to be some random number, and the Concat function will attempt to patch together some very long strings and stuff them into a string (Time) which is not large enough to hold them. The result will be a string overflow error when the program runs.

Also at the beginning of PROCEDURE Convert, you'll notice a VAR declaration of string Timeout which defines it as TYPE shortstring. In the initial program declarations, shortstring is declared as TYPE string[2]. I've taken this approach because *Personal Pascal* does not let you use a statement such as Timeout:String[2] as part of a PROCEDURE call.

Updating The Window

PROCEDURE Do_Redraw is responsible for redrawing the clock window whenever necessary. In fact, Do_Redraw is used to make *any* adjustments to the clock window, even when merely printing new digits to update the time. This is because Do_Redraw contains all the safeguards necessary to keep the screen nice and neat:

1. The Boolean variable *bckgrnd* determines whether the white background in the clock window should be redrawn. It is redrawn only if part of the window was hidden and is now visible. If the time just needs updating, the white background is not redrawn, because there is a noticeable flicker if the program continuously redraws the background and changes the time.
2. The statement containing Set_Window is very important. It makes sure that the update takes place in the clock window. Just opening a window or bringing it to the front does not automatically select that window for graphics and text. It's better to be safe.
3. Notice how the calls to Paint_Rect (paint the window background) and Frame_Rect (frame the window) assume that the entire window is being redrawn, even though only part of the window may actually need redrawing. GEM and Set_Clip make sure that only the appropriate portion of the window is affected.

PROCEDURE Event_Loop monitors events and takes action based on what event occurred. It first tests for messages, then acts on the messages as they are received. This is the procedure that takes care of opening and closing windows, bringing windows to the front, and moving and resizing the window. As mentioned above, however, the Desktop Clock window does not allow resizing, since it's hardly necessary.

At the end of the event loop, the timer event is handled outside the CASE statement for messages. This way, the program checks to make sure that the clock window is open before responding to the timer event. Why? Because a desk accessory—unlike other programs—can get timer events even when the accessory is not active (no window is open). If the program did not test for an open window, you'd see the time printed on the screen background, which is not what we want.

After a timer event, the program updates the time and redraws the window as discussed above. Thus, the program must keep track of the x and y coordinates of the window, as well as the height and width.

ST

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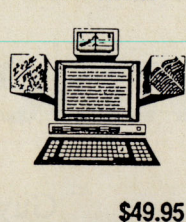
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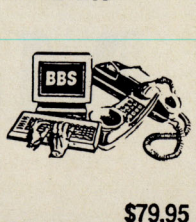
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Mouse Editor

Guy Davis

With this utility, programmers can create custom mouse cursors for use in their own application programs. Numerous options make it easy to design shapes on a gridlike sketchpad, and the new cursor can be tested and then saved on disk. It works on all STs in all screen modes: low- or medium-resolution color and high-resolution monochrome.

If you're writing application programs that support GEM (the Graphics Environment Manager), one final touch that's sure to grab attention is a custom mouse cursor. Imagine, for instance, a notepad program with a cursor shaped like a pencil, or a drawing program with a cursor that changes at appropriate times into a paint brush, spray can, eraser, or pen. GEM gives you the capability of redefining the mouse cursor within an application, but does not give you the tools necessary to make the job easy.

That's why you need "Mouse Editor." It's a utility program that makes designing custom cursors a snap. You can draw the new shape pixel by pixel on a magnified sketchpad, then rotate it, flip it, or reverse it. When you're satisfied with the results, you can test the new cursor by viewing it in actual size and moving it around the screen with the mouse. Finally, you can save the shape on disk for inclusion in your own programs.

Mouse Editor won't let you redefine the cursor for use on the GEM desktop—GEM lacks that capability. However, it is a handy tool for those who write their own application programs in a wide variety of languages.

Video Graph Paper

On the magazine disk you'll find four files associated with Mouse Editor: MOUSE.PRG, MOUSE.PAS, ARROW.MSE, and FUJI.MSE. The Mouse Editor program itself is MOUSE.PRG; simply double-click or open this filename/icon to run Mouse Editor. MOUSE.PAS is the source-code file for MOUSE.PRG, which is written in *Personal Pascal*. The source code is mainly of interest to Pascal programmers who want to study how Mouse Editor works. ARROW.MSE and FUJI.MSE are two predefined mouse cursors included on the disk for demonstration purposes. In a moment, we'll describe how to load and view these cursors.

When you run Mouse Editor, you'll see a window containing a 16×16 grid. This is the sketchpad or graph paper on which you'll create your new mouse cursor. Each square in the grid represents a blown-up view of a pixel on the screen. To draw a shape on the sketchpad, simply point the mouse cursor at one of the grid squares and click the left mouse button. The square changes from the background color to black. To erase a pixel, click on its square again; it returns to the background color.

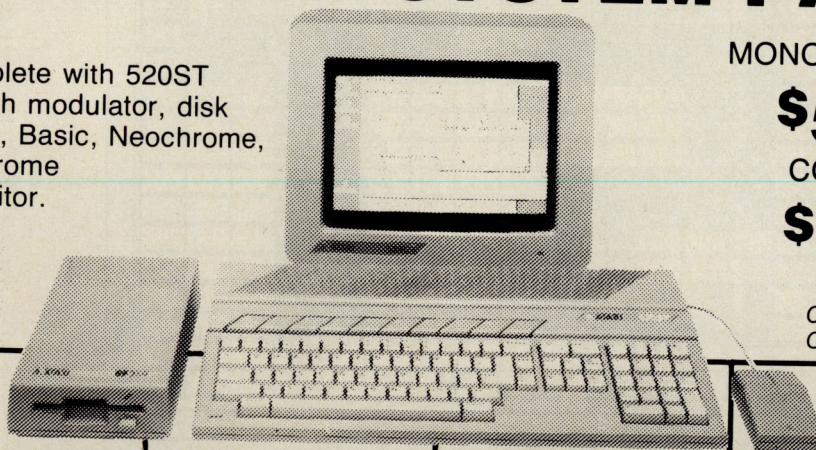
Like almost any GEM window, the sketchpad can be resized and moved anywhere on the screen. When you resize the window, the 16×16 grid automatically rescales itself to the new dimensions. This lets you adjust the sketchpad's magnification. (See Figures 1 and 2.)

At the top of the screen, you'll notice four menus. Starting at the left, the Desk menu contains the usual desk accessories (if you booted any) and a copyright notice. The File menu contains three fairly

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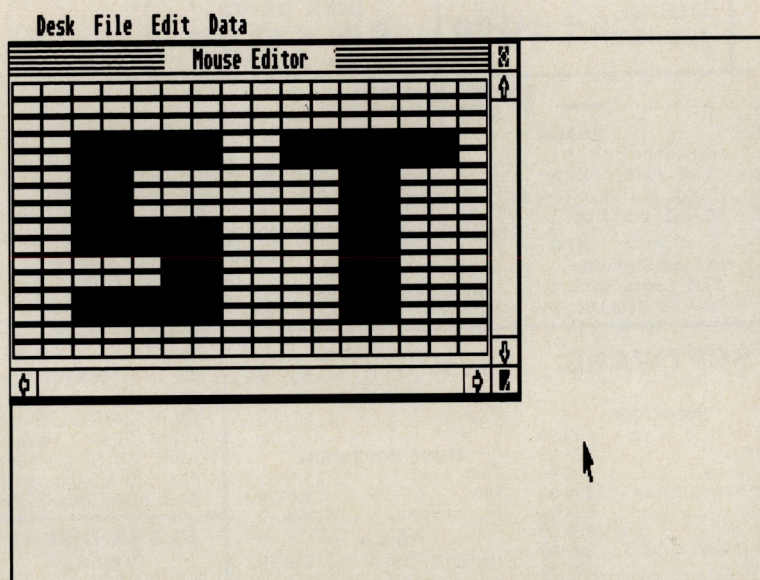
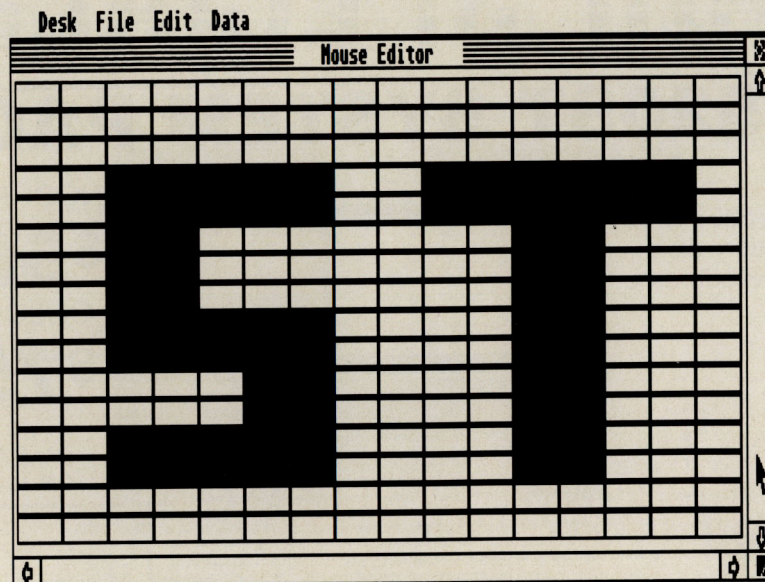
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Figures 1 and 2: The sketchpad grid in "Mouse Editor" can be resized to different magnifications.



obvious selections: Load Mouse (load a previously saved shape), Save Mouse (save the shape currently displayed on the sketchpad), and Quit (exit Mouse Editor to the GEM desktop). The other two menus, Edit and Data, require some explanation.

