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DISK INSIDE

COMPUTE!'s Atari ST DISK & MAGAZINE

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The Editor's View

Ever since the Atari 400 and 800 personal computers were first introduced back in 1979, Atari has struggled against its image as a videogame company. Although the Atari 800 was a sophisticated home computer for its day, it was still dismissed as a "game machine" by critics. Even the Atari ST—a 16/32-bit computer with upwards of a megabyte of memory and a high-resolution screen—has suffered from this prejudice. When people think about buying a personal computer, only a tiny minority of them think about Atari.

Tandy/Radio Shack used to have a similar problem. Although Tandy was right out front with Apple and Commodore in bringing out the first personal computers in 1977, the TRS-80 was often ridiculed as the "TRaSh-80." Early versions of the Color Computer, with its chiclet keyboard, didn't win rave reviews, either. In addition, many people had a hard time taking Tandy computers seriously when they were sold alongside battery-powered plastic robots and remote-control toys.

But an important difference between Atari and Tandy is that the latter has successfully cleaned up its image. By opening special Computer Centers, Tandy disassociated its computers from its more frivolous products. Nationwide distribution and trained sales people made it easy for shoppers to get the computer they wanted and the help they needed. A low-priced line of IBM PC compatibles played a major role in launching the current boom in MS-DOS computers. And by delivering new products in quantity, almost immediately after they were announced, Tandy has managed to avoid most of the supply/demand and vaporware problems that afflict many other companies in this industry.

As a result, some analysts say that Tandy is now selling more microcomputers than anyone else in the world—including IBM.

Recently, Atari has started taking bold steps, too. At the Fall COMDEX show in Las Vegas, Atari exhibited some products that are unlike anything ever seen from the "videogame company."

When you add these announcements to Atari's $67.3 million purchase of a chain of consumer electronics stores, it looks like Atari is trying pretty hard to emulate Radio Shack.

Can Atari pull it off? To find out more, we sat down with Atari President Sam Tramiel at COMDEX and asked him some questions that have been bothering many observers for months. You'll find an account of our interview on page 10. And on page 14, there's a complete report on the new products Atari exhibited in Las Vegas.

Tom R. Halfhill, Editor

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Readers' Feedback

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.

Pinning Down A Bug

I'm having a problem with alphabetical sorting. I need a program in ST BASIC to sort a couple of thousand words, some of which have up to 18 letters. I typed in the Quick Sort program from the book *Elementary ST BASIC* (COMPUTE! Books), inserting my own DATA statements. It works fine for short words, but it misspells longer words and throws in symbols that aren't part of the alphabet. It also sorts differently each time it runs. Can you tell me what else I need to do?

Mary Ellen Couch

There are no known bugs in the Quick Sort program you mention, and even if you made a mistake while typing it in, there's nothing in the program that would scramble strings or introduce random characters.

The most likely problem, unfortunately, is ST BASIC itself. We've received several letters from people using ST BASIC who have seen strings corrupted with random characters. ST BASIC just doesn't seem to handle string arrays correctly. There are many other bugs in ST BASIC as well. (For instance, try typing X = 18.9 in the Command window. The first attempt results in a strange error message; the second attempt crashes the computer.)

Many other languages are available for the ST, including several versions of BASIC. We feel that the best solution for your problem is to avoid using ST BASIC. A second solution is to buy a database program to do the sorting.

If you're reluctant to try another language or a database program, you could try rewriting the program in Logo, which was included with Atari STs sold before mid-1987. One of Logo's commands is SORT, which alphabetizes lists.

A final suggestion, if you choose to stick with ST BASIC, is to try to work around the scrambled string bug by leaving the string array unsorted and manipulating a numeric array that acts as an index into the string array.

Why 1K Isn't 1K

In the February 1987 issue, it says that the Extended Formatter program gives you 404K on a single-sided disk. When I run it, it formats to 416K. Will using this extra 12K cause head-alignment problems? I'm using a 520ST with TOS in ROM and an SF354 drive.

Jeffrey Hayes

In common usage, K is an abbreviation for kilo, *which represents a quantity of 1000. A kilometer equals 1000 meters, for example, and a kilowatt is 1000 watts. In computer jargon, however, K has a slightly different meaning: It means a quantity of 1024.*

When you use the Extended Formatter program on a single-sided disk, you should get a message that there are 413,696 bytes available, which would lead you to believe that you have nearly 414K on the disk. The article said 404K, however, because in the computer world 1K represents 1024 bytes, an even power of two. Multiplying 404 × 1024 equals 413,696.

The extra 24 units per K begin to add up, especially when you get into the range of megabytes. A 20-megabyte hard disk drive contains more than 20 million bytes. When you multiply 20 × 1024 × 1024, the result is 20,971,520, a bonus of nearly a million bytes over what you might expect.

Whether your drive will experience head-alignment problems when using disks formatted with Extended Formatter depends on the design tolerances of your individual drive. Atari tells us that late-model ST drives have somewhat less tolerance than earlier drives, so programs such as Extended Formatter might not work properly.

Classroom Management

I am a teacher and am relatively new to the field of computing. In December 1986 I bought my first computer, an Atari 520ST. As time passed, I became increasingly aware of the lack of software for classroom management. I need programs that will keep track of assignments, grades, and attendance; help construct, evaluate, and analyze tests; and provide graphics for school-related subjects and activities. If such programs exist, please tell me how I may purchase them.

George A. Gutierrez

Unfortunately, there isn't much commercial software for the Atari ST that's specifically aimed at the applications you mention. You'll either have to adapt general-purpose software to your needs, write your own software, or get someone to write the programs for you.

The first approach is to try using flexible, general-purpose software. If you're concerned mainly with calculating grade averages, you could use a spreadsheet program. For record-keeping (grades, attendance, home address, and so on), you could use a database program. Most spreadsheets and database managers are capable of figuring out and printing grades. There are many such programs available for the ST, ranging from simple to complex. Although they're not designed expressly for managing a classroom, they're suitable for that purpose.

Another approach is customized software—a program that's written to handle 35 students, ten quizzes, and three tests, or whatever combination you plan for a certain class. If you know even a little BASIC, you could probably write such a program yourself. Or, assuming that your school district offers computer programming classes, you could have a student write the program as an extra-credit assignment.

A third solution is to find a specific program for another type of computer (COMPUTE! Publications has, in the past, published grade-book programs for the Atari eight-bit computers and the

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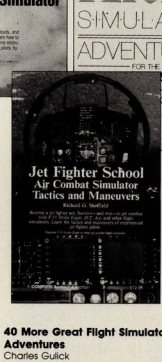

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Commodore 64). In classrooms around the country, Apple, IBM, Commodore, and Tandy computers are very popular. You'd be more likely to find grade-book software for these computers because software companies concentrate on the largest markets.

You'll probably have to try all three approaches to solve your problems. You can design and evaluate tests with general-purpose programs like word processors and database managers. You can search for other programs specifically designed for common classroom-management tasks, or write your own. For publishing classroom newsletters or school newspapers, you can use some of the graphics and desktop publishing programs widely available for the ST.

To demonstrate how a gradebook program might be designed, we've written a short example in GFA BASIC. *It is included on the magazine disk in ASCII format under the filename GRADES.LST. This simple program stores information on up to 31 students. If your classes are larger, the DIM statement in the first line can be modified.*

All information is stored in DATA statements. The first DATA statement contains the number of records in the file. This value is read into the variable COUNTER and is used to build the data arrays.

After reading the data into the arrays, the program displays the grades and averages for individual students and offers you the option of printing out the information. Each series of DATA statements should begin with the student's name and end with an X. *The values in between are the test scores (up to 30 may be included).*

A more elaborate version of this program could direct input and output to a disk file. Routines for searching and displaying individual records could also be included.

Reading The Directory

Is there a way to access the disk directory from ST BASIC other than through the DIR command? I'm writing a file manager, and I must be able to read and save the directory to another file for use by the retrieval segment of the program.

Erich Izdepski

It's fairly easy to read the disk directory from within a program in almost any language except ST BASIC. You need four GEM calls—Fgetdta, Fsetdta, Fsfirst, and Fsnext—none of which is accessible from ST BASIC.

The first two functions get and set the DTA (Device Transfer Area), which is a 44-byte section of memory that contains information about a given file. The filename and extension start at byte 30 within the DTA (the first byte is 0, so byte 30 is actually the 31st in the buffer). First you get the current DTA address and save it; then you set the DTA to your own buffer. Next, use Fsfirst to find the first file matching the wildcard pattern ".*" and read the name from offset 30 in the DTA.*

The Fsnext function will continue to put the next filename in the DTA until there are no more filenames to be found on the disk. The filenames are not sorted in any way; they appear on the disk in the order they were written. When Fsnext returns a negative number, you know you've reached the end of the directory. At that point, you restore the old DTA and exit the program. Here's how you do it in C:

```
#include <osbind.h>
#include <stdio.h>

char diskbuf[44];
char *realbuf;
char names[100][20];
int total=0;
int i;

main( ){
appl_init( );
realbuf = (char *) Fgetdta( );
Fsetdta( diskbuf );
if( Fsfirst( "*.*", 0 ) > -1 ){
  do{
    strncpy( names[total], &diskbuf[30],
12 );
    names[total++][12] = '\0';
  } while( Fsnext( ) > -1 );
}
for( i=0; i<total; i++ )
  printf( "%s \n", names[i] );
Bconin(2);
Fsetdta( realbuf );

appl_exit( );
}
```

The reason you can't write a similar program in ST BASIC is that the four functions Fgetdta, Fsetdta, Fsfirst, and Fsnext are part of GEMDOS, and ST BASIC doesn't support GEMDOS calls. Besides changing languages, there are three solutions you could pursue.

If the important thing is to allow the user to choose a file from the disk, you could display a file selector. See the article "All About File Selectors" in the December 1987 issue of COMPUTE!'s Atari ST Disk & Magazine for details. Several example programs were listed, including one written in ST BASIC.

If you're more interested in manipulating the filenames from inside your program, you could create a file of names with the "SuperDOS" program from the October 1987 issue. Use the SuperDOS DIR command, but redirect output to a disk file. You can then read and modify the resulting ASCII file from the ST BASIC program.

The third solution requires a knowledge of machine language. You could write a routine that calls the various GEMDOS functions, and then call it from the ST BASIC program.

Why They Synchronize Watches

I very much liked the "Personal Calendar" program in the August issue. The author did goof, though, in describing the history of the calendar system when he wrote about the Gregorian calendar replacing the Julian calendar. [Editor's Note: See "Changing Calendars" in the December 1987 "Readers' Feedback."] George Washington's birthday was February 11 in the old style (Julian) calendar, but we call it February 22 (Gregorian).

Your readers might be interested to learn that the Orthodox Russians did not adopt the Gregorian calendar until the early twentieth century, by which time it was 13 days out of sync. In the eighteenth century they did not join with the Protestants in adopting the new calendar. Therein lies the reason for one of the military victories of the Prussian king, Frederick the Great. It seems the Russians and Austrians agreed to gang up on the Prussians. They set a place and time for their armies to combine to attack Prussia. The Austrians showed up first and were whipped. Eleven days later, the Russians showed up and were beaten in turn.

Now you know why they always synchronize their watches in those war movies.

George Gauthier

Thanks for the information.