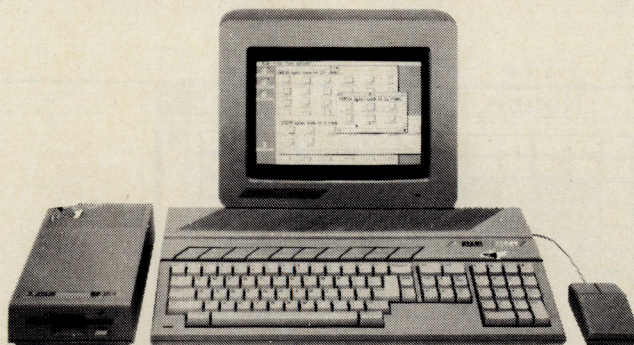
Manipulating Shapes

The Edit menu contains seven selections that will be useful when designing your cursor. The first selection, Reverse Image, redraws the current shape as a mirror image of itself. Flip Image turns the shape upside down. Rotate Right turns the shape 90 degrees in a clockwise direction; if you do this four times,

the shape ends up as it started. Rotate Left turns the shape 90 degrees in a counterclockwise direction. Clear Mouse erases the current shape on the sketchpad, allowing you to start from scratch.

The last two options on the Edit menu let you view and test a custom mouse shape without going to the trouble of writing a program. When you pick Test Mouse, the normal arrow cursor turns into the custom shape currently displayed on the sketchpad. By manipulating the mouse controller, you can move the custom cursor anywhere on the screen. You can even use it to select other menu items and continue designing your custom shape. (See Figure 3.)

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Figure 3: This custom cursor is patterned after Atari's corporate logo.

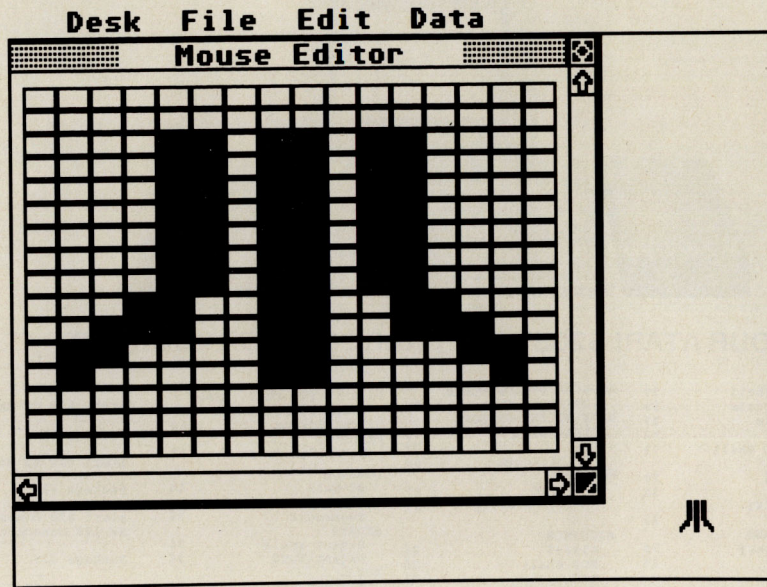
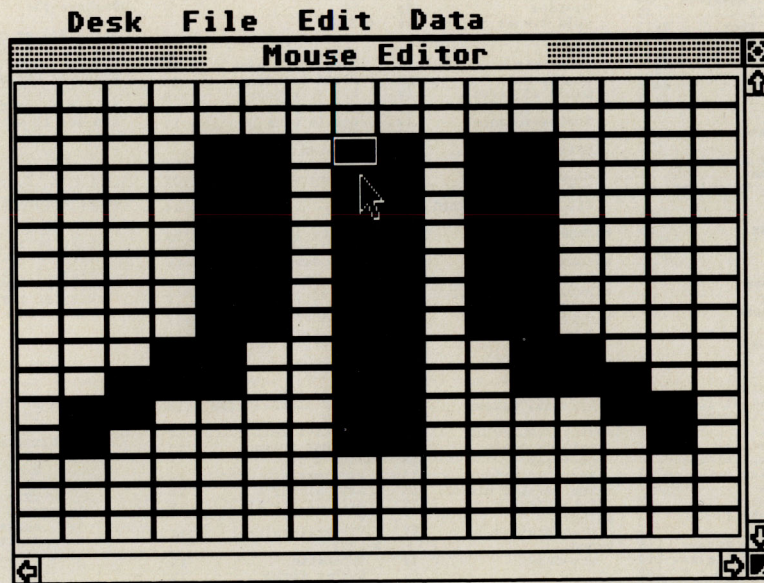


Figure 4: Repositioning a cursor's hot spot.



If you want to turn off the custom cursor and restore the normal cursor, choose Set Arrow from the Edit menu. This brings back the default pointer.

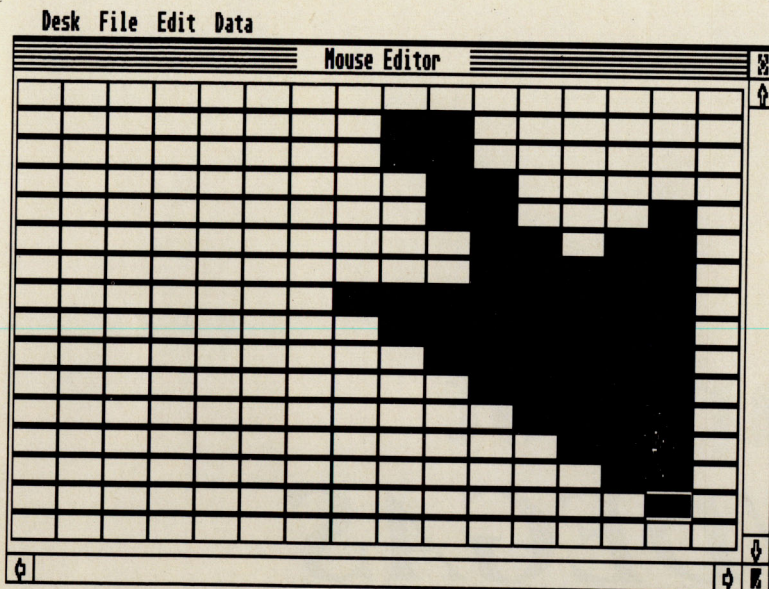
The Data menu offers three options: Hot Spot, Mask, and Data. The first option plots a box on the sketchpad to identify the pixel in the mouse cursor that returns the screen coordinates to a program—the cursor's hot spot. In other words, this is the actual pointer spot within the cursor—the part of the cursor that must be on a dialog button or menu item, for instance, when you press the mouse button. By selecting Hot Spot, you can move this indicator box

anywhere on the grid to set the custom cursor's hot spot. (See Figure 4.)

The Mask option lets you make a pixel white instead of black. If you look very closely at the default cursor, you'll notice that the black pointer is surrounded by a thin, white mask that helps to separate it from the screen background. With the Mask option, you can draw a similar mask around your custom cursor. If you click on a white square while using Mask, the square changes to the background color.

Finally, the Data selection lets you cancel the

Figure 5: Matching the hot spot to an upside-down pointer.



Mask or Hot Spot options and continue setting black pixels.

Free Samples

To experiment with the two sample cursors included on the magazine disk, simply run Mouse Editor, pick Load Mouse from the File menu, and pick either ARROW.MSE or FUJI.MSE from the item selector. ARROW.MSE resembles the ST's default cursor, and FUJI.MSE is patterned after the Atari corporate logo.

To see how the location of the hot spot affects the cursor, load ARROW.MSE and pick Flip Image from the Edit menu. The arrow image on the sketchpad should now be upside down. Next, pick Test Mouse from the Edit menu. Then try setting some pixels on the sketchpad. Notice how the upper left corner of the cursor still determines where the cursor is pointing, even though the arrow itself points downward.

To match the hot spot with the cursor's new direction, pick Hot Spot from the Data menu and place the box somewhere near the tip of the pointer. (See Figure 5.) Then select Test Mouse again. This time the cursor should work as expected.

The File Format

When you save a custom cursor shape on disk with the Save Mouse option, the resulting file adheres to a certain format.

The first two two-byte integers in the file define the horizontal and vertical (*x* and *y*) locations of the hot spot.

Next, there are two sets of 16 two-byte integer values. The first set defines the mask pattern and the second set defines the pointer pattern.

If you want to learn how these files are saved and loaded, examine the source-code file for Mouse Editor, MOUSE.PAS. There's also an example in the Mouse Control section of the *Personal Pascal* manual.

ST

Mouse Editor was written using *Personal Pascal* from Optimized Systems Software. Portions of this program (the linked libraries) are copyright 1986 by OSS and CCD. Used by permission of OSS.

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Snapshot *NEO/DEGAS*

Philip I. Nelson, Assistant Editor

This convenient desk accessory is available whenever you want to capture a screen image for later use with NEOchrome or DEGAS. You can even use it to convert NEOchrome and DEGAS pictures from one format to the other. It adjusts automatically to any screen resolution and works on any ST, color or monochrome.

NEOchrome and DEGAS are both excellent drawing programs for the Atari ST. But let's face it—not all of us are artists. Rather than always starting with a blank screen and creating something from scratch, sometimes it's easier to simply capture an existing screen image and load it into your favorite drawing program for modifications.

A number of so-called "snapshot" utilities are available both commercially and in the public domain for this purpose. But after trying several of them, we found that none had all of the features we wanted. Some work only in certain screen modes; some can save a screen in DEGAS format but not NEOchrome format, or vice versa; some don't let you specify a filename or pathname when saving the screen on disk; some require *two* programs to function—one to capture a screen and another to save it; and so on.

As a result, we wrote our own utility: "Snapshot NEO/DEGAS." Like other snapshot programs, it lets you capture any screen image instantly and save it

on disk for later use. But as the name implies, Snapshot NEO/DEGAS lets you save the screen in either NEOchrome or DEGAS format. It also works on any ST in any screen mode: low-resolution color, medium-resolution color, and high-resolution monochrome. It lets you specify any pathname and filename you want when saving the file on disk. It's available at any time with a simple keypress. And since it's a desk accessory, Snapshot NEO/DEGAS installs itself in memory automatically whenever you turn on the computer.

You can use Snapshot NEO/DEGAS to capture graphics screens, GEM screens, high-score game screens, or just about anything. As a bonus, it also lets you convert NEOchrome pictures to DEGAS format, or vice versa.

Installing Snapshot

You'll find Snapshot NEO/DEGAS on the magazine disk under the filename SNAPSHOT.AC. It cannot be run from the disk menu program or the GEM desktop; it must be installed as a desk accessory. (A *desk accessory* is a program that automatically loads into memory when you first switch on your computer, and then idly waits there until called from the Desk menu at the far left of the menu title bar. The Control Panel which comes with every ST is an example of a desk accessory.)

To use Snapshot NEO/DEGAS, you must first install it as a desk accessory on your startup disk (the disk you insert in drive A when switching on

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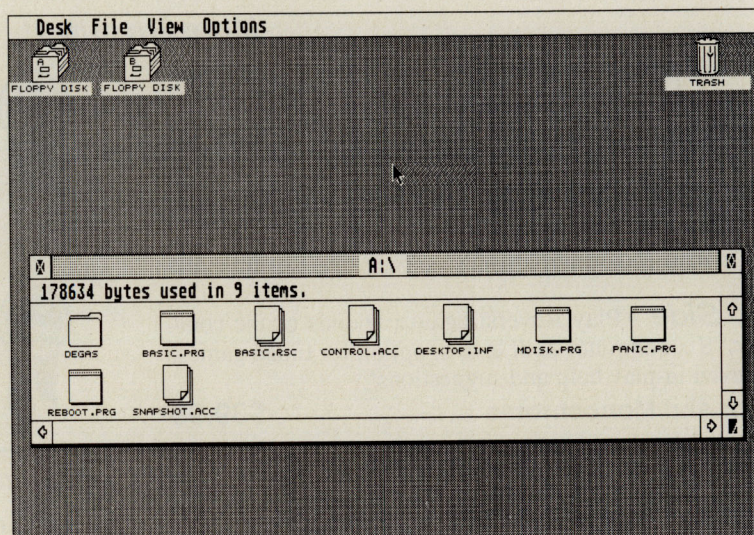
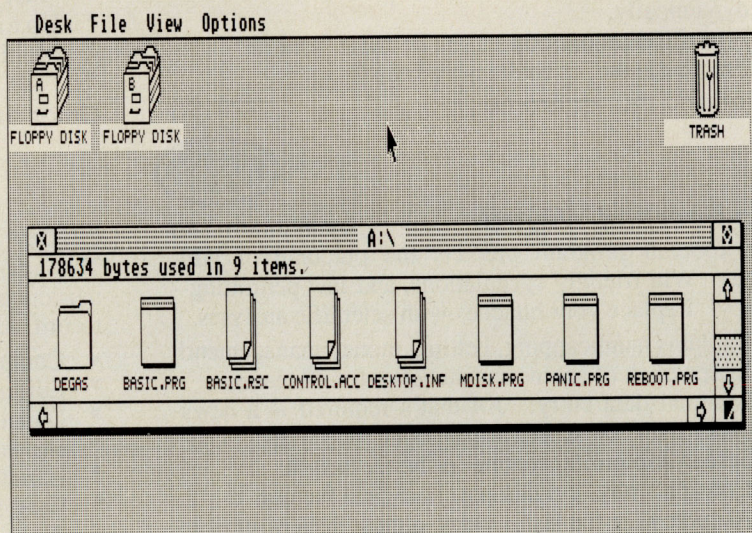
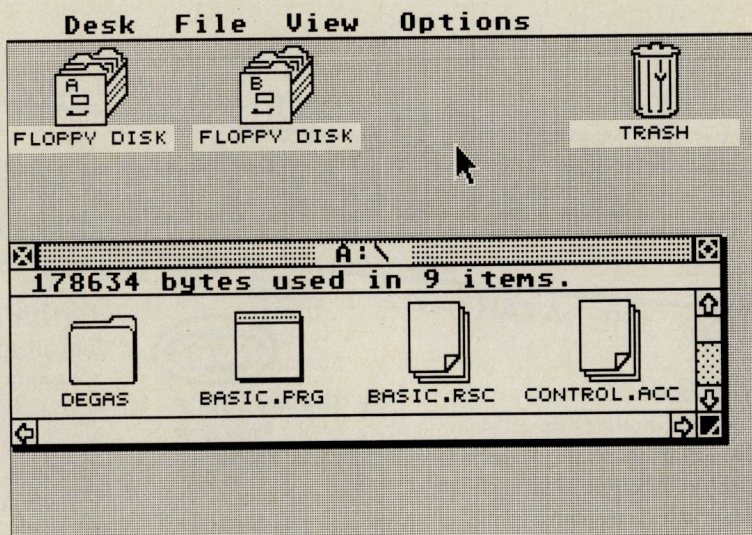
the computer) by renaming it SNAPSHOT .ACC. If you aren't sure how to do this, follow these steps:

1. Copy the file SNAPSHOT.AC from the magazine disk to your startup disk.
2. Display a directory window for your startup disk.
3. Select the file SNAPSHOT.AC by clicking once on its icon or filename to highlight it.
4. Drop down the File menu and select the Show Info option.
5. When the Show Info dialog box appears, a cursor should appear on the filename line. Change the name of the file to SNAP-SHOT.ACC.
6. Exit the Show Info box by pressing Return or clicking the mouse on the OK button. The directory window for your startup disk should confirm that the file is now named SNAPSHOT.ACC.

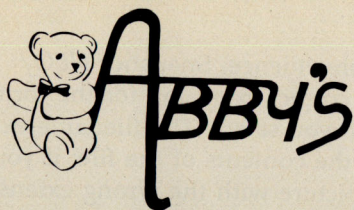
Snapshot *NEO/DEGAS* is now ready to be installed. Turn off your computer and wait about 15 seconds. Then insert your startup disk with SNAPSHOT .ACC into drive A and switch the computer on again. (This *cold start* procedure is recommended because merely pressing the reset button for a warm start does not reliably install a new desk accessory.) When the GEM desktop appears, drop down the Desk menu. You should see a new selection entitled SNAPSHOT NEO/DEGAS.

Snapping Pictures

As a desk accessory, Snapshot *NEO/DEGAS* hides in memory until you need it, even when you're using applications such as ST BASIC or *1ST Word*. To snap a picture of the current screen, just press Alt-Help (hold down the Alt key, then tap the Help key). Snapshot *NEO/DEGAS* briefly inverts the screen colors to signal that it has stored a complete image of the screen, including the resolution, color palette, and current position and appearance of the mouse pointer.



As these three figures show, "Snapshot *NEO/DEGAS*" can capture almost any ST screen in any resolution.



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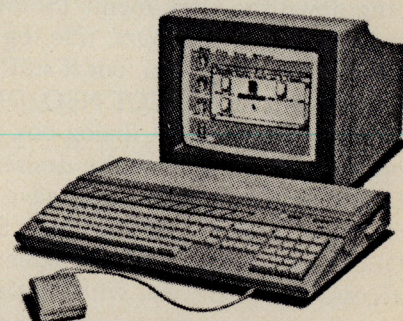
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At this point, the screen is captured in memory but is not yet saved on disk. If you press Alt-Help again, the captured image will be replaced by a new screen. Unlike most cameras, Snapshot *NEO/DEGAS* can take only one picture on its "film." If you need to capture more than one screen, you must save each image on disk before pressing Alt-Help again.

To save a captured screen on disk, start by dropping down the Desk menu. (Some application programs, such as *1ST Word*, title the Desk menu with the Atari logo symbol, but it still works the same.) Then select SNAPSHOT *NEO/DEGAS* to activate the desk accessory. A dialog box appears and prompts you to choose the desired format: *NEO* or *DEGAS*. If you decide not to save the screen, you can click on CANCEL. (If you select SNAPSHOT *NEO/DEGAS* without a captured screen in memory, the accessory informs you with an alert box.)

Since the current version of *NEOchrome* loads only low-resolution files, Snapshot *NEO/DEGAS* warns you if you choose the *NEOchrome* file option when in medium or high resolution. To cancel the save, simply select the CANCEL box. However, Snapshot *NEO/DEGAS* is designed for upward compatibility, so it allows you to save a *NEOchrome*-format image in medium or high resolution in case *NEOchrome* is ever updated to handle those screen formats as well.

After you've selected the file type, Snapshot *NEO/DEGAS* opens a standard GEM file selector box which allows you to choose a filename for the stored screen image. Choose the drivepath and filename you wish to use, just as you would from BASIC or any other ST application. Again, if you choose CANCEL, or if you select OK without entering a filename, Snapshot *NEO/DEGAS* aborts the operation without saving anything to disk. If you select a filename that already exists, Snapshot *NEO/DEGAS* gives you the option to replace the existing file or cancel.

The program also checks to make sure the disk contains enough free space to hold the new file; if there's not enough room, Snapshot *NEO/DEGAS* displays an alert box and aborts without altering the disk. (Keep in mind that a picture file in any resolution in either format requires about 32K.)

Naming Picture Files

When saving pictures, you are responsible for entering a filename with the correct three-character extension for the desired picture format. Every *NEOchrome* filename must end with the .NEO extension. *DEGAS* filenames end with the extension .PI followed by a 1, 2, or 3 to indicate the screen resolution: Use .PI1 for low resolution, .PI2 for medium resolution, and .PI3 for high resolution.