Learning C

I have bought *Lattice C*, and I've read through the manual. I just don't understand half of it. It took me months to figure out how to link a program. Can you please help?

Christopher Summerhayes

Learning any new language requires a great deal of study, and often you'll have to explore sources of information beyond the language manual. Manuals are generally intended as reference

works rather than tutorials. You'll find that there are many books available in bookstores and computer stores which explain C. Some are highly technical; others are written with beginners in mind. Even if the book is written for a computer other than the ST, you should be able to learn how C works.

The C language itself is fairly small and compact, with only a few dozen built-in functions and a handful of operators. In addition to the functions and operators, there are several standard input/output (I/O) functions such as printf( ) and scanf( ). These standard I/O functions are contained in the STDIO.H file.

On the ST, there are scores of additional built-in functions for handling windows, menus, dialog boxes, graphics, and the like. These are part of the ST's GEM user interface—not part of C—although you can call them from a C program. A few of the functions are very useful; others you may never need. It's not really necessary to memorize every single GEM function, as long as you have a good reference book about GEM.

Once you have a few good programmer's guides, you can learn more about C (and GEM) by taking classes, joining a user group, joining bulletin board systems, and examining the source files of programs on the magazine disk. Good luck.

Turning .BAS Files Into .PRGs

How can I write programs in ST BASIC that can be run without ST BASIC? Is there any way to write a BASIC program that runs all by itself?

Donald Palaganas

ST BASIC is an interpreted *language, and the interpreter (BASIC.PRG) must be loaded before the ASCII files created by the editor section of ST BASIC can be run.*

There's a shortcut you can use, however. BASIC may be installed on the desktop as an application. Select BASIC.PRG on the GEM desktop by single-clicking; then drop down the Options menu. Select Install Application, and enter BAS on the document-type line of the dialog box that appears. Click on OK. Now save the desktop to your BASIC boot disk, again from the Options menu.

From now on, if you double-click on any .BAS file, ST BASIC will load and execute your selected program automatically. (The only exception is when the program's filename is eight characters long, not counting the .BAS extension; due to a bug in ST BASIC, the program is loaded but not executed.)

Another alternative is to use a BASIC compiler. *A compiler converts your program into an executable file which can be run from the desktop without requiring you to load the language in which it was written. (All of the programs on our magazine disk—except those written in ST BASIC—are compiled.) You can even get a compiler that works with most existing ST BASIC programs.* LDW BASIC *not only compiles ST BASIC programs into executable .PRG files, but also fixes some ST BASIC bugs.*

ST

Power With A Price

The long-anticipated two- and four-megabyte Mega ST computers finally started shipping in the U.S. in mid-October, complete with blitter chips. Originally scheduled for release back in March, the Megas made their debut at higher prices than expected. Atari's laser printer also is going to cost significantly more than predicted.

The new machines may have exacted a higher price in another way, too: Several sources blame the sluggish sales of the ST throughout 1987 on the protracted birth of the Megas. The feeling is that many people postponed buying STs—particularly 1040STs—until they could get a look at the more powerful Mega STs.

When the Megas and the laser printer were unveiled at the Winter Consumer Electronics Show in January 1986, Atari didn't officially announce prices for the computers, but hinted that the Mega ST2 would probably list for about $1,500 and the Mega ST4 for about $2,000. A third model, the one-megabyte Mega ST1, was supposed to cost about $1,200. The laser printer was officially announced at $1,500.

Instead, the Mega ST2 lists for $1,699 with a monochrome monitor and $1,899 with a color monitor. The Mega ST4 lists for $2,399 monochrome and $2,599 color. (As reported earlier in "ST News & Notes," the Mega ST1 has apparently been dropped.) The laser printer is now priced at $1,999. These prices are 13 to 33 percent higher than originally expected. Furthermore, a 20-megabyte hard disk drive specially designed to stack atop the Mega's system unit retails for $899, about 300 percent more than a comparable drive for an MS-DOS computer.

Why the higher prices? One reason is that the Megas rely on the new one-megabit random access memory chips, and chip prices haven't fallen as fast as projected. Another reason is a new sales strategy that represents a significant departure for Atari, the "Power Without The Price" company: higher profit margins. Atari says it will give authorized Mega ST dealers industry-standard margins in order to attract more distribution.

Lack of distribution has been Atari's weak point since the STs were first introduced in 1985. Although STs have sold fairly well in Europe, they've never enjoyed the wide distribution required to make them best-sellers in the U.S. Mass merchants, burned in the home computer wars of the early 1980s, have largely retreated from computer retailing. Computer specialty dealers were turned off by Atari's low profit margins; they could make much more money selling MS-DOS computers, Apple Macintoshes, and (to a lesser extent) Commodore Amigas.

By allowing specialty dealers to reap more profits from the Megas, Atari hopes to attract more dealers and thereby boost sales.

Sheldon Leemon & The Editors

Stiffer Qualifications

At the same time, Atari is trying to be more selective of its dealers in an effort to bolster the company's business image. Because the Mega STs are too expensive to be considered home computers, Atari must convince business people that a Mega is a better alternative than an IBM, IBM clone, or Macintosh.

To this end, Atari has announced a new dealer program for the Mega line. It's almost identical to the approach taken by Atari Canada as reported in last issue's "ST News & Notes." Under this program, dealers who wish to sell the Mega STs must qualify as authorized Atari business computer centers. To do so, they must have an outbound sales force (sales people who make calls on potential customers at their place of business), a detailed business plan, an in-store service department, and on-site facilities for demonstrations and training.

The idea is that the Mega ST is a business computer, and it should be sold only by dealers who have the staff and facilities required to give business users the kind of support and service they demand. Atari has also stated that there will be absolutely no mail-order sales of the Mega STs.

In order to encourage dealers to incur the additional overhead necessary to qualify as a Mega dealer, Atari is promising industry-standard profit margins, better reimbursement for warranty service work, and an inventory financing plan. Atari also plans to offer support in the form of training for service technicians and advertising targeted to vertical markets.

Theory Versus Practice

At least, that's how Atari's new strategy to attract business users is supposed to work in theory. In

The Ear

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

Terminal Emulator Termination

The Ear recently heard an interesting rumor emanating from Digital Equipment Corporation. Supposedly, much of the software for DEC's advanced high-resolution terminal, the VT-300, was written on an Atari ST. For that reason, DEC has **VT-300 emulator software** that runs on the ST. The ST's screen resolution is much lower than the VT-300's, so the emulator gives you the choice of scrolling the ST screen or displaying a condensed representation of the whole VT-300 screen.

Now, the ironic part of this story is that there's supposedly **a shortage** of actual VT-300 terminals, so some DEC engineers who need the new VT-300 terminals are using **Atari STs** with the emulator. DEC is a mite touchy on the subject, to say the least. Supposedly, DEC management has declared that if a copy of VT-300/ST emulator is ever discovered outside the company, they won't even bother to look for the guilty party—they'll just **terminate everybody** who ever had a copy.

Questionable Ancestry?

Rumors have been circulating that *PC-Ditto*, the software-based MS-DOS emulator for the Atari ST, is **actually a translation** of the *Transformer*, a similar emulator for the Commodore Amiga. The rumors are **almost true.** Although William Teal of Avant-Garde Systems is indeed the author of both programs, he insists the ST version is a **complete rewrite** that uses none of the code from previous versions. Since the first MS-DOS emulator he wrote was for the Tandy 6000, the ST version could be considered a third-generation effort. Although his previous emulators worked only with monochrome-mode IBM software, *PC-Ditto* runs color programs with no trouble.

PC-Ditto runs a great deal of MS-DOS software, but is still **much slower** than a regular IBM PC. Teal refuses to go into specifics, but has stated that there are ways to improve the emulator's performance so it matches a PC. These methods almost certainly involve **extra hardware,** such as an add-on box with custom logic chips to speed up some of the transformations now performed in software. Some people believe the box could cost as little as $100.

Maybe The 16-Bits Are Dead

Who says eight-bit computers are dead? Not Apple and Commodore. Apple claims it sold more Apple II-series computers in the past six months than in **any similar period** of the company's ten-year existence—and those sales included 200,000 Apple IIGS models. Commodore, which is advertising the Commodore 64 again on Saturday-morning and after-school TV, claims it sold **one million 64s** in 1987 in the U.S. alone. Atari won't release sales figures for any of its computers, but industry sources estimate 1987 sales of the Atari ST in the U.S. at about 100,000 units.

Adios, Amiga

The Ear hears that Atari already has **one change in mind** for the Federated Group, a chain of consumer-electronics superstores it acquired last summer. The **Commodore Amiga,** a stiff competitor for the Atari ST in the store's computer department, is getting the old **heave-ho.**

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. All sources treated confidentially.*

practice, it raises a potential conflict with Atari's simultaneous effort to widen distribution. Why? Because the more rigorous dealer requirements would disqualify many of Atari's existing dealers. If the plan backfires, it could actually narrow the ST's distribution.

Perhaps that's why some Atari dealers have already received shipments of Mega STs before undergoing the qualification procedure. In fact, some dealers selling Mega STs claim to be completely unaware of any restrictions. They also seem surprised by Atari's claims of industry-standard profit margins, since they receive the computers at a 25 percent discount below list price. Industry leaders like IBM, Compaq, and Apple typically give their dealers 35–40 percent.

Some dealers also are less

than pleased about Atari's policy regarding defective computers. Dealers say that Atari holds them totally responsible for fixing defective machines, even if the merchandise is dead on arrival from Atari. In addition to costing the dealers money, this can also lead to a growing inventory of broken computers. When new machines such as the Mega ST first appear, spare parts typically don't become plentiful for several months.

Atari's new dealer policy represents a rather large shift from the company's previous philosophy of moving products to the stores at the lowest possible price, leaving it up to consumers to figure out what to do with them. It's going to take some time for Atari to work out the kinks and get the program fully operational. If Atari is successful, however, it will open up a whole new market for the ST line. While the current 520ST and 1040ST models will still be sold as mass-market home computers, the Mega STs will be aimed at the vast number of small businesses who are moving toward desktop publishing and other applications for which the Megas are well suited.

Atari PC: Still Unavailable

Many analysts believe that Atari's best hope for penetrating the business market is the IBM-compatible Atari PC that was announced at the Winter Consumer Electronics Show in January 1986. Although it doesn't offer as much raw computing power as a Mega ST or even a 520ST, the Atari PC does have the advantage of full compatibility with the software that has become the industry standard. But the Atari PC, originally scheduled for release in spring 1986, has been hampered by delays even worse than the Mega STs.

The latest postponement is said to be due to certification problems with the Federal Communications Commission (FCC). The FCC is responsible for making sure that computing devices don't radiate excessive amounts of radio and TV interference, and many low-end PC clones have been flunking their tests lately. If the Atari PC has failed (no comment from Atari), the resulting delay could postpone the computer's release in the U.S. another two or three months. This could mean that the Atari PC will entirely miss the important holiday shopping season.

In addition, there has been a great deal of speculation that the delays are partly due to Atari's ambivalence about the Atari PC. Now that Atari is trying to move the Mega STs into the business market, the company may not want to confuse the picture.

Another factor is the speed at which the MS-DOS marketplace is evolving. The two models of the Atari PC looked attractively priced at $499 and $699 in January 1986, but things have changed.