If you're not sure about the extension, look at the path specification in the upper portion of the file

selector box. As a convenience, Snapshot *NEO/DEGAS* supplies the correct extension for the format and resolution which you select. The filename extension does not affect the contents of the file; if you accidentally save a picture with the wrong extension, simply rename it with Show Info from the desktop.

Once you've selected a filename, Snapshot *NEO/DEGAS* saves the complete screen image on disk in the desired format, including the screen resolution and color palette which were in effect when you captured the screen. The resulting file can be loaded into *NEOchrome* or *DEGAS* and manipulated like any other picture file.

As a desk accessory, Snapshot *NEO/DEGAS* is normally available from within any GEM application. However, it's possible for an application to change what's available in the Desk menu. Some programs replace existing menus with menus of their own (or make all accessories unavailable, as in the case of *NEOchrome*), but restore them when you exit the application. If you have previously installed Snapshot *NEO/DEGAS*, it should work even when you're using such a program. Press Alt-Help to store a screen image while the application is running; the screen should blink as usual to signal that the image is captured. After you've exited the application, Snapshot *NEO/DEGAS* should reappear in the Desk menu. At this point, you can save the captured image to disk. The process of returning to the desktop does not disturb the captured image.

If Snapshot *NEO/DEGAS* does not reappear in the Desk menu when you return to the desktop, it has been forcibly removed by the application and cannot be used. It's considered bad GEM etiquette for an application to remove a desk accessory without replacing it, but you should be aware of the possibility.

Additional Notes

Snapshot *NEO/DEGAS* works correctly under circumstances where a program temporarily changes the screen resolution. For instance, *NEOchrome* always runs in low resolution, even if the computer is set for medium resolution before you run *NEOchrome*. If you capture a screen in *NEOchrome*, then exit to a medium-resolution desktop, Snapshot *NEO/DEGAS* remembers the correct resolution and saves the picture in lo-res format.

This does not apply, however, to a resolution change which does not occur under program control. If you switch resolutions from the desktop with the Set Preferences option, the ST reinitializes all desk accessories, effectively erasing any screen that Snapshot *NEO/DEGAS* has captured in memory.

Like most ST programs, Snapshot *NEO/DEGAS* opens the GEM file selector to let you choose a filename and pathname. Sometimes, calling the file selector from a desk accessory can have unexpected consequences. If the file selector box overlays an

open disk directory window on the desktop, mouse events may occasionally "leak through" the file selector and affect the underlying window. In such cases it's possible for GEM to become confused about which activity—the file selector or the disk directory window—has priority in receiving mouse input. To avoid surprises, you can close any directory windows that are likely to lie under the file selector box when it appears on the desktop.

Although Snapshot *NEO/DEGAS* itself is less than 4000 bytes in length, it needs to reserve another 32,000-odd bytes of memory to store the screen image, color palette, and other data. That shouldn't create problems unless you're running a highly memory-intensive application on a 512K machine, or are using several other desk accessories which are very large.

Normally on the ST, pressing Alt-Help activates a graphics screen dump to your printer. Snapshot *NEO/DEGAS* diverts this hardcopy vector in order to capture the screen instead. If you run another program that also tries to divert the hardcopy vector for some other reason, Snapshot *NEO/DEGAS* probably won't work correctly. To avoid conflicts, do not use any other program or utility that relies on Alt-Help while Snapshot *NEO/DEGAS* is installed. If you wish to print a hardcopy image of a screen—either from the desktop or a program like *DEGAS*—turn the computer off and reboot with a startup disk that doesn't contain *SNAPSHOT.ACC*. Or temporarily rename the program to *SNAPSHOT.AC* and reboot. (A desk accessory must have the extension *.ACC* to be recognized by the system.)

Snapshot *NEO/DEGAS* may not work correctly on early 520STs which require you to load TOS (the operating system) from disk. Later 520STs and all 1040STs have TOS in ROM (read only memory). There are many differences between the RAM-based and ROM-based versions of TOS. You can have an early 520ST upgraded with TOS in ROM chips at an authorized Atari service center.

Suggested Applications

Snapshot *NEO/DEGAS* is useful in many situations. You may want to create geometric figures in BASIC or Logo (or any other language, for that matter), save the picture, and then touch it up with *NEOchrome* or *DEGAS*. Many such figures can be created more easily with a program than with *NEOchrome* or *DEGAS*. Students can plot mathematical functions; dabblers in the stock market can track the progress of selected securities; artists can draw crystalline lattices.

Game players may also appreciate the ability to save screens. When you struggle to reach the all-time high score, it's nice to have a permanent record of your achievement. It also proves that you really did make a certain score, especially if you have friends who may doubt your boasts.

Another idea is to snap screens to accompany newsletter articles. The screens can be printed out with *NEOchrome* or *DEGAS*. All of the sample screens appearing in *COMPUTE!'s Atari ST Disk & Magazine* which aren't photographs are captured with Snapshot *NEO/DEGAS*, then uploaded using special software to a minicomputer/typesetter. Even some of the actual screen photographs are of captured images; some programs with animation can't be paused long enough for the long exposures required. Snapshot *NEO/DEGAS* captures a frozen image instantly.

Another useful feature of Snapshot *NEO/DEGAS* is its ability to convert a picture from *NEOchrome* to *DEGAS* format or vice versa. To convert a *NEOchrome* picture to *DEGAS* format, simply run *NEOchrome* and load the picture, select the Full Screen display, and then capture the picture by pressing Alt-Help. Exit *NEOchrome* and save the picture from the desktop with a *DEGAS* filename (use the extension *.PI1* to indicate low resolution). The picture can then be loaded into *DEGAS*.

To convert from *DEGAS* to *NEOchrome* format, simply reverse the process: Capture the screen from within *DEGAS*, return to the desktop, and save it with a *NEOchrome* filename (use the extension *.NEO*). Since screen data is structured differently for different resolutions, this conversion works only for low-resolution pictures. You cannot convert between lo-res *NEOchrome* pictures and medium- or hi-res *DEGAS* pictures.

Incidentally, Snapshot *NEO/DEGAS* can capture a *NEOchrome* screen only when you have selected the Full Screen display. If you try to capture a screen that contains the *NEOchrome* tools at the bottom of the screen, the image will be incomplete. This is because *NEOchrome* uses special split-screen techniques to display more than the usual 16 colors in the palette box.

How It Works

The Snapshot *NEO/DEGAS* accessory is written partly in machine language and partly in C. The C portion calls the machine language module as a C function when it initializes the accessory.

The machine language module performs two functions. During initialization, it diverts the ST's hardcopy vector (Alt-Help) to point to itself instead of the screen-printing routine contained in the computer's operating system. After the entire program has initialized, the main part of the machine language portion saves a complete screen image, including the current resolution and color palette, whenever you press Alt-Help. When this occurs, the machine language module also sets a flag to inform the C module that a screen image is available to be saved.

The main portion of the program, written in C,

takes care of displaying the various dialog boxes that appear when you select the accessory. It lets you choose the file format, select a filename, and save the complete image as a disk file.

Since disk operations always involve a certain element of risk, and people have been known to change their minds, the program gives several opportunities to abort the process. If a disk error occurs (for instance, if the disk contains a bad sector or you do something foolish like removing the disk from the drive while it's busy), Snapshot *NEO/DEGAS* aborts the save and informs you that a fatal error has occurred. If you wish to try again, you must start over by pressing Alt-Help and selecting Snapshot *NEO/DEGAS* from the Desk menu.

Studying The Source Code

If you're interested in C or machine language programming, the Snapshot *NEO/DEGAS* source code offers good examples of how to manipulate disk files from C and how to combine a separate machine language module with a main C program. The C source code is on the magazine disk under the filename *SNAPSHOT.C*; the machine language module is named *SNAPS.S*.

If the machine language portion is to be called as a C function, it must be given a global name that

begins with an underscore character (`_`). For instance, the C portion of Snapshot *NEO/DEGAS* calls the machine language portion as the function *snap()*. Accordingly, the machine language module begins by declaring `_snap` as a `.globl` name and putting the label `_snap:` before the first instruction in that module.

Likewise, any variables or arrays shared by the C and machine language modules must be declared globally, so that both modules can find and manipulate their contents. This particular application uses four such global objects: the array `_scrbuff`, which stores the captured screen image; the array `_palbuff`, which stores the current color palette; the variable `_rez`, which records the current resolution; and the variable `_picflag`, which serves as a simple yes/no flag to indicate whether or not a screen image is in storage.

Snapshot *NEO/DEGAS* was written with the Atari ST developer's system, also known as *Alcyon C*. With this system, the two program modules were developed separately and joined together only at the final stage, during linking. Other systems may favor a different procedure. For example, some C compilers offer an ASM macro which permits you to include machine language modules as part of your inline C source code.

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Extended Formatter

Richard Smereka

With this useful utility, you can format blank disks with an option to increase the storage capacity of either a single- or double-sided disk. It works on any ST in any screen mode, either as an "ST-Shell" command or as a stand-alone application from the GEM desktop.

As you know, a formatting command is already built into the Atari ST's GEM desktop. You insert the disk to be formatted into a drive, click the mouse on the corresponding drive icon, drop down the File menu, and select Format. A dialog box pops open to let you choose single- or double-sided formatting. It's all very quick and easy.

Why, then, is a separate utility to format a disk a useful addition to your software library? For one thing, the integral format command is available only from the GEM desktop. If you're using an alternative such as "ST-Shell"—a command-driven disk operating system which was published in the December 1986 issue of *COMPUTE!'s Atari ST Disk & Magazine*—there may be no format command available. In addition, GEM's Format option currently doesn't offer some special features that are possible in a custom formatting utility.

"Extended Formatter" fills both of these voids. First, it provides a handy format command for the ST-Shell command-line interface. (For a full description of ST-Shell, see the December issue; the ST-Shell program can be found on the December disk.) And second, as its name implies, Extended Formatter provides a special formatting option not currently

supported by GEM: You can format a single-sided disk to store 404K of data instead of the standard 349K, or a double-sided disk to store 808K instead of the usual 698K. Best of all, disks formatted with this option can be read from or written to without using any special software. They're fully interchangeable with regular disks.

Extended Formatter works on any ST in any screen mode, and works with both single- and double-sided floppy disk drives.

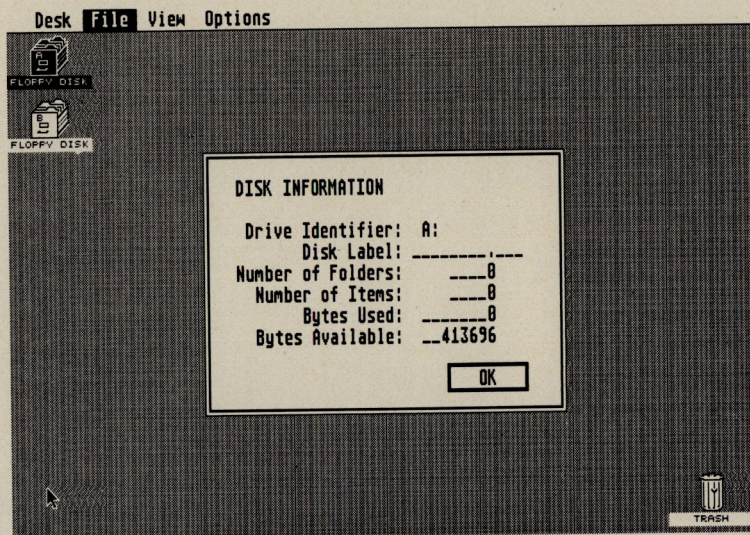
Installing On The Desktop

There are two different ways to install Extended Formatter, depending on whether you plan to use it from the GEM desktop or from a command-driven DOS such as ST-Shell.

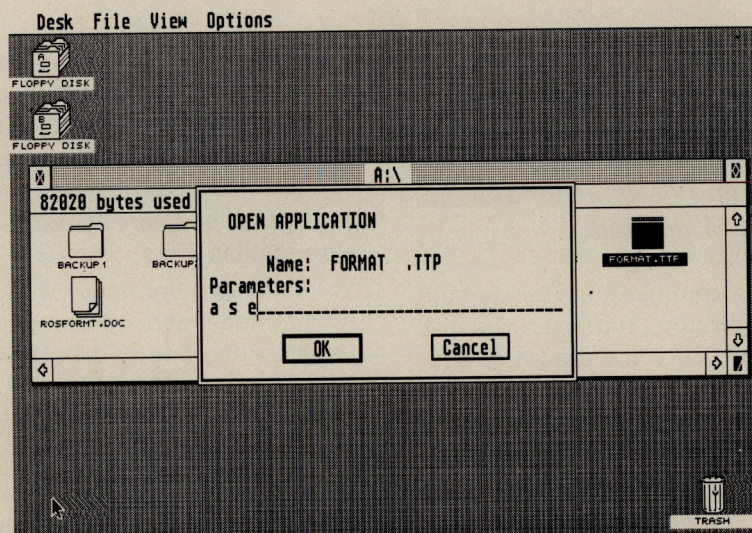
To use it from the desktop, copy the file `FORMAT.XXX` from the magazine disk to your own disk and rename it `FORMAT.TTP`. The `.TTP` file-name extension is important. It stands for *TOS Takes Parameters*, which signals to the ST that Extended Formatter is a Tramiel Operating System program that requires certain parameters before it can function. When you run a TTP application by double-clicking on its icon, a dialog box pops open on the screen so you can enter these parameters. (We've named the program `FORMAT.XXX` on the magazine disk to guard against accidentally formatting the disk.)

Here are the parameters expected by Extended Formatter:

`DS [E]`



As seen in this disk information box, "Extended Formatter" boosts the capacity of both single- and double-sided disks.



When you're running "Extended Formatter" from the GEM desktop, a dialog box opens up so you can enter the proper parameters.

The first two parameters are required. *D* is the drive identifier; substitute *A* (for drive A) or *B* (for drive B). *S* indicates the number of sides to be formatted; use *S* for single-sided or *D* for double-sided. (You must have a double-sided drive to use *D*, of course.) The third parameter is optional; if *E* is entered (do not type the brackets), the extended formatting option is selected. The parameters must be separated from each other by at least one space.

Here are some examples of what you might type into the dialog box when you run Extended Formatter:

A S

This formats the disk in drive A for single-sided use.

B D

This formats the disk in drive B for double-sided use.

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A S E

This formats the disk in drive A for single-sided use and also selects the extended-formatting option (404K).

A D E

This formats the disk in drive A for double-sided use with the extended formatting option (808K).

After you've entered the parameters and clicked on the OK button or pressed Return, Extended Formatter loads into memory and then waits for you to press a key. This gives you a chance to swap disks if necessary. (On a single-drive system, naturally, you wouldn't want to format the disk from which you loaded Extended Formatter.)

That's all there is to it. Just remember that formatting erases any previous information that may have been stored on the disk. GEM's Format command warns you about this with an alert box, but Extended Formatter does not. This shouldn't be a problem, however, since the TTP dialog box should be warning enough and it also provides a Cancel button to abort the program.

Formatting From ST-Shell

A somewhat different procedure is required when you're running Extended Formatter from a command-line interface like ST-Shell instead of from the GEM desktop.

First, install Extended Formatter by copying FORMAT.XXX from the magazine disk and renaming it FORMAT.PRG. Note that you *do not* name the program FORMAT.TTP in this case.

To run Extended Formatter, type the following command line:

```
FORMAT D S [E]
```

The parameters are the same as those used when Extended Formatter is being run from the desktop. *D* is the drive identifier, either A or B; *S* is the number of sides to format, either S for single-sided or D for double-sided; and *E* is the optional parameter for extended formatting (again, omit the brackets). The parameters must be separated from each other and from the FORMAT command by at least one space. Here are some examples:

```
FORMAT A S
```

This formats the disk in drive A for single-sided use.

```
FORMAT B D
```

This formats the disk in drive B for double-sided use.

```
FORMAT A S E
```

This formats the disk in drive A for single-sided use and also selects the extended-formatting option.

```
FORMAT A D E
```

This formats the disk in drive A for double-sided use with extended formatting.

After you've entered the parameters and pressed Return, Extended Formatter loads and then waits for

you to press a key. This gives you a chance to swap disks if necessary.

Additional Tips

Extended Formatter works only with microfloppy disks in drives A or B. Attempting to format a disk in any other drive causes an *invalid drive specification* error. Also, do not attempt to format a RAM disk or hard disk with this utility.

When you run Extended Formatter, there must be at least 20,000 bytes of memory available in the computer for the track buffer. If there's not enough memory, an error results.

Normally a single-sided ST disk has 349K of disk space available and a double-sided disk has 698K. The extended-format option boosts these capacities to 404K and 808K, respectively, by increasing the number of tracks on the disk as well as the number of sectors per track. There should be no problem reading from or writing to these disks with drives that are properly aligned. To avoid trouble, however, we recommend filling an extended disk with files that can be replaced and testing it awhile before entrusting it with your irreplaceable data.

When using the extended format option, you may have to change the way you copy disks. The Atari ST's disk copy routine—which is called when you drag a disk icon atop another disk icon or use the copy command from ST Shell—will not copy a normally formatted disk onto an extended format disk, or vice versa. That's because the operating system first checks to be sure the disks used in a copy operation are compatible. That is, both disks must have the same total storage space available. If not, the computer informs you that the disks are incompatible. You may have encountered this message when trying to copy a floppy disk to a RAM disk or vice versa.

To copy a normally formatted disk onto an extended format disk, copy the individual files and folders from disk to disk. The easiest way to do this is to select a number of files simultaneously by looping them with the mouse or clicking on them while holding down a Shift key. See your ST manual for more information on extended-selection copying.

It is possible, however, to copy extended format disks onto each other by dragging the disk icon or by using the copy command from ST Shell.

To minimize its size, Extended Formatter was written in machine language instead of a high-level compiled language. Programmers who wish to study how the program works can examine the file FORMAT.S on the magazine disk.

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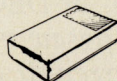
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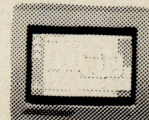
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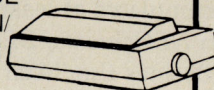
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Picture Puzzler

Douglas N. Wheeler

Looking for an interesting diversion? This program scrambles a NEOchrome- or DEGAS-format picture into a 10 × 10 jigsaw puzzle for you to reassemble on the screen. It also times how long it takes you to solve the puzzle and works in any screen resolution, color or monochrome.

Nearly every Atari ST user accumulates at least one diskful of pictures created with *NEOchrome*, *DEGAS*, and other drawing programs. Besides the "Atari Art" feature published in each issue of *COMPUTE!'s Atari ST Disk & Magazine*, numerous screens are available from user groups and bulletin board systems. With the popular slide-show programs that are also widely available, it's easy to view these pictures in rapid succession without actually loading them into *NEOchrome* or *DEGAS*.

Now there's something new you can do with your computer art collection. "Picture Puzzler" lets you turn any *NEOchrome*- or *DEGAS*-format picture into a fascinating jigsaw puzzle that you reassemble on the screen. It even keeps track of how long it takes you to put the puzzle back together.

Picture Puzzler supports the mouse and works in any screen resolution: low-resolution color, medium-resolution color, and high-resolution monochrome. And because it's written in compiled C, it responds to your commands very quickly.