Recently, sales of 80286-based IBM compatibles overtook those of 8088- and 8086-based machines for the first time. Although Atari's souped-up turbo 8088 with built-in enhanced graphics adapter (EGA) is about as good as a PC compatible gets, the faster AT-class computers with 80286 microprocessors may kill off PC clones altogether before long. Therefore, Atari may be rethinking the kind of PC it really wants to produce. An inexpensive 80286 clone, like the new Tandy 1000 TX, with a built-in video graphics array (VGA), would be a tough machine to beat.

Pondering The Federated Puzzle

Atari's recent acquisition of the Federated Group was initially interpreted as an attempt to increase shelf space for its computer and videogame products (see "ST News & Notes," December 1986). Atari bought the financially troubled electronics-store chain in late August at a cost of about $67 million. Shortly thereafter, pundits began comparing the move to IBM's failed attempt to operate company-owned stores.

The personal computer community, however, has quite different ideas about why Atari bought Federated. Atari claims the purchase was motivated not so much by the desire to expand distribution for Atari products, but rather by the relatively low price for which the company could be acquired. Even analysts who expressed concern over Federated's red ink seem to agree that Atari paid a bargain-basement price for the chain.

Although Atari undoubtedly will sell its computers and videogames in Federated stores, it should be remembered that these outlets are huge 20,000–30,000 square foot "superstores" which offer a broad range of consumer electronic products—everything from videocassette recorders to microwave ovens. They can hardly be considered company stores. Therefore, some sources now believe Atari is preparing to enter the consumer-electronics business in competition with such chains as Radio Shack and Circuit City.

Some of Atari's current dealers seem unhappy with the acquisition. One dealer says he was told that since Atari spent $67 million for Federated, Atari was canceling the national TV ad campaign for ST computers that was promised for the holiday season. Commercials for the XE videogame system have been aired during Saturday-morning children's shows, but the ST ads have yet to appear. ST

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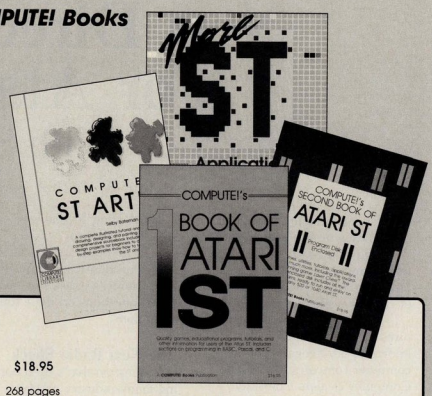

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New Directions For Atari:

An Interview With Sam Tramiel

Tom R. Halfhill, Editor

A parallel-processing transputer? A local area network for STs, IBM PCs, and Macintoshes? Five MS-DOS computers, including a state-of-the-art 80386 machine? A chain of consumer electronics stores?

All are highly unusual ventures for Atari, traditionally known as a videogame/home computer company. At the Fall Computer Dealers Exposition (COMDEX) held in Las Vegas last November, Atari announced more new products than at any trade show since Jack Tramiel took over the company after leaving Commodore. (See "Atari at Fall COMDEX: New High-End Products," elsewhere in this issue.) Significantly, most of those products are tilted toward customers who are likely to be considerably different than the home users Atari has dealt with in the past.

One of Tramiel's often-quoted mottos at Commodore was "Computers for the masses, not for the classes." But at prices climbing over $10,000 for a transputer-driven workstation, his new customers are likely to be corporations, universities, research laboratories, computer-aided design shops, and extremely well-heeled power users.

What is Atari up to? Is it backing away from a home market that has absorbed fewer than 200,000 STs in the U.S. over the past two and a half years? Is it diversifying into higher-end markets to survive against giant competitors like IBM and Apple? Or is it just floating several very expensive trial balloons?

To find out, we interviewed Atari President Sam Tramiel—Jack Tramiel's eldest son—and posed questions on these topics and others.

The Next Radio Shack

One question that's been bothering many industry observers since last fall was why Atari spent $67.3 million to buy the Federated Group, a chain of 65 consumer electronics stores spread throughout California, Arizona, Texas, and Kansas. Federated sells everything from computers and TVs to stereos and videocassette recorders. The chain also finished its most recent fiscal year in the red.

Tramiel says there are three main reasons why Atari bought Federated: it was a good buy; Atari needs more distribution for its computers and videogames; and Atari plans to introduce a line of sophisticated consumer electronics products that aren't personal computers.

"We wanted to have distribution for our computers and videogames, to control our own destiny, especially on the computer side," he says. "The dealers in this country are so tied into Apple, Compaq, and IBM that they don't want to know about a fourth line. They don't want to have another standard. So instead of continuing to butt our heads against the wall with them, we now have our own stores and our own assured distribution."

Tramiel says the Federated stores will continue to sell a wide range of consumer electronics products, but will also have a separate computer section "like Radio Shack does." Within that section, shoppers will find Atari STs, Mega STs, Atari PCs, and competing computer brands—even, contrary to rumor, Commodore Amigas. "We're in it to make money," he explains. "You'll see them there."

Although the stores are now limited to four states, Tramiel hinted that Atari may expand the chain or widen distribution in other ways after Federated's financial health is restored. That won't take long, he predicts.

"Federated was nowhere close to the disaster that Atari was when we took over Atari. Atari was losing a billion dollars in a year. Federated lost $5 million. There's a big difference between fixing Federated and fixing Atari. Atari took us 18 months to turn around. We'll be breaking even [with Federated] this quarter, and by next year, we'll be making good money."

Atari TVs And VCRs?

What about rumors that Atari plans to sell noncomputer products under its name at Federated stores? "Yes, we plan to," says Tramiel. "High-end consumer electronics. Unique things, microprocessor-based. Very smart VCRs, or very smart stereo multi-

screen TVs. Those types of things."

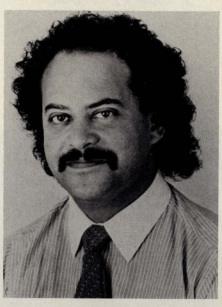
Tramiel says Atari is working on the products now, and they'll be ready sometime in 1988. Because Atari's own factory in Taiwan is too busy making computers and videogame machines, production will be farmed out to other manufacturers, probably in Asia.

One new Atari product that most likely won't be sold in the Federated stores is the Abaq, a parallel-processing transputer shown at Fall COMDEX. At prices ranging from about $6,000 to well over $10,000 (including the Mega ST and high-resolution monitor required to use it), it's by far the most expensive computer Atari has ever announced. Essentially a high-end workstation with the potential power of a mainframe computer, the Abaq represents a significant departure for Atari, which has always been a consumer-oriented company.

"When we first introduced it," says Tramiel, "we got phone calls literally from around the world, from universities and atomic research centers. They were saying, 'When can we get this thing?' It's just so fast, so powerful, at such a low price, they went crazy. So we're going out to the very high-end educational market, and the scientific market, of course."

No Retreat

Other high-end products announced at Fall COMDEX or planned for 1988 include five MS-DOS compatibles, one of which is a speedy 80386 machine to compete with the Compaq DeskPro; a local area network for connecting STs, PCs, and Macintoshes; a Unix-like multitasking/multiuser operating system for the ST; and a new 32-bit computer based on the Motorola 68030 chip. The last product, which Tramiel expects to exhibit at an important computer show held in Hannover, Germany,



in March, won't run ST software but will be able to use STs as terminals. Tramiel says it will run Unix, an operating system more commonly found on workstations than on personal computers.

Despite this array of high-end products, Tramiel denies that Atari is retreating from its traditional home market. He says that Atari's videogame machines, including the recently introduced XE videogame system, are selling as fast as the factory can crank them out. And he points out that at least three of the five MS-DOS computers are aimed at the mass market, not to mention the combination CD-ROM drive/CD audio player shown at COMDEX.

"So yes, we're introducing the Abaq—the transputer machine—but we think those prices will come down in the years to come, and we have to develop the latest technology now to get into it," Tramiel says. "Then we'll wait for the prices to come down in the future, like we've always done."

Atari's long-term survival as a viable computer company depends on this kind of high-tech research and development, he maintains. But R & D doesn't come cheap, and Atari is at a disadvantage in some ways against giant competitors like IBM and Apple. To make the most of its resources, Atari appears to be relying on outside companies to develop some new products, particularly in the area of system software.

For instance, the Abaq's forthcoming operating system, Helios, is a Unix-like system under development by Perihelion Software in the U.K. Another independent developer is working on an MS-DOS emulator for the Abaq. And the multitasking/multiuser operating system announced for the ST at Fall COMDEX is IDRIS, developed by Whitesmiths Ltd. of Massachusetts and ported to the ST by Computer Tools International of Washington.

Weathering The Crash

So in spite of the recent outlays for R & D and the acquisition of Federated, Tramiel says Atari is still in good financial shape. Atari's stock was badly battered in the October market crash, but so far, he says, the effects are minimal.

"We have $80 million in the bank right now," Tramiel declares. "The stock market affects me emotionally, but not financially. The company is exceptionally strong right now. We have no need to go outside into the financial markets now to raise any more capital. We have plenty. We have lots and lots of money, even after buying Federated. We have plenty of cash."

As an international company (factories and suppliers are based in Taiwan, Japan, Hong Kong, and Korea, among other places), Atari is vulnerable to fluctuations in foreign stock markets and currency exchange rates. But Tramiel points out that sometimes those fluctuations work in Atari's favor, as is happening with ST sales in Germany, where the mark is strong against the dollar. So by diversifying into different markets, Atari appears to be spreading its risk. **ST**

Northern Lynx

Judy Wyckoff

Each issue, COMPUTE!'s Atari ST Disk & Magazine features computer artwork contributed by an ST artist. You'll find the NEOchrome*-format file on the magazine disk under the filename ART.NEO. It can be loaded into any graphics-design program compatible with* NEOchrome *files.*

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 in either NEOchrome *or* DEGAS *format. You may include some text describing the artwork and any special techniques employed. We pay $100 for artwork accepted for publication, plus royalties for artwork on the disk. Accepted artwork becomes the property of COMPUTE! Publications, Inc. Only those disks accompanied by a self-addressed, stamped mailer will be returned.*

Notes By The Artist

I am an electronics calibration technician for a Minnesota-based computer company. I draw with *DEGAS Elite* or *Paintworks* for relaxation.

"Northern Lynx" was created with *DEGAS Elite*, without the assistance of a video digitizer. It was patterned after a photograph taken by a friend, Jan McGee, at the Minnesota Zoo.

As the earlier versions show, I started by drawing an outline of the lynx, gradually filling in the detail. The outline was drawn in the normal-size mode with help from *DEGAS Elite*'s flow-draw option. To fill in the detail, I used the magnified mode. I find that a magnification of 4× to 7× works best.

The delicate shading effects were achieved by using light and dark colors in adjacent areas. For sharper edges, use one medium color between the light and dark colors. For more rounded edges, use a larger number of transitional colors and blend them into each other. When blending, try to avoid using one color in a certain area. Use a random pattern of dots, instead.

When keeping objects in perspective is a problem, but the exact problem is hard to identify, it helps to make a mirror image of the picture by flipping the screen 180 degrees (*DEGAS Elite* lets you do this, but some other drawing programs don't). Often, a mirror image makes the perspective problem more apparent—for example, if the left eye is in the wrong position. If the picture looks okay backward, you can be pretty sure it will look okay forward. But don't overuse this technique, or you'll get so accustomed to seeing the problem, it will seem to disappear.