Scrambling A Screen

Two files associated with Picture Puzzler are on the magazine disk: PUZZLER.PRGM, the executable program file, and PUZZLER.C, the C source code (mainly of interest to programmers). To get started, simply run PUZZLER.PRGM from the disk menu or the GEM desktop in the screen resolution of your choice.

After you've clicked on the OK button to acknowledge the copyright message, a standard GEM file selector appears. This works like any other file selector; click on the filename of the picture you want to load, and then click on OK. (As a shortcut, you can double-click on the filename.) If the picture you want to load is on another disk, insert that disk in drive A and click within the file window to display

the new directory. You can also change the path-name at the top of the selector window to load pictures from other drives.

Picture Puzzler automatically recognizes a *DEGAS*- or *NEOchrome*-format picture by its filename extension. *DEGAS* pictures should end in .PI1 for low resolution, .PI2 for medium resolution, and .PI3 for high resolution. *NEOchrome* pictures should always end in .NEO.

After Picture Puzzler loads the picture, it asks you to pick a difficulty level: easy, medium, or hard. (See Figure 1.) We recommend starting with easy. On this level, the program divides the picture into a 10 × 10 grid and randomly scrambles the resulting 100 pieces. The medium and hard levels scramble the picture into 100 pieces, too, but they also add a twist—literally. On the medium level, about 25 percent of the pieces are flipped upside-down. On the hard level, about 50 percent of the pieces are flipped. When you pick your level, Picture Puzzler rapidly scrambles the picture before your eyes. The result can be seen in Figure 2.

The Hard Part

So much for the easy stuff. Now it's time to reassemble the picture. To do this, you drag pieces around the screen with the mouse just as you drag files around on the GEM desktop. To pick up a piece, point to it; then click and hold the left mouse button. Drag the piece where you want it; then release the mouse button. Instantly, it's swapped with the piece that formerly occupied that spot. (See Figure 3.)

If you chose the medium or hard level, you may need to flip some pieces over. To do this, hold down either the Shift, Control, or Alternate key when you press the mouse button to drag a piece; when you release the button, the piece is dropped into place and flipped.

Reassembling a picture is not as easy as it looks. To give you some help, Picture Puzzler lets you look at the unscrambled picture when you press and hold the *right* mouse button. You can look at the picture as long as you hold down the button. But be careful: You get only three such peeks during each puzzle.

If you get frustrated and want to give up, you

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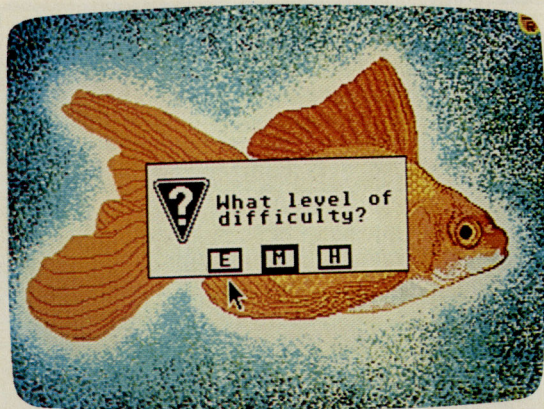


Figure 1: This picture is about to be scrambled.

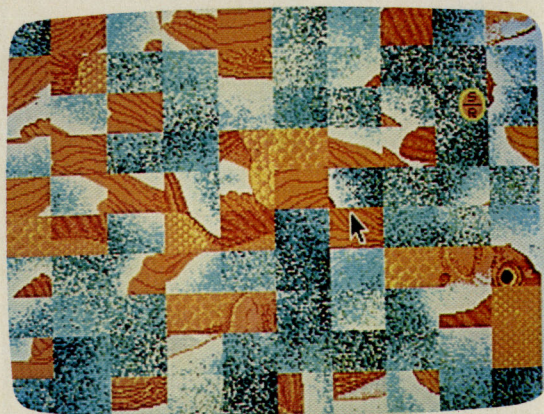


Figure 2: In seconds, "Picture Puzzler" turns the screen into a jumbled mess.

can return to the desktop by pressing both mouse buttons simultaneously. A dialog box asks you to confirm this action.

If you persevere and complete the puzzle successfully, Picture Puzzler instantly lets you know and displays a dialog box showing how long it took you to finish. At this point, you can either try another picture or exit the program.

Helpful Hints

Some of the same techniques that apply to assembling real jigsaw puzzles also work with Picture Puzzler. For example, if the screen has a border, this is always a good place to start when assembling a complex picture. If the picture contains any text, this is also a good place to begin.

You may be wondering what happens when a picture contains large areas of solid color or repeating patterns. It would seem to be nearly impossible to reassemble such a picture, because many of the pieces are visually identical. However, Picture Puzzler takes this problem into consideration. If two or more pieces really are identical, their positions are interchangeable. But if even one pixel is different, Picture Puzzler treats them as separate pieces that must be placed in their original locations.

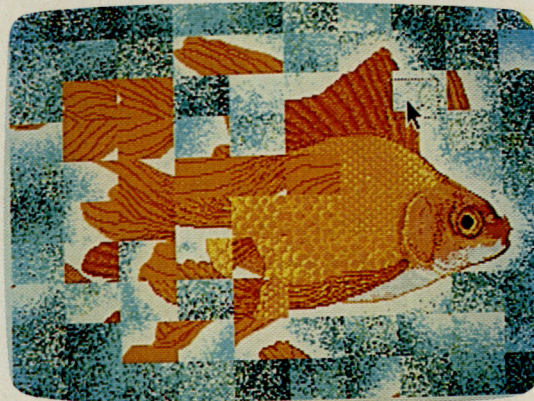


Figure 3: An outline box appears as you drag a piece to a new location.

Despite this feature, occasionally you may assemble a picture which looks correct, but in fact is not. The problem is that more than one palette color may be assigned the same red, green, and blue values, making them indistinguishable on the screen. Picture Puzzler knows the difference and won't let you finish until you get it right. This problem can be seen in the picture entitled "Mr. X" that comes on the *DEGAS* disk. There's a border on the lower right side of the screen, though you can't see it.

Fortunately, there is a solution. When you drag a piece over one of these areas, the border of the dragged box changes colors. At any rate, keep this problem in mind if you're creating your own pictures for puzzles.

Another problem is encountered when trying to piece together sections of a picture that were spray painted. For instance, the picture of the comet on the *DEGAS* disk is just about impossible to complete because there is almost no pattern to the stars. If you want to try it, be my guest—but be sure not to waste your three peeks at the correct picture.

About The Program

As you may have noticed, this program makes use of many of the ST's special features. The source code is well documented if you want to experiment with the program. It was compiled with *Megamax C*, so some changes may be necessary to make it compatible with other versions of C.

Here's a brief look at a few generic functions which may be of use in your own programs:

- `rnd(n)`—returns a random integer between 0 and $n-1$.
- `copy(orig, new, words)`—copies a portion of memory of length *words* from *orig* to *new*, where *orig* and *new* are memory locations.
- `compare(orig, new, words)`—compares two areas of memory as defined by *orig*, *new*, and *words*. Returns a zero if they match, or a one if they do not.
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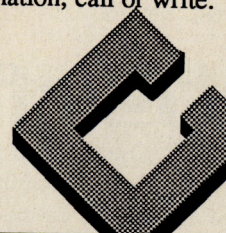
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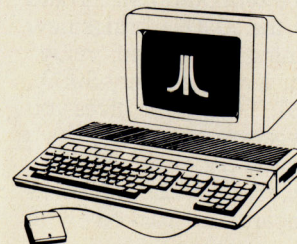
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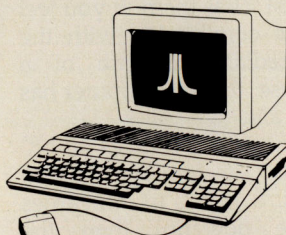
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Choosing A Compiler

So far, we've discussed why it's a good idea to learn to program in C, and a little of what the C language is like. Those of you who think you'd like to try C are now faced with the problem of choosing a C compiler. You have several versions of C to choose from on the ST.

The process of comparing compilers, however, is complicated by the fact that the compiler itself does not make up a complete C programming environment. In order to effectively program in C on the ST, you need not only a C compiler, but also a text editor, linker, command processor shell, resource file construction program, and documentation of the GEM (Graphics Environment Manager) and TOS (Tramiel Operating System) functions. You might also want an assembler, disassembler, debugger, program librarian, and make utility. Each of the C compilers currently being sold contains some, but not all, of these features.

C compilers for the ST are available from Alcyon, Megamax, MetaComCo, and GST. Another package, *Haba Hippo C*, has been discontinued, though copies are probably still available from existing stock. Still another, *Mark Williams C*—a package popular on the IBM PC—has recently become available, but at this writing we have not yet obtained a copy for review.

Of the compilers we've seen, we'll pass by the two lowest-

priced entries, *Haba Hippo C* and *GST C*. *Hippo C* was the first C compiler available for the ST other than Atari's own development system (*Alcyon C*). *Hippo C* was lacking in such areas as floating-point math and GEM support, and had so many other problems that it was ultimately withdrawn from the market.

GST C is not nearly as problem-ridden as *Hippo C*, and in fact has many positive features. For a very low price it offers not only the compiler and linker, but also an assembler, text editor, and menu-driven command shell. It also offers complete GEM support (though it doesn't include GEM documentation). The major problem with *GST C* is that it's not really a complete implementation of the C language. It lacks such major features as floating-point math, casts, and structures. This is not to say that you can't develop significant programs with *GST C*; *GST* reportedly used it in-house to develop *1ST Word*, the word processor included with every ST. But if you're just learning to program on the ST, you're confronted with adapting to both a new language and a complex operating system, and it's extremely difficult to work around the eccentricities of a nonstandard compiler at the same time.

Alcyon C: Wheat And Chaff

The first C compiler to appear for the ST was *Alcyon C*, which is included in the kit which Atari sells to software developers. The \$300 developer's kit is a package deal, however, so you can't buy *Alcyon C* without also paying for everything else in the kit—mostly doc-

umentation. This makes *Alcyon C* the most expensive C package and probably the most extensive as well.

Atari's GEM and ST documentation represents both the best and the worst available. It's the best because it contains the most ST information you can get in one place, and it's the worst because precious little of it was written specifically for the ST.

Take, for example, the GEM documentation. Basically it consists of poor photocopies of Digital Research's preliminary GEM manuals for the IBM PC, complete with 8088 machine language examples that have nothing to do with the 68000-based Atari ST. Atari didn't add any material on how GEM differs on the ST, nor did it try to eliminate the large quantity of irrelevant material that relates only to the PC. It's up to the reader to separate the wheat from the chaff. So while the documentation starts out as a stack of about 2000 loose sheets of paper, by the time you get rid of the IBM GEM installation manual, material on CP/M-68K, and more information than you'll ever want to know about the Kermit communications transfer protocol, you're left with a much smaller pile.

The good stuff consists mainly of the *Hitchhiker's Guide to the BIOS*, the *Line A Document*, a GEMDOS manual, some hardware specifications, and miscellaneous loose ends. This material is very helpful but is incomplete, not entirely free from errors, and poorly organized (some of it exists only as disk files that you must print yourself). There have been some indications that Atari is in the process

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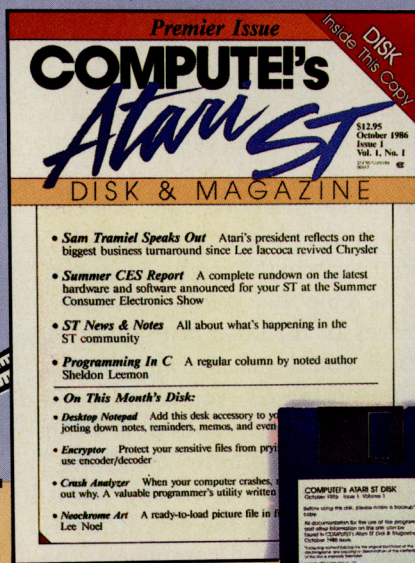
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Probably just as helpful as the printed documentation, or more so, is the support that Atari provides in the Atari Developers' Forum on the CompuServe Information Service. To reach this area, log on and type GO ATARIDEV. Atari representatives are available online to answer programming questions, and they also provide programming examples and timely updates to the manuals. Although this service goes a long way toward filling in the gaps left by the written documentation, it's not free.

The *Alcyon C* Compiler

Alcyon C consists of a three-pass compiler that generates machine language source code, plus an assembler. After you've run those four programs, you still have to put your object code through the linker and Relmod utility to convert it into a form that can be loaded by GEMDOS (GEM Disk Operating System). To make running these six programs a little more bearable, Atari includes a minimal batch utility program that lets you set up text scripts which describe a sequence of programs to be run with one command.

Although the batch utility makes compiling and linking more convenient, it doesn't do much to speed up the process. *Alcyon C* produces good results, but having to load and run so many programs makes it slower for development than any other C compiler. It's theoretically possible to run this compiler with just one single-sided drive, but it's not something I'd recommend if your time is worth more to you than 30 cents an hour. A hard disk drive—or better still, a very large RAM disk—is the only way to go with this package.

The compiler itself is solid and professional. It offers several compile-time options that can be invoked with flags in the command line, including one which specifies a search path for include

files. It has good support for floating-point math, and the library of standard functions is quite adequate.

As usual with this package, however, the compiler documentation is not really specific to the ST version of *Alcyon C*. Instead, you get photocopies of the Digital Research CP/M-68K C documentation, along with *Alcyon's* generic Motorola development system manual. It's up to you to figure out what applies to the system you're working with. Nevertheless, all of the material is there, somewhere.

Valuable Extras

The *Alcyon C* package includes a large collection of auxiliary software. Digital Research's *Resource Construction Set* (RCS) is almost indispensable for creating GEM program resources such as menus and icons. For creating source code, there is the *Micro-EMACS* editor, a non-GEM command-driven text editor that is also available in many public domain versions. The *AR68 Program Librarian* helps manage system library files. *SID* is a symbolic assembly-level debugger.

There's also a simple, usable-but-buggy command processor shell called *COMMAND.TOS* that operates something like the MS-DOS interface. (Personally, I prefer the *Michtron DOS Shell* program, which is more complete and reliable.) And to compensate for the disorganized documentation, the program disks include good source code for a sample GEM application and desk accessory.

In summary, the Atari developer's kit contains everything you need to write great GEM software, but finding it can sometimes resemble a high-tech adventure game.

Although Atari doesn't limit the sale of its developer's kit as some manufacturers do (Atari's definition of a developer is somebody who is willing to spend \$300), the prospective buyer

should exercise discretion. This package is mostly for those who are seriously dedicated to producing commercial applications.

Megamax C: Complete And Concise

The *Megamax C* compiler package provides a development system almost as complete as Atari's, but in a much more attractive and usable format and at a more affordable price (\$200). The GEM documentation isn't as extensive as the Digital Research material from Atari, but that's mostly because it doesn't contain any extraneous information.

Instead, each GEM library call is summarized on its own page, complete with an example of the syntax, a full explanation of the function, and its input and output parameters. Brief overview sections provide a little insight into how to put the calls together. Similar concise explanations are offered for BIOS (Basic Input/Output System), XBIOS (extended BIOS), and GEMDOS routines. In addition, there are chapters covering system global variables, keyboard codes, and system error codes.

In short, *Megamax* has taken all of the most useful ST information and summarized it in a convenient and attractive format, complete with a table of contents and index. The documentation for the compiler itself is also neatly laid out. Its most serious flaw is that there's no list explaining the compiler or linker error messages, which can make it quite difficult to figure out where you've gone wrong.

Megamax's previous 68000 compiler was created for the Macintosh, and for good or ill that experience has shaped the ST version of C. On the positive side, *Megamax* is obviously used to dealing with a mouse-driven windowing environment, and it shows in the way in which *Megamax C* takes advantage of the user interface.

For example, while it's

convenient to use the GEM desktop icons to run a single program, it isn't so convenient when you have to edit, compile, link, and test an application over and over again. So Megamax provides a shell program from which you can easily edit, compile, link, and run the program you're writing. It even has a built-in make utility that lets you compile and link in one step. Moreover, when a compile fails, you end up back in the text editor with your source code and a list of the compile errors in separate windows.

The 32K Ceiling

But Megamax's Macintosh background also has some drawbacks. Macintosh programs use position-independent code, which limits program code and data segments to a maximum size of 32K. While Mac programmers are used to this by now, it seems to have thrown the ST world for a loop. Whenever I mentioned the Megamax compiler to any of its competitors, they almost always said the same thing: It's a nice, fast compiler for small applications, but it isn't really useful for serious work because it limits you to 32K programs.

Of course, if that were true, there wouldn't be any Macintosh software. The 32K limit on program segments means only that any single function must be less than 32K. To create programs larger than 32K, you simply string the 32K sections together.

Likewise, the 32K data section limit means you can't declare an array with more than 32K of elements. You can, however, work with larger data arrays by using the *malloc* function to allocate the memory, then declaring a pointer to that memory block.

Swift Compilation

The *Megamax C* compiler itself is a fast and simple one-pass compiler. True, this simplicity does limit your options somewhat. For example, since there are no compile-time directives, all header files must either be in the same folder

as the source file, or in the HEADERS folder within the MEGAMAX folder. The MEGAMAX folder, in turn, must be on the disk's root directory, which irritates some hard disk users. Also, compiler error messages are directed to a disk file without consulting you for your opinion.

In general, *Megamax C* is very compatible with *Alcyon C* source code. It uses 16-bit integers, which simplify GEM programming. As many published benchmarks have shown, the object code produced by *Megamax C* tends to be smaller and faster than that produced by *Alcyon C*—in some cases, significantly so.

A more important distinction is the time and trouble required to compile a program with each package. Unlike the large and unwieldy collection of programs required for *Alcyon C*, all of the necessary *Megamax C* programs fit neatly on one single-sided disk with room left over for source code. And the Megamax compiler works so quickly that it's actually much faster to compile and link a program using *Megamax C* with a floppy drive than it is to use *Alcyon C* on a hard disk. If you use *Megamax C* with a hard disk or RAM disk, it's almost like working with an interpreter rather than a compiler.

The auxiliary programs in the Megamax package are outstanding. It is the only C package besides Atari's that comes with a resource construction set. Resource files are all but essential to creating GEM applications that use drop-down menus, dialog boxes, and icons, and it is almost prohibitively tedious to create them manually. A resource construction set, therefore, is practically a necessity for serious GEM programmers.

The *Megamax C* linker is intelligent enough to load only the modules necessary to resolve external references in your source code, which reduces the size of executable object files. Also, because it automatically searches the

system library, your command line merely has to specify the name of your object module.

Sorry, No Assembler

Along with the linker there's a librarian and a code improver that performs branch optimization. The text editor is nice, but probably too Mac-like for most ST users—it won't let you move the cursor with the cursor keys, and it's limited to 32K files. Of course, you're free to use any other standard ASCII text editor or word processor to create your source code.

There's no assembler in the Megamax package, and some would say that none is necessary since the compiler accepts in-line assembly commands and thus doubles as an assembler. Still, some people like a compiler that generates assembler source code so they can optimize sections of the program. This isn't possible with *Megamax C* unless you use its disassembler to break down your program and then reconstruct it as source code.