I pause often to study my artwork, checking for good perspective, contrast, and balance. This picture took 40 to 50 hours to create and evolved through about 20 different versions.

Usually, I finish a work with the same color palette I started with. In "Northern Lynx," however, I changed the palette a few times. For instance, I started out with more reds because the photograph was more reddish, but I ended with only one red. [Editor's Note: As seen here, the artist added a butterfly to the picture for balance. Our editors and artists preferred the version without the butterfly, but both versions have their admirers.]

ST

Atari At Fall COMDEX:

New High-End Products

Tom R. Halfhill, Editor

Last fall's Computer Dealers Exposition (COMDEX) was definitely a new product show for Atari, with more new hardware announced than at any trade show in the past two years. But with prices climbing beyond $10,000, many of those new products represent a departure from Atari's traditional markets.

Atari's announcement of the Mega STs and two IBM PC clones a year ago was perceived as a significant overture toward new markets for a company that has always specialized in home computers and videogames. The Mega STs are the most expensive Atari computers ever sold, and the PC clones were the first Atari computers to offer a non-Atari operating system.

Now, with the flurry of new products announced at the Fall COMDEX held in Las Vegas last November, Atari's intentions are even clearer—or fuzzier, depending on your point of view. To the mystification of some industry observers, Atari seems to be branching out in several nontraditional directions at once. Consider these products exhibited at COMDEX:

- A new high-end workstation built around a parallel-processing transputer. With a full-blown system expected to cost more than $10,000, it's aimed mainly at computer-aided design shops, universities, and research laboratories.
- A multiuser/multitasking operating system for the ST that runs Unix-like software and is incompatible with all existing ST programs. It's aimed mainly at businesses and higher-education institutions.
- A local-area network that connects STs, IBM PCs, and Apple Macintoshes.
- A full line of five IBM compatibles ranging from a low-end PC clone to an 80386 powerhouse.
- A combination CD-ROM/CD audio player for businesses, schools, libraries, and homes.
- A $4,000 Mega ST/laser printer package for desktop publishing.

On top of all that, Atari's acquisition of the Federated electronics-store chain moves the company into the highly competitive field of retailing, and Atari is even planning to introduce a line of noncomputer home electronics products such as projection TVs. Yet, Atari has no plans to exhibit at the Winter Consumer Electronics Show in January, an unusual move for a mass market-oriented company.

Some observers are worried that Atari, still a relatively small corporation, is spreading itself a bit too thin—especially at a time when its stock plunged to an all-time low after an historic market crash, and economists are worrying about a recession or depression. But Atari insists it is healthier than ever, has all the financial capital it needs, and must move into high-technology areas to insure long-term survival. (See "New Directions For Atari: An Interview With Sam Tramiel" elsewhere in this issue.)

What's New

In contrast to its complete absence from Spring COMDEX in Atlanta last May, Atari showed up at Fall COMDEX in Las Vegas with a large booth devoted to a host of new products. Here's a summary of what's new.

By far, the most unusual product was the Abaq (pronounced *AH-bahk*, the root word of *abacus*), a transputer-based workstation. What's a transputer? A computer that can use multiple processors to work on a common task simultaneously. This is called *parallel processing*. Although most computers, including the ST, have coprocessors to assist in certain auxiliary functions, such as the video display, a transputer's multiple processors can all work on the main application at the same time. For certain tasks—particularly math-intensive operations—the result is a fantastic improvement in performance.

Atari's Abaq is based on the Inmos T-800 microprocessor, a 32-bit reduced instruction set computer (RISC) chip. By reduc-

Atari's $599 combination CD-ROM/CD audio player has a snap-off remote control panel and can serve as a monitor stand for ST computers.

ing the number of instructions in the chip's machine language, even more speed is gained. The basic-model Abaq has one T-800 processor, four megabytes of random access memory (RAM), and one megabyte of screen RAM. It has four screen modes: 1280 × 960 pixels with 16 colors or monochrome; 1024 × 768 with 256 colors; 640 × 480 with 256 colors and two screens; and 512 × 480 with 16 million colors.

The basic-model Abaq can execute 10 to 12 million instructions per second (MIPS), performing calculations at a rate of 1.5 megaflops (million floating-point operations per second). That's roughly ten times faster than an IBM PC AT.

But that's just the beginning. The Abaq can accept up to three processor expansion cards, each with four T-800 processors. Atari says a fully expanded system with 13 T-800s would run at about 100 MIPS, comparable in speed to a mainframe computer. The system can be expanded even further by chaining two or more Abaqs together.

The Abaq must be plugged into the expansion port of a Mega ST to operate because it lacks a keyboard and input/output devices. It also requires an expensive monitor to display all those colors and pixels, something in the range of $1,000–$3,000.

Instead of working with a standard operating system, the Abaq will run under Helios, a Unix-like operating system being developed by Perihelion Software in the U.K. According to Atari, Unix programs can be adapted to Helios with little or no modification. Atari also says another developer is working on an MS-DOS emulator capable of running IBM PC software at speeds faster than an AT.

What's the bottom line for the Abaq? Atari announced no prices, but the basic model is expected to cost about $3,000, not including the Mega ST and monitor. An Abaq with 13 processors is expected to cost around $10,000, again, without a Mega or monitor. Atari predicts the Abaq will be available in the U.S. by the second quarter.

CD-ROM Reappears

Atari watchers may recall that way back in July 1985, soon after the 520ST was first introduced, Atari announced a CD-ROM (Compact Disc-Read Only Memory) drive. At one industry trade show, Atari even demonstrated the CD-ROM drive on an ST with a CD-based encyclopedia (see "Monster Memory," COMPUTE! magazine, August 1985). Wonderful things were predicted for CD-ROMs in homes, schools, and libraries.

Atari says a fully expanded Abaq transputer would execute about 100 million instructions per second. Comparable in speed to a mainframe computer.

Then, abruptly, Atari's CD-ROM disappeared. Atari explained that the technology was still too expensive for the mass market.

Over the past two years, numerous other companies have introduced both CD-ROM drives and extensive databases on CD. But at costs exceeding $1,000, these products have been purchased mainly by institutions and corporations.

At Fall COMDEX, Atari declared that CD-ROM is now ripe for the home. Consequently, the company showed the latest incarnation of its drive: a combination CD-ROM/CD audio player. When hooked up to a stereo system, it looks much like any other CD player. But when hooked up to an ST, it reads CD-ROM discs, a multiple personality that Atari hopes will make it a success in the home market.

During COMDEX, Atari demonstrated the unit's data-storage capabilities with *The Visual Dictionary* (an interactive, illustrated encyclopedia on CD-ROM), and showed off its audio capabilities with a Huey Lewis album. Because a CD-ROM can store 540 megabytes of information, the encyclopedia fit comfortably on a single disc. Despite a few minor glitches, the system appeared to work smoothly, thanks, in part, to the ST's direct-memory access (DMA) port, which can transfer data at ten megabits per second.

A nifty touch is the player's front-mounted control panel: It snaps off to provide a remote control for music listening. Also, the unit is styled to match the ST and can serve as a monitor stand.

Atari says the CD-ROM drive will be available by February at a retail price of $599.

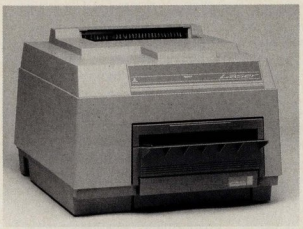
Five MS-DOS Computers

Although the two Atari PCs announced in January 1987 still hadn't appeared in U.S. stores by COMDEX in November, Atari exhibited three additional MS-DOS computers and slightly redesigned the original two machines.

The new lineup now includes the PC1 and PC2, a pair of low-end IBM PC clones; two variations of the PC4, an AT-class compatible; and the PC5, an 80386-based computer.

The PC1 and PC2 each have an 8088 microprocessor that runs at 4.77 or 8 megahertz (standard IBM PC speed is 4.77 mHz); 512K RAM expandable to 640K on the motherboard; a single 5¼-inch or optional 3½-inch floppy disk drive; a battery-powered clock; a mouse and mouse port; serial and parallel ports; built-in color/graphics and enhanced graphics adapters (CGA and EGA); and an amber monitor capable of displaying EGA graphics in monochrome.

The main difference between



Atari's SLM804 laser printer is finally out of the box, but the $1,999 price is $500 more than expected.

Hooked up to an Atari laser printer, the Mega ST-2 or Mega ST-4 becomes a desktop publishing system starting at $4,000.

the two machines is expansion potential. The PC1 has a single half-card slot; the PC2 has five full-size slots (like the PC XT) and is physically larger. Both have sockets for an 8087 math coprocessor.

Atari said the PC1 would be available in the U.S. in late November for $799; the PC2 was scheduled for release in the U.S. in early January at $899.

The new PC4 is an AT compatible available in two configurations. Both have an 80286 microprocessor; 640K of RAM; a socket for an 80287 math coprocessor chip; four AT-style expansion slots; a battery-powered clock; a mouse and mouse port; serial and parallel ports; a 5¼-inch or optional 3½-inch floppy disk drive; a hard disk controller; an amber-screen monitor capable of displaying EGA graphics in monochrome; and four built-in display adapters—CGA, EGA, monochrome (MDA), and Hercules. The PC4 can also be equipped with a video graphics array (VGA), the new video adapter introduced with IBM's PS/2 series.

The difference between the two versions of the PC4 is speed. One model runs at 8 mHz with zero wait states, while the other runs at 12 mHz with one wait state or 8 mHz with zero wait states. According to Atari, the regular PC4 will be available in early 1988 for around $2,000; the faster version will be available at the same time for a bit more.

Topping off Atari's line of MS-DOS computers is the PC5. This machine is similar to the PC4 but is powered by a 32-bit 80386 microprocessor, running at 16 mHz with zero wait states. Atari says it will be available in early 1988 for around $3,000.

Multitasking And Networking

As yet another indication that Atari is pursuing the business market, the company announced a multiuser/multitasking operating system for the ST, and a local area network that connects STs to IBMs and Macintoshes.

Actually, the new operating system was first seen back in May at Spring COMDEX. It's a Unix-like operating system called IDRIS and was described in the October 1987 issue of COMPUTE!'s Atari ST Disk & Magazine. IDRIS is not compatible with existing ST software and cannot run GEM or TOS programs. Instead, it's a command-line operating system that works only with software specifically written for IDRIS.

Six IDRIS programs were announced at COMDEX: *Crystal-Writer Plus* (a word processor) and *Crystal Document Management System* (a word processor/formatter/typesetter) from Syntactics; *LEX P*D*Q* (a word processor) and *LEXET* (a desktop publishing system) from Trajectory Software; *Word Era* (a Wang-compatible word processor with voice recognition) from Tigera; and *Fusion Network Software* (a networking package for micro- and minicomputers) from Network Research Corporation.

IDRIS was developed by Whitesmiths Ltd. of Concord, Massachusetts, and adapted for the ST by Computer Tools International of Federal Way, Washington. The retail price is $800.

Atari's new local area network (LAN) is called—seriously—Moses PromiseLAN, a name that obviously owes something to Jack Tramiel's Jewish heritage. It allows up to 17 Atari STs, IBM PCs and compatibles, and Macintoshes to be connected in a star configuration with ordinary telephone wire. The computers can then exchange data and share peripherals, including laser printers and storage devices.

Moses PromiseLAN is compatible with two LAN standards: NETBIOS (Network Basic Input/Output System), which is used by IBM and Novell; and AppleTalk, which is used by Apple for the Macintosh. It transfers data at a rate of 1 megabit per second with PCs, and more than 250 kilobits per second over AppleTalk.

No prices or availability dates were announced for Moses PromiseLAN. **ST**

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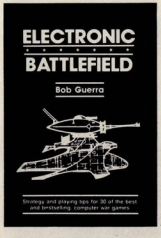

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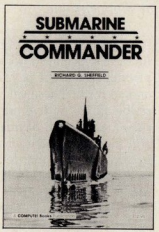

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Financial Calculator

David Moews

Maybe you're thinking about buying a house, a car, new furniture, or a major appliance, and you'd like to know what your monthly payments will be. Or perhaps you've just heard about an irresistible get-rich-quick investment, and you're anxious to figure out how soon you'll be a billionaire. No matter what kind of financial computations you need to solve, you'll find this program an invaluable aid. It can be used as either a stand-alone program or a desk accessory, and it works on all STs, color or monochrome.

A very popular type of hand-held calculator is the financial calculator, normally used to compute loan payments, interest payments on invested money, and so forth. These calculators typically let you describe a loan by five numbers—principal, interest rate, loan period, payment periods, and payment—and then they solve for any one of the five numbers in terms of the other four. One drawback is that due to the hand-held calculator's limited display, only one of the five numbers can be shown at a time.

"Financial Calculator" is a useful program that solves this problem by using the Atari ST's screen to simultaneously display all of the values that describe a loan. It has other advantages over a hand-held calculator, including the ability to display all intermediate results during a computation.

Two versions of Financial Calculator are included on this issue's magazine disk: a regular stand-alone program and a desk accessory. They are identical in function; the desk accessory version merely has the advantage of being instantly available from any Desk menu when installed during bootup. Financial Calculator is compatible with all ST systems, color (medium-resolution only) or monochrome.

Getting Started

The stand-alone program version of Financial Calculator can be found on the magazine disk under the filename CALC.PRG. To run it, simply double-click on the icon or filename from the GEM desktop as usual. You can also run the program from the magazine disk menu.

When you copy CALC.PRG to one of your own disks, remember to copy the file CALC.RSC as well. This is a resource file required by the program in order to function.

The desk accessory version of Financial Calculator can be found on the magazine disk under the filename CALC.AC. It cannot be run from the disk menu or the GEM desktop. Instead, like all desk accessories, it must be copied to your boot disk so it will be installed in memory when the computer is first switched on. To install Financial Calculator as a desk accessory, follow these steps:

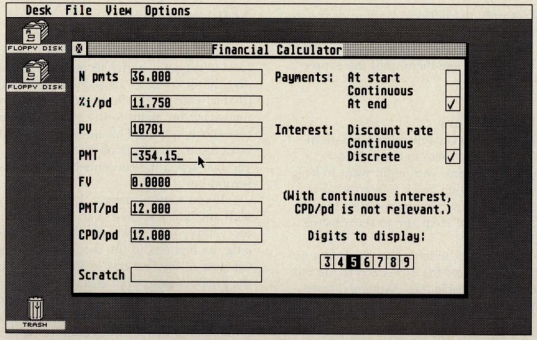
1. Copy CALC.AC to your boot disk—that is, the disk you routinely insert in drive A before switching on the computer. Be sure to copy the file into the *root directory* of the disk (the main directory, not a subdirectory/folder). If the ST system you're using has a hard disk, copy CALC.AC to the root directory of drive C.

2. Rename CALC.AC to CALC.ACC. If you're not sure how to rename a file, consult the manual that came with your ST.

3. Copy the resource file CALC.RSC to the root directory of your boot disk, or to the root directory of drive C if you're using a hard disk.

4. Now you're ready to install the accessory. Switch off the computer and wait at least 30 seconds. Then insert the boot disk with CALC.ACC and CALC.RSC into drive A and switch the computer back on. (If you're using a hard disk, put your normal boot disk in drive A; the desk accessory will be loaded from drive C.)

5. When the GEM desktop appears, drop down the Desk menu; a new entry entitled *Financial* should be there. Selecting this entry opens the Financial Calculator. Desk accessories are always available from the GEM desktop or within any GEM program that has a Desk menu. (In some programs, such as *1ST Word*, the Desk menu appears under an Atari logo symbol.)



"Financial Calculator" lets you solve a wide variety of common financial problems in seconds.

Remember that the current version of the ST's operating system does not allow you to install more than six desk accessories at a time. The Control Panel / Install Printer accessory (named CONTROL.ACC) that came with your ST counts as *two* accessories. If Financial Calculator won't install properly, make sure you haven't exceeded this limit. Also, keep in mind that desk accessories consume RAM, and an unexpanded 520ST with several large accessories and a ramdisk might run out of memory. If you have this problem, try disabling some accessories by renaming them with some filename extension other than .ACC and rebooting the computer.

If you have an early 520ST without the TOS operating system in read only memory (ROM), you'll have to rename CALC.ACC to DESK*x*.ACC, where *x* is a number from 1 to 6 that does not conflict with other accessories on your boot disk. Example: DESK5.ACC.

Operating The Calculator

Whether you run the program version of Financial Calculator or the desk accessory, the calculator window that pops open looks the same (see the accompanying figure). There are eight empty boxes on the left; each box can hold a number or a numeric expression. On the right are two groups of check boxes, which are used to adjust the way in which the calculator solves problems. You'll also see a strip of numbered boxes for adjusting the number of significant digits displayed by the calculator.

To enter numbers into one of the eight boxes on the left, select it by clicking it with the mouse; an underline cursor will appear in the selected box. You can then enter numbers into the box by typing them on the keyboard. To denote a negative number, precede the number with a minus sign. To indicate exponential notation, precede the number with an upper- or lowercase *E*. For example, this entry

```
-1.7e-3
```

is interpreted to mean

```
-0.0017
```

Numeric expressions can be entered into the boxes as well as numbers. Expressions may use the following operators:

+	(for addition: 16+2=18)
−	(for subtraction: 16−2=14)
*	(for multiplication: 16*2=32)
/	(for division: 16/2=8)
^	(for exponential functions: 16^2=256)
v or V	(for taking *n*th roots: 16v2=4)

You can also use parentheses in expressions to change precedence. Financial Calculator obeys the normal rules of mathematical precedence: Exponential functions and roots are performed first, followed by multiplication and division, then addition and subtraction. (You might recall the MDAS, or "My Dear Aunt Sally," rule from high school: Multiplication, Division, Addition, Subtraction.)

While you're entering an expression, Financial Calculator computes all possible intermediate results and displays them to the number of significant digits selected. For example, if you enter 4+2*3 and have chosen to display three significant digits, the program displays 4.00+2.00*3 in the box. If you enter 4+5*(2+3*4+5) with three significant digits selected, the program displays 4.00+5.00*(14.0+5).

Because room is limited in the boxes, some expressions may grow too long to fit—especially if many intermediate results are displayed at once or if many significant digits are selected. In this case, the

program displays only the leftmost portion of the expression in the box. You may continue entering numbers and operators as if everything were visible, but you won't be able to see them until the expression simplifies.

Calculator Control Keys

Several special keys are available within Financial Calculator. We'll describe them in detail below; when learning the program, you might want to keep a copy of the accompanying quick-reference table handy. Also, at any time while you're using the calculator, you can press the Help key to see a list of the commands.

The Return key closes all left parentheses in a numeric-entry box and reduces the expression in the box to a single number, if possible. For example, if three significant digits are being displayed and you enter

```
4*(2+3
```

the box reads

```
4.00*(2.00+3
```

If you then press Return, the box reads

```
20.0
```

The Escape key clears a numeric-entry box. Another way to clear a box is to hold down the Shift key and click on the box with the mouse.

The underscore or underline key (_) acts like the +/− key on a hand-held calculator—it reverses the sign of the number just entered or of the intermediate result just calculated. For example, 5_ and 2+3 [Return] _ both yield −5.00 (assuming that three significant digits are being displayed).

The pound or number-sign key (#) acts like the $1/x$ key on a hand-held calculator—it takes the reciprocal of the number just entered or of the intermediate result just calculated. For example, 5# and 2+3 [Return] # both yield .200 (assuming that three significant digits are being displayed), because 1/5 equals 0.2.

The up-arrow key moves the underline cursor to the box immediately above the one that's currently selected. If the cursor is in the top box, the up-arrow key moves the cursor to the bottom box.

The down-arrow key moves the underline cursor to the box immediately below the one that's currently selected. If the cursor is in the bottom box, the down-arrow key moves the cursor to the top box.

The equals key (=) solves a financial problem for the selected box; we'll explain this in a moment.

If you enter an illegal keystroke (for example, two mathematical operators in sequence), Financial Calculator beeps and ignores the keystroke. If a more serious error occurs—such as an internal memory overflow (because of too many pending operations), division by 0, or taking a 0th root—an alert box appears as a warning that something went wrong. Press Return to continue.

Additional Controls

If you want to append a long number or an expression in one box to an entry in another box, you don't have to retype it in the second box. Instead, simply *drag* the first box to the second box with the mouse (that is, point to the first box, hold down the left mouse button, point to the second box, and release the mouse button). This adds the contents of the first box onto the contents of the second box, just as if you had typed the contents of the first box into the second box.

If you want to *replace* the contents of one box with another box, there's an easy way to do that, too. Simply hold down either Shift key while dragging the first box to the second box. This copies the contents of the first box to the second box, erasing the previous entry that was in the second box.

To set the number of significant digits displayed in the numeric-entry boxes, click on the appropriately numbered box at the bottom of the Financial Calculator window.

Performing Computations

Financial computations involve only the top seven numeric-entry boxes. The eighth box, at the bottom, is a spare box for scratch work. You may find it handy at times to perform calculations in the scratch box and then transfer the results to any of the other boxes by dragging with the mouse.

The upper seven boxes, starting from the top, have the following functions:

N	*Number* of payments you will make or receive.
%i/pd	*Interest paid* during a certain base period (typically a year).
PV	*Present value;* the amount of money you start with.
PMT	*Payment;* the amount of money per payment.
FV	*Future value;* the amount of money you have at the end after all of the N payments are paid or received.
PMT/pd	*Payments per period;* the number of payments you make during each period (for instance, 12 for monthly payments, or 1 for yearly payments, if the period is a year).
CPD/pd	*Compounding per period;* the number of times per year the interest is compounded during each period (for example, 12 for monthly compounding, or 1 for yearly compounding, if the period is a year).

Financial Calculator allows you to solve for any one of these seven variables when you enter the other six. Just enter the appropriate numbers or numeric expressions into six of the boxes, click the mouse on the remaining box you wish to solve for, and press the equals key (=). Instantly, Financial Calculator evaluates the numeric expressions in the other six boxes (as if you had pressed Return in each of these boxes), and displays the final result in your selected box.

If the program cannot evaluate an expression in a box for some reason, you'll hear a beep, and all boxes will remain unchanged.

The signs of the PV, PMT, and FV boxes indicate the direction of cash flow. That is, a positive value indicates payments to you (from an investment,

for instance), and a negative value indicates payments you owe (such as loan payments on a purchase).

The Six Check Boxes

Outcomes of financial computations are further affected by the six check boxes on the right side of the Financial Calculator window. These check boxes are arranged in two groups of three. Only one box can be selected in each group at a time. The selected box is indicated by a check mark inside it.

The top three check boxes determine exactly when the payments take place. If the top check box (*Payments at Start*) is selected, the PV records the amount of money you have as of the first payment, and the FV is measured one payment after the last payment is made, at the time of payment N+1.

If the middle check box (*Payments Continuous*) is checked, the PV and FV are measured the same time apart, but the money from the payments is spread out and paid continuously between them. However, the money paid is accumulated into N discrete payments for purposes of bookkeeping.

If the bottom check box (*Payments at End*) is checked, the same time still elapses between the measurement of the PV and the FV, but the PV is measured one payment *before* the first payment—at the time payment 0 would occur—and the FV is measured at the same time as the last payment, payment N. This is the way most loan payments are figured.

The other three check boxes control the way in which interest accumulates. Interest Discrete is the normal way of paying interest—the %i/pd rate is compounded the number of times per period given in the CPD/pd box.

When Interest Continuous is selected, the %i/pd rate is compounded *continuously*, as if the CPD/pd box contained a very large number. In this case, the CPD/pd box is ignored and cannot be solved for.

The *Interest Discount Rate* check box indicates that the interest is figured *after* it has been paid, rather than before. Normally, for example, 20 percent interest on $100 yields $120, because 20 percent of $100 is $20, and $100+$20 equals $120. But with Interest Discount Rate, 20 percent interest on $100 yields $125, because 20 percent of $125 is $25, and $100+$25 equals $125.

When you first run Financial Calculator, it automatically sets the check boxes for Payments at End and Interest Discrete. This should be correct for most financial problems. With some problems, you'll have to change the payment check boxes for Payments at Start; the other checkbox options are less frequently used.

A Few Limitations

In certain cases, the value you're solving for is mathematically impossible to determine from the values you give, or else your values may describe an impossible situation. In these cases, an alert box appears as a warning that something went wrong; press Return to continue. Also, under certain conditions, there are two solutions possible for %i/pd, PMT/pd, or CPD/pd; the program will find only one of these solutions.

If N is negative, you can solve for N, PV, PMT, and FV, but not for %i/pd, PMT/pd, or CPD/pd. I recommend that you enter positive values for N.

PMT/pd and CPD/pd should be kept positive at all times or undetected errors may occur.

Values obtained for %i/pd, PMT/pd, and CPD/pd are accurate to a maximum of six decimal places, regardless of the number of significant digits being displayed at the time.

Figuring Loan Payments

Let's try an example of the most common type of problem performed on financial calculators—determining the amount of a monthly payment.

Assume you wish to buy a car that costs $7,000. You have $1,000 cash or trade-in for a down payment, so you need to borrow $6,000 for the balance. You apply for a $6,000 loan at First Rational Bank, and they offer you 8.25 percent interest for three years. The payments are due monthly, and the interest is compounded monthly. What will your payments be, and how much interest will you have to pay?

To begin with, make sure the number of significant digits to be displayed is 5 by clicking on the appropriate box at the bottom of the window. (Financial Calculator defaults to five significant digits when it runs.)

Now, begin entering the information required to solve the problem. Since your car payments will be monthly, there are 12 payments per year; enter 12 into the PMT/pd box. Interest is also compounded 12 times per year; enter 12 into the CPD/pd box. Enter 6000 into the PV box, and 8.25 into the %i/pd box. Since you have to make monthly payments for three years, you have a total of 36 payments; enter 36 into the N box. After three years, the loan will be completely amortized, and you'll owe no money; so enter 0 into the FV box.

At this point, you've entered six of the seven possible variables. To solve for the seventh variable—the payment—select the PMT box by clicking on it with the mouse, and then press the equals key. Financial Calculator displays a value of *−188.71*. Remember, the sign indicates the direction of cash flow, so a negative value means the monthly payment you owe is $188.71.

To find the total amount of interest you have to pay, first save the principal, $6,000, by dragging the PV box to the scratch box. Next, select the %i/pd box, press Esc to clear it, and enter 0 to reset it to zero. Now select the PV box and press the equals key; the result is 6793.6. This is the sum of all 36 payments you must make. Finally, enter a minus

Financial Calculator Quick-Reference Table

Keyboard/Mouse Controls

– (Minus sign) Indicates negative value in box.

E Indicates exponential functions in box. Lower- or uppercase *E* allowed.

_ (Underscore) Reverses sign of number just entered or intermediate result just calculated.

Takes reciprocal of number just entered or intermediate result just calculated.

↑ (Up arrow) Moves cursor upward to next box.

↓ (Down arrow) Moves cursor downward to next box.

Esc Clears a box.

[left mouse button] Selects a box.

Shift-[left mouse button] Clears a box.

Return Closes left parentheses and evaluates expressions (if possible) in a box.

= Solves a financial calculation for the selected box.

Help Displays a list of available commands.

[Mouse drag] Appends value from source box onto value in target box.

Shift-[mouse drag] Replaces value in target box with value from source box.

Arithmetic Expressions

+	(for addition: 16+2=18)
–	(for subtraction: 16–2=14)
•	(for multiplication: 16*2=32)
/	(for division: 16/2=8)
^	(for exponential functions: 16^2=256)
v or **V**	(for taking *n*th roots: 16v2=4)
()	(for changing precedence)

Numeric-Entry Boxes

N	*Number* of payments you will make or receive.
%i/pd	*Interest paid* during a certain period (typically a year).
PV	*Present value;* the amount of money you start with.
PMT	*Payment;* the amount of money per payment.
FV	*Final value;* the amount of money you have at the end after all of the N payments are paid or received).
PMT/pd	*Payments per period;* the number of payments you make during each period (for instance, 12 for monthly payments or 1 for yearly payments, if the period is a year).
CPD/pd	*Compounding per period;* the number of times per year the interest is compounded during each period (for instance, 12 for monthly compounding, or 1 for yearly compounding, if the period is a year).

sign (–) to prepare for subtraction, drag the principal from the scratch box back up to the PV box, and press Return. The result is 793.59, the total amount of interest you have to pay.

Remember, Financial Calculator lets you solve for *any one* of the seven variables by entering values for the other six. This can be extremely useful when you need to attack a problem from different directions. For instance, in the example above, let's say you decide before shopping for a car that the largest monthly payment you can afford is $190. By entering this value in the PMT box, and then entering appropriate values for the interest rate, number of payments, and so forth, you can solve for the PV box to figure out the most money you can borrow without busting your budget (in this case, $6,040.99).

Notes For Programmers

Financial Calculator was written in *Megamax C*. If you're interested in studying how the program works, the C source code is included on the magazine disk in a special compressed format. The source files are contained within the compressed file SOURCE.ARC. See "Uncompressing Source Files" elsewhere in this issue for instructions on reading the source code.

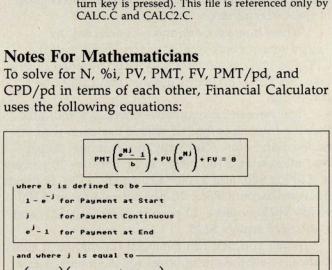
The source code files for Financial Calculator are CALC.C, CALC2.C, CALC3.C, and CSTRUCT.H. To compile Financial Calculator as a program, you must compile CALC.C, CALC2.C, and CALC3.C, and link CALC.O, CALC2.O, CALC3.O, and the *Megamax* library DOUBLE.L. To compile Financial Calculator as a desk accessory, you need to remove the comment from #define ACC in CALC.C, compile CALC.C, CALC2.C, and CALC3.C, and then link CALC.O, CALC2.O, CALC3.O, and the *Megamax* libraries DOUBLE.L and ACC.L.

Here are descriptions of the source files:

CALC.C	Contains all GEM-specific code; it draws the boxes, labels, and so forth, and handles the user's keypresses, mouse clicks, and drags.
CALC2.C	Evaluates algebraic expressions, such as displaying 5.00 when 2+3 [Return] is entered.
CALC3.C	Solves the financial problems when the equals key is pressed.
CSTRUCT.H	Specifies the data structure used to hold partially evaluated expressions (such as 2+3 before the Return key is pressed). This file is referenced only by CALC.C and CALC2.C.

Notes For Mathematicians

To solve for N, %i, PV, PMT, FV, PMT/pd, and CPD/pd in terms of each other, Financial Calculator uses the following equations:

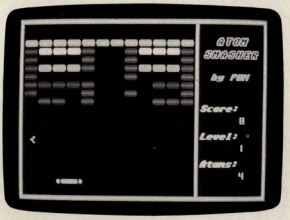


ST

Atom Smasher

Patrick B. McCaffrey

With its smooth animation, 32 different screens, up to half a dozen simultaneously moving objects, and a few delightful surprises, "Atom Smasher" is one of the most well-crafted action games ever published for the Atari ST. It runs on any ST system with a color monitor.



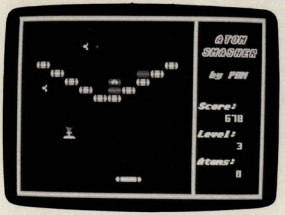
Save your quarters for the parking meters: "Atom Smasher" is here.

Atom Smasher is an arcade-style action game that brings you to a domain of intricate brick barriers, high-speed uranium atoms, and gremlins surfing on flying saucers. It's as thrilling as any game you'll find in the coin arcades and a lot more economical. Plus, with 32 different screens to conquer, it'll keep you challenged for a long time.

To play Atom Smasher, the only file you need on this issue's magazine disk is SMASHER.PRG; there are no resource or data files. Notice the compact size of SMASHER.PRG—only about 15K. Atom Smasher was written completely in machine language for minimum size and maximum speed.

You can run Atom Smasher from the magazine disk menu or the GEM desktop. Either way, we recommend switching to the low-resolution screen mode before loading the program. Although Atom Smasher can be played in medium resolution, it looks best in low-res.

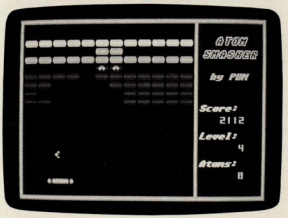
After the program is up and running, you'll be greeted by a screen that asks you to press P to play or Q to quit. Clicking the left mouse button also advances to the first game screen.



Smashing Bricks

The object of Atom Smasher is to destroy the bricks on each screen by smashing them with a uranium atom bounced off your movable paddle. The paddle can be moved left and right across the screen with the mouse. If you miss the uranium atom with your paddle and let it fall off the screen, it's replaced with another atom until you've missed five in all. Then the game ends.

To start a game of Atom Smasher, click either mouse button to set the first atom into motion. You can pause the game at any time by pressing the space bar; press it again to resume play. You can also abort



a game by pressing both mouse buttons at once.

Atom Smasher has 32 different game screens. To advance to each successive screen, you must destroy all of the *ordinary* bricks on a screen. Ordinary bricks are those without any markings. The bricks with markings have special purposes, as explained below:

Banded bricks These are virtually indestructible. Don't waste a lot of time trying to smash them.

A Releases another uranium atom into play. There can be as many as five atoms on the screen at once (but not for very long, unless you're an expert player). If more than one atom is on the screen, all of them must fall off the screen before they collectively count as one lost atom.

S Speeds up all uranium atoms on the screen.

? Awards a random point value.

G Releases Guido the Gremlin to annoy you. He'll be surfing on his flying saucer, following your paddle. To get rid of Guido, you must hit him—not his saucer—with an atom.

Both the ordinary bricks and the special bricks have different point values and require different numbers of hits to be smashed, as summarized in the following table:

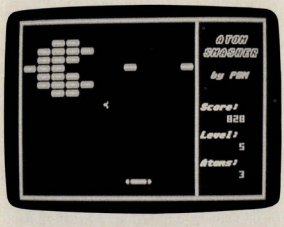
Brick	Hits Required	Points
Blue	1	1
Purple	1	2
Yellow	2	5
Cyan	2	10
Silver	3	20
Banded	Lots	25
A	2	0
S	2	0
?	2	random
G	2	0
Guido	1	50

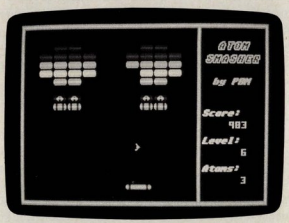
Also, note that for every 750 points you score, you earn a bonus uranium atom.

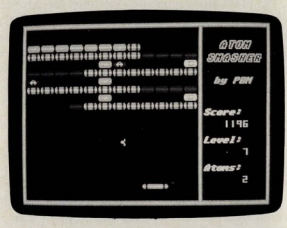
Notes For Programmers

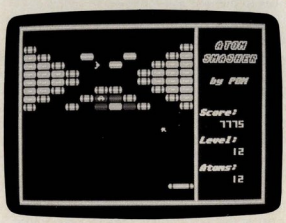
As mentioned, Atom Smasher is written entirely in machine language. If you're interested in studying how the program works, the source code files are included on this issue's magazine disk in a special compressed format. The source files are SMASHER.S, START.S, and SLAM.BAT; they're contained within the compressed file SOURCE.ARC. See "Uncompressing Source Files" elsewhere in this issue for instructions on reading the source code.

ST









Mazemaker:
The Maze Game Construction Set

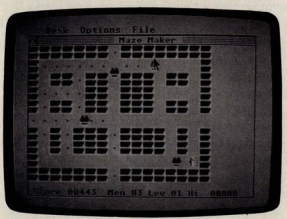
David Plotkin

More than just another maze game, "Mazemaker" allows you to construct your own game boards, and—for programmers—demonstrates basic animation techniques in Personal Pascal. The program requires an ST with a color monitor and a joystick.

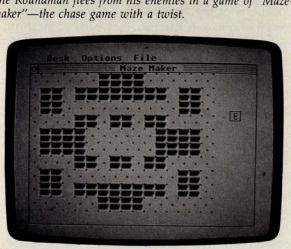
"Mazemaker" is a program for constructing and playing maze-type chase games. You can use the standard maze that's included with the program or design your own maze in minutes, and absolutely no programming skills are required.

If you *are* a programmer, though, you'll get even more out of Mazemaker. The program was written with *Personal Pascal* from OSS and takes advantage of all of the ST's bells and whistles—including color, animation, mouse control, drop-down menus, dialog boxes, and alert boxes. Mazemaker represents a major programming effort, requiring two and a half months of solid work. During this time, I discovered many noteworthy facts, both about *Personal Pascal* and GEM. In the section beginning "Notes for Programmers," I'll cover these techniques in detail so you won't have to reinvent the wheel.

But first, let's see how to play Mazemaker. You don't need to understand the workings of the program to enjoy it.



The Roundman flees from his enemies in a game of "Mazemaker"—the chase game with a twist.



With "Mazemaker," you can quickly and easily design your own mazes and save them for future games.

Getting Started

On this issue's magazine disk is a file called MAZEMAKE.PRG; this is the game program. For programmers, the source code is also on disk in compressed form, but we'll cover this later. The only file required to play Mazemaker is MAZEMAKE.PRG.

To run Mazemaker, you must have an ST with a color monitor and a joystick. Plug the joystick into port 2 (the port not used by the mouse). Then switch to the low-resolution screen mode and double-click on the icon or filename for MAZEMAKE.PRG. (You

can also run Mazemaker from the magazine disk menu in low-resolution mode.) We recommend turning off the key clicks on the Control Panel either before or after loading Mazemaker; this prevents interference with the program's own sound routines.

When Mazemaker is up and running, it presents you with three choices on the screen: You can play a game, make a maze, or quit. All choices are made with the mouse, so just point and click.

Let's start by playing a game. After you click on Play, Mazemaker gives you the option of using the current maze or loading a new maze. Since we haven't yet designed a maze, we'll have to load one. After you click on Load, Mazemaker gives you three more options: Default, Load, and Cncl (Cancel). There aren't any mazes to load from the magazine disk, so click on Default or press Return. This brings up the default maze which is built into the program (see photo).

Three drop-down menus are available at the top of the screen. At the far left is the customary Desk menu, from which desk accessories can be called (more on this in a moment). At the far right is the File menu, which allows you to save and load mazes. And in the center, the Options menu lets you start, stop, and pause a game. To begin playing, click on Start.

Hot Pursuit

Five characters instantly appear on the screen: a Roundman and four enemies. You're the Roundman, and your job is to evade the four enemies by fleeing through the maze.

When a game starts, the program always attempts to place the Roundman in the approximate center of the maze and an enemy in each corner. This isn't a problem with the default maze, but the exact locations of the characters may vary in a custom-designed maze. If the program can't find an unoccupied square to place a character, or if one of the enemies is placed on the same square as the Roundman, the program warns you of this and aborts. You then have to go back and redesign the maze. This shouldn't happen too often, and again, it's not a problem with the default maze at all.

When the game begins, you control your Roundman with the joystick. Press the joystick in the direction you want to go, and munch the green dots as you travel. If you're caught by an enemy, you lose one of your three lives. Munching a red dot turns the enemies purple for a short time, and you can gobble them up for extra points; afterward, they reappear at their starting positions. The enemies flash briefly before turning deadly again. (Note: The game colors may vary if you've changed the ST's default colors with the Control Panel.)

If you munch all of the green and red dots without losing your three lives, you advance to the next round. The enemies, which move randomly except when they come near the Roundman, get a little smarter in successive rounds.

Your score appears at the bottom of the screen. You can pause or quit the game at any time by selecting the appropriate item from the Options menu.

Designing Your Own Mazes

When you tire of the default maze, you can design your own. This procedure is very easy and requires no programming skills.

To get started, return to the first option screen which appeared when you ran Mazemaker. (If a game is in progress, simply select Quit from the Options menu.) Click on the button labeled *Make*.

In a few seconds, a blank grid of dots appears on the screen. If you were playing a game of Mazemaker earlier, the current maze appears superimposed on the grid. The grid is the framework for your maze. Each block in the grid may contain one of three objects: a green dot, a red energy dot, or a section of maze wall.

To construct the maze, there are three tools you can use, all controlled with the mouse. To change tools, click the right mouse button. The mouse cursor changes shape to indicate which tool is selected. To use a particular tool, click the left mouse button. If the program doesn't seem to respond to your mouse clicks at first, try clicking the mouse button more slowly.

The first tool is a hollow-box cursor; it lets you place green dots. To place a dot, simply point to a position within the grid and click the left mouse button. A green dot appears. If anything previously occupied that square (such as a red dot or a maze wall), it is replaced.

The second tool is an *E*-shaped cursor; it lets you place red energy dots. Point to the desired position within the grid and click the left mouse button. A red dot appears. Again, this replaces anything that previously occupied that square in the grid.

The third tool is a solid-block cursor; it lets you place sections of the maze wall. It works just like the other tools—just point and click the left mouse button. (See photo.)

With any of the tools, you can hold down the left button and move the cursor over the grid, effectively "painting" dots or maze walls.

If you want to completely erase the grid and start from scratch, drop down the Options menu and select Clear.

Saving And Loading Mazes

When you've designed a maze you really like, you can save it on disk for recall later. Simply drop down the File menu and select Save. The usual GEM file selector window appears, allowing you to choose a pathname and filename. To reload a maze, select Load from the File menu.

If you pick any menu selection that would wipe out your current maze, the program asks you to verify the selection before continuing. Note, however, that the program doesn't issue a warning if you quit back to the main menu without saving the current maze. That's because you won't lose the maze by returning to the main menu. If you choose the Play option from this menu, and then choose the Current option on the following screen, the maze you're designing appears on the screen for a test game.

One note about the Desk menu. As mentioned above, this menu allows you to open any desk accessories that were loaded into memory when the computer was booted. However, because of the way the game animation works, any desk accessories that use the timer event and then return control to the main application would be obliterated by the Roundman and the enemies as they move across the screen. A good example of this type of desk accessory is a clock that keeps time in the background. To prevent this from happening in the middle of a game, Mazemaker freezes as long as the desk accessory is active.

Notes For Programmers

The following discussion is for those who wish to study how Mazemaker and its animation routines work.

Mazemaker is written in OSS's *Personal Pascal*. Three Pascal source code files are included on the magazine disk: MAZEMAKE.PAS, GEMRAST.PAS, and BLITSCRN.PAS. These files, however, are contained within the compressed file SOURCE.ARC. Before accessing the source files, SOURCE.ARC must be uncompressed. See "Uncompressing Source Files" elsewhere in this issue for complete instructions.

When you examine MAZEMAKE.PAS, notice that the very first line in the program turns off *Personal Pascal*'s pointer-checking:

```
{$P-}
```

Why? Because *Personal Pascal* won't let you access memory locations outside of what is called the *heap*. Since most of the interesting memory locations are outside of the heap, this command disables the pointer checking so you can look at other memory locations.

Procedure Blit_Scrn is the external procedure which animates the screen figures. It picks up the screen block defined by *x,y,w(width)* and *h(height)*, and either saves it in a buffer array (dir=0) or puts the contents of a buffer array on the screen (dir=1). Because Blit_Scrn is an external procedure, you must perform the following steps if you wish to modify and recompile Mazemaker:

1. Copy the uncompressed source files GEMRAST .PAS and BLITSCRN.PAS to your programming disk.

2. Compile GEMRAST.PAS and BLITSCRN.PAS, but don't link them. This produces the files GEMRAST.O and BLITSCRN.O.

3. Drop down the Options menu in *Personal Pascal* and select the Link item. Add GEMRAST.O and BLITSCRN.O as additional link files under this option.

4. Now you may compile and link MAZEMAKE.PAS.

How The Animation Works

GEMRAST and BLITSCRN make use of GEM functions to produce the smooth animation in Mazemaker. VDI function 109 (Copy Raster, Opaque) can move blocks of bits from one memory location to another. To achieve this, a grouping of data called a *Memory Form Definition Block* (MFDB) is required.

If you look at the listings for GEMRAST.PAS and BLITSCRN.PAS, you'll see RECORDs set up to do this. You need separate MFDBs for the source and destination bit blocks. The first item in the MFDB is the memory address, then the width and height in pixels of the bit block. You then tell the MFDB the width of the bit block in words. This is simply the width in pixels divided by 16 and rounded to the next highest integer.

The format determines whether the bit block is to be moved using device-specific or general routines. The general routines have the advantage of working with any device, but the device-specific routines work much faster. Since we're always going to be moving blocks of bits to and from the screen, we'll use device-specific routines.

The next item records the number of bit planes. In the low-resolution screen mode used in Mazemaker, four bit planes are necessary for 16 colors.

The enumerated field of Raster_Op details all the different ways GEM is capable of moving blocks of bits between two memory locations. Mazemaker uses ROP_Replace to simply obliterate whatever was on the screen before, but ROP_Xor can also be very useful, since drawing a shape at the same place twice with XOR (eXclusive-OR) leaves the screen the way it was before you drew the shape.

Next, we set up the necessary items to call the Virtual Device Interface (VDI), including the arrays and the external procedure VDI_Call. The names of the arrays should be familiar to anyone who has programmed with GEM. Procedure Copy_Opaque in GEMRAST then stuffs the numbers into the right places and calls VDI to do the work.

The BLITSCRN Routines

BLITSCRN starts out similarly to GEMRAST. Note how Copy_Opaque, which is used in BLITSCRN, is declared as an external file. Function Get_Port and Procedure Port_Inquire provide some useful information, such as the number of bit planes for the current screen. If you are creating animation with whole windows, these routines can also provide the height and width of the current window.

Procedure Blit_Screen declares the necessary MFDBs, sets up the variables, and calls Copy_Opaque to do the work. Note that the last three variables in the MFDB (res1, res2, and res3) are set to zero. These variables are not currently used, but may be used later, so it's best to set them to zero to maintain compatibility. Note also how you can set the memory location (the first item in MFDB) to zero to point to screen memory. That way, you don't actually have to know where the screen is located in memory—another concession to compatibility, since screen memory resides in different places on a 520ST and 1040ST.

The next two functions, Getrez and SetGetColor, are calls to the Extended Basic Input/Output System (XBIOS). Getrez (XBIOS 4) returns the screen mode: 0 for low resolution, 1 for medium resolution, and 2 for high resolution. SetGetColor (XBIOS 7) changes the color in a single color register specified by the argument *colorreg* to the color *color*, which can vary from $000 to $777 (hexadecimal). If the color passed is −1, the function returns the current color stored in *colorreg*.

There is a complication with using this function, however. As explained by Tom Hudson in an article which appeared in *ANALOG*, XBIOS and GEM view the color registers differently. For example, Mazemaker draws the enemies in color register 7 when the Roundman has munched on an energy dot. However, if we want to use this XBIOS function to modify the color in register 7, we must call the routine with color register 5.

The following table shows the relationship between the color registers for GEM and those for XBIOS:

GEM	XBIOS
0	0
1	15
2	1
3	2
4	4
5	6
6	3
7	5
8	7
9	8
10	9
11	10
12	12
13	14
14	11
15	13

The sound effects in Mazemaker are also created by XBIOS calls. The function and procedure which call XBIOS 28 give you access to the General Instruments sound chip in the ST. These functions are general-purpose routines used to stuff numbers into various registers of the sound chip. Using numbers in the right places, you can specify the note, volume, and waveform.

Procedure Sound demonstrates a sound command similar to the one on the eight-bit Atari 400/800/XL/XE computers. Note that you must enable the sound first by using a procedure such as Sound_Init. Also, the user should turn off the key clicks from the Control Panel to keep them from interfering with the program's sound effects.

Custom Mouse Cursors

The screen grid which forms a framework for the mazes is created by taking a portion of the window and dividing it up into squares in Procedure Set_Up_Grid. An array called Maze stores the contents of each square in the grid. Each square may contain a green dot, a red energy dot, or a section of maze wall. Using the appropriate mouse tools, users can paste any of these elements down into any square.

Procedure Set_Up_Mice demonstrates how to set up the different mouse cursors which denote the three different tools. The *Personal Pascal* manual also contains a good example of this technique. The data for the cursor form is entered in hexadecimal; attempting to use decimal numbers results in an error.

Since Mazemaker needs random numbers for various purposes, the following function returns a random number between 0 and $n-1$. The XBIOS function actually returns a number between 0 and 16,777,215. The Mod operator then gives you the remainder of dividing the random number by n, leaving a random number in the indicated range.

```
FUNCTION Rand(n:Integer):Integer;
  FUNCTION Random:Integer;
    XBIOS(17);
  BEGIN {Rand}
    Rand:=Abs(Random Mod n)
  END; {Rand}
```

The next function is simply a delay loop. It's much better than using a do-nothing loop like this:

```
FOR wait:=1 TO 1000 DO
```

A do-nothing loop ties up the computer so that background tasks, like print spoolers and desktop clocks, cannot use the time in this loop for their own purposes. Do-nothing loops are also hard to time accurately.

```
PROCEDURE Wait(timer:Integer);
  VAR event:Integer;
  BEGIN {Wait}
    event:=Get_Event(E_Timer,0,0,0,timer,false,0,0,0,0,false,0,0,0,0,
           msg,dum,dum,dum,mx,my,dum);
  END; {Wait}
FUNCTION Super(sp:long_integer):long_integer;
  GEMDOS($20);
```

The next function allows you to put the computer into supervisor mode if you pass an argument of 0:

```
supstack:=Super(0);
```

If you use the value of a previous Super call as the argument, the computer is returned to user mode:

```
supstack:=Super(supstack);
```

Supervisor mode is necessary for such things as reading memory locations. User mode won't let you do this. It's best not to remain in supervisor mode any longer than you have to, though.

Pascal PEEK And POKE

The following function allows you to perform the equivalent of a BASIC PEEK—that is, to view the contents of a memory location. In this case, we're looking for an integer, but we could look for a byte or long integer simply by changing the type of int_ptr to ^BYTE or ^long_integer.

```
FUNCTION lpeek(address:long_integer):long_integer;
  TYPE int_ptr=^integer;
  VAR funny:RECORD
                CASE boolean OF
                 true:(a:long_integer);
                 false:(p:int_ptr);
               END; {case}
  BEGIN {lpeek}
    funny.a:=address;
    lpeek:=funny.p^
  END {lpeek}
```

This function actually represents an example of a variant RECORD. This particular RECORD has only the variant field. Normally, the valid fields in the variant (either *a* or *p*, in this case) depend on the value of another field in the RECORD, known as a *tag* field. This RECORD has no tag field, so the variant is known as a *free union.* What this means is that both variants are valid, and the RECORD is both a long_integer and a pointer to an integer.

Thus, you can set the RECORD equal to an address when it is a long integer, and then see what the RECORD points to (what value the address contains) when it is a pointer to an integer. Complex, but it works.

Although not used in this program, the equivalent of a BASIC POKE command is quite similar:

```
PROCEDURE poke (address:long_integer; value:integer);
  TYPE int_ptr=^integer;
  VAR funny :    RECORD
                 CASE boolean OF
                  true:(a:long_integer);
                  false:(p:int_ptr);
                 END;
  BEGIN
    funny.a:=address;
    funny.p^:=value;
  END;
```

Printing On The Screen

Makemaker's Procedure Print_Num takes an integer and prints it on the screen. It sounds simple, but strangely, *Personal Pascal* doesn't directly support printing numbers on the screen. The Draw_String command allows you to print a string of characters anywhere on the screen, so Print_Num converts an integer number into a string of characters. It does this by successively dividing by smaller powers of ten, taking the integer result of the division and adding its character value to the string, and then taking the remainder and dividing by the next smaller power of ten. It also makes sure the answer is not longer than the number of digits specified.

There are other procedures available which lop off leading zeros and convert real numbers into strings. They're too long to reproduce here, however; check the OSS bulletin board.

An alternative to using procedures like Print_Num is to put your numbers directly on the screen. To do this, you must position the cursor using escape codes, then use the Pascal WRITE command:

```
PROCEDURE PrintnumatXY(x,y,num:integer);
  BEGIN
    Write(Chr(27),'Y',Chr(y+32),Chr(x+32));
    Write(num);
  END;
```

This prints the integer *num* at position *x,y.* The position is in character coordinates, so you lose some of the freedom you have with Draw_String in placing characters exactly where you want.

Refreshing The Screen

Procedure Do_Redraw shows how to properly respond to a redraw message from GEM. Your program can also call Do_Redraw to redraw the screen whenever necessary. It's advisable to always redraw the screen this way, because Do_Redraw obeys the rules that GEM expects. The problem mentioned earlier, in which the game characters can "run over" an open desk accessory, is the result of drawing them directly on the screen instead of using Do_Redraw (which is well behaved). So why doesn't Mazemaker use Do_Redraw? Unfortunately, Do_Redraw is just too slow for realtime animation.

Note how the program resets Set_Clip so it can draw on the whole screen. If this isn't done, the enemies and Roundman wouldn't appear, and the program wouldn't be able to draw on the screen unless it was working in the last rectangle which had been redrawn.

Procedure Make_Maze is the heart of the maze design routine. It responds to all events, buttons, messages, and menus. It first looks for the left mouse button, messages (which include menu items), and the timer. It responds appropriately to the messages—such as redrawing the screen and menu selections—and draws dots or maze walls in response to the left mouse button.

Although *Personal Pascal* has the ability to look for both the right and left mouse buttons at the same time, it can't tell you which of the buttons was pressed if you're looking for them both. This procedure gets around this limitation in the following way.

First, it looks only for the left mouse button (in addition to messages, and so on). If the left button is *not* pushed—and if there are no messages—the timer causes the Get_Event call to return. If the timer *did* cause the return, the program looks to see if only the right button of the mouse was pushed and responds accordingly (changes tools).

There is also a Get_Event call to wait for the right button to come up again before looping back. Without this, each time the player pressed the right button, the tools would change many times before the button could be released—because the computer is much faster than the person using it.

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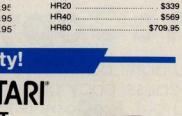

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Reading The Joystick

Procedure Read_Stick reads the joystick and moves the Roundman. The directions of the Roundman and enemies are:

```
      0
3           1
      2
```

To read the joystick, the program examines memory location $FFFC02, which is updated by the keyboard controller. (There are more elegant ways to do this, such as receiving messages from the keyboard controller, but they didn't seem to work for me.) The values returned by this memory location correspond to the joystick directions:

```
1535     511     2559
1279             2303
1791     767     2815
```

This was first reported by George Miller in the June 1986 issue of COMPUTE!.

First, Read_Stick reads the joystick. If you're trying to reverse direction, it lets you, since the Roundman can always go back the way it came without running into the maze. Otherwise, the program determines the maze coordinates of the upper left and lower right corners of the Roundman. If these coordinates are the same, the entire Roundman is located within one square of the maze, so it's OK to change direction.

Next, the program looks to see if the Roundman can turn in the direction the joystick is indicating. If it can, the program changes the Roundman's direction. Otherwise, it looks to see if the Roundman can continue in its present direction. If not, the Roundman quits moving.

This procedure also checks to see if the Roundman has chomped on a green dot or a red energy dot, and then it adjusts the score and the color of the enemies accordingly.

Finally, after the program has determined the Roundman's direction, it adjusts the Roundman's coordinates and puts the appropriate shape on the screen. The shape depends on the direction the Roundman is facing. There are four shapes for each direction, and the procedure steps through them, creating the illusion of animation.

One potential problem is that the Roundman can erase a dot by moving partially into a square, then reverse and not actually move into the square. This would update the array Maze and increment the score, even though the dot wasn't munched. Therefore, the program always looks behind the Roundman to see if there's a dot. If so, the program redraws the dot.

Animating The Enemies

Procedure Move