Finally, the Megamax package contains even more example programs than Atari's, including the same application and desk accessory program source.

The only other viable C product I've seen that's cheaper is MetaComCo's *Lattice C*. While this is a good, full C compiler with an excellent standard library, it suffers from some serious problems. First, the *int* data type is 32 bits long instead of 16, which causes portability problems with *Alcyon C*. Second, it doesn't include a resource construction set, which puts a damper on GEM programming. And third, it doesn't include any GEM documentation. By the time you finish buying the extra books you need, your investment will equal the cost of *Megamax C*.

But the real clincher is the compiling time. Unless you're trying to finish *War and Peace* while your programs compile and link, you'll find *Megamax C*'s speed to be a lifesaver.

ST

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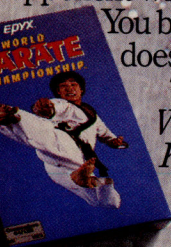
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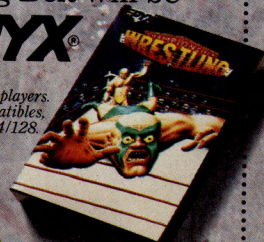
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Finnish

Steve Rehrauer

Each issue, COMPUTE!'s Atari ST Disk & Magazine features a screen of computer artwork contributed by an ST artist. The screen is on the magazine disk in NEOchrome format under the filename ART.NEO. It can be loaded into any graphics-design program compatible with NEOchrome files. If you want to contribute a screen, send the disk to COMPUTE!'s Atari ST Disk & Magazine, P.O. Box 5406, Greensboro, NC 27403. All artwork must be completely original and previously unpublished in any form. Screens should be drawn in the low-resolution color mode. Please include a paragraph or two of text describing the artwork and any special techniques employed. We pay \$100 plus disk royalties for each screen accepted for publication. Artwork accepted for publication becomes the property of COMPUTE! Publications, Inc.

Notes From The Artist

I am a software engineer at Prime Computer in Framingham, Massachusetts, working in the area of compiler design. At home I use my 520ST for fun and profit, and hope to soon see more of the latter. I have several projects in the works, but take a break now and then with *DEGAS* and *NEOchrome*. I used both of these programs, plus an advance copy of *DEGAS Elite*, to create "Finnish." I originally had only a monochrome monitor with my ST system, and "Finnish" was one of my first color efforts. In this picture I was trying to capture the metallic sheen and flowing grace of a goldfish. I am slowly learning to use color effectively at the expense of lower resolution.

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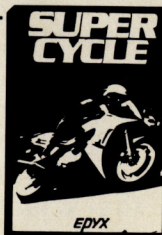
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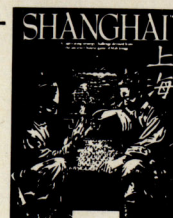
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New Products

ST Desktop Publishing

SoftLogik has introduced *Publishing Partner*, a desktop publishing program for the Atari ST. It offers a complete screen representation of the printed page, and is designed for professionals who want to produce high-quality output mixing text and graphics on their dot-matrix and laser printers.

Publishing Partner supports any PostScript-compatible printer, including Apple's LaserWriter. Epson- and graphics-compatibles, Star (Gemini), and Okidata dot-matrix printers are also supported, and new printer drivers are already being released for other brands.

In addition to having word processing capabilities, the program permits the user to adjust the character size, character spacing, and line spacing ranging from 1/72 inch up to 2 inches. The Toolbox option lets the user insert lines, boxes, circles, and

patterns anywhere on the page.

Publishing Partner is available for \$149.95, and will work with 520ST and 1040ST systems using either a color or monochrome monitor (monochrome recommended).

SoftLogik, 4129 Old Baumgartner, St. Louis, MO 63129.

Circle Reader Service Number 220.

MIDI Recording For ST

Midisoft has announced *Metatrak*, a 32-track software recording studio that connects any MIDI (Musical Instrument Device Interface) musical instrument with an ST.

The \$99 program offers realtime record, playback, overdub, rewind, and fast-forward functions; 32 polyphonic independently controlled tracks; 30,000 notes per song on the 520ST and 70,000 on the 1040ST; full track editing that lets you combine, move, copy, and erase any combina-

tion of the tracks; and many other features. The program also uses all MIDI signals, including pitch bend and keystroke velocity.

Midisoft, P.O. Box 1000, Bellevue, WA 98009.

Circle Reader Service Number 221.

ST Computer Bridge

Bridge Baron, a computer bridge-playing program, is now available for the Atari ST in a recently enhanced version. Winner of the First Computer Bridge Tournament, *Bridge Baron* can generate more than a million random deals, or the user can set preselected deals. In either case, the computer will bid, play the cards, and defend.

The new features of the program include playing with a partner against the computer, receiving hints from the program, optional scoring in rubber bridge fashion, switching sides to replay a previously played hand, choosing an automatic-play mode, and saving deals to disk.

Bridge Baron is available for \$49.95 for the Atari ST computers with either monochrome or color monitors.

Great Game Products, 8804 Chalon Drive, Bethesda, MD 20817.

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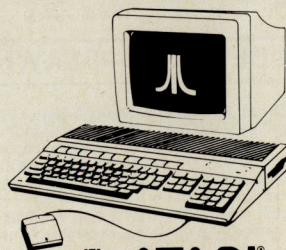
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Advertisers Index

Reader Service Number/Advertiser	Page
102 Abacus	BC
103 Abby's Discount Software	41
104 Absoft	54
105 Accolade	1
106 Aercc	44
107 Atari Corp.	53,54
Batteries Included	2
109 Beckemeyer Development Tools	31
110 Communications Electronics Inc.	63
111 Compucat	64
112 ComputAbility	29
113 Computer Creations	35
114 Computer Mail Order	33
115 Computer Software Service	16
116 Computer Solutions	21
Crown Custom Covers	54
117 DAC Software, Inc.	19
118 Electronic One	47
119 EPYX	5
120 EPYX	13
121 EPYX	59
122 Firebird Licensees, Inc.	IBC
123 Gemeni Enterprises	53
124 Megamax, Inc.	53
125 Metacomco	51
126 MichTron	31
127 MichTron	39
128 MicroProse	10
NRI Schools	25
129 Okidata	6
130 Origin Systems	IFC
131 Precision Data Products	53
Proco Products	51
132 Serious Software	62
133 Software Discounters of America	61
134 SoftWerk	54
135 Static Engineering, Inc.	51
136 STplus	37
137 The ST Station	49

COMPUTE! Books' Atari ST Collection 9
 COMPUTE!'s Atari ST Subscription 56
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How To Use The Disk

Every issue of *COMPUTE!'s Atari ST Disk & Magazine* includes a 3½-inch microfloppy disk as part of the package. If you experience a problem with the disk, please contact us at (919) 275-9809 from 8:30 a.m. to 4:30 p.m. (Eastern Time), Monday through Friday.

To use the disk, simply insert it in a drive and click on the appropriate file-drawer icon to display the directory window. If you wish, you may boot up your ST with this disk by inserting it in drive A and switching on the computer, but normally it contains no active desk accessories.

There are two ways to access programs and files on the disk. You can simply run or examine the files from the GEM desktop. Or you can use the custom menu program on the disk that contains descriptions of each file as well as special instructions. To run the menu program, double-click on the file named DISKMENU.PRGM. It works in all screen modes: low- and medium-resolution color, and high-resolution monochrome.

DISKMENU.PRGM displays a directory of files on the disk, one screen at a time. Click on the lower buttons labeled *Prev* or *Next* to display the previous or next screens.

At the top of the disk menu are three buttons labeled *Description*, *QUIT*, and *Run program*.

The *Description* button calls up a screen which describes the program or file. At the bottom of this screen is the filename and two buttons labeled *MENU* and *RUN*. Clicking on the *MENU* button returns you to the disk menu. Clicking on the *RUN* button loads and runs the program. However, if this particular file is not an executable program (for example, a source code or data file), the *RUN* button is dimmed and disabled.

You can also run a program directly from the disk menu by clicking on the *Run program* button at the upper right. However, if this particular file is not an executable program, you'll be alerted to this fact.

Note that many files on the disk require special instructions or explanation; please refer to the corresponding article before attempting to run a program or access a file.

Clicking on the *QUIT* button on the disk menu returns you to the GEM desktop.

There are four files on the disk which are required for the disk menu program: DISKMENU.PRGM, DISKMENU.RSC, MONOMENU.RSC, and CONTENTS.FEB. Do not delete these files if you intend to use the disk menu. If you plan to use the disk menu, be sure these files are copied when you back up the disk.

Our disk is not copy-protected. You are encouraged to make a backup of the disk as soon as possible. However, the contents of the disk are copyrighted and may not be used by anyone other than the owner of the magazine. Since the writers and programmers whose work appears on this disk are paid, in part, according to the volume of sales, we ask that you respect the copyright.

Special Notes

In order to conserve magazine space for more program-oriented articles, this issue's reviews are included on disk. The filenames are CORNMEN.TXT, PAINTWRK.TXT, MODULA2.TXT, TEXTPRO.TXT, and LEADER.TXT. These are ASCII text files which can be viewed or printed out in three ways. The simplest method is to double-click on the icon or filename in a GEM desktop directory window; when a dialog box appears, click on *SHOW* to read the review on the screen, or click on *PRINT* to make a copy on your printer. Alternatively, you can view or print the reviews by loading them into any text editor or word processor that handles ASCII text files, such as *1ST Word* or *ST Writer*. A third way to view or print the reviews is to use the "File Lister" program included in this issue. Refer to the article for instructions.

Check this issue's "Readers' Feedback" column for updates to two programs published in the October 1986 issue: "Word Count" and "Encryptor."

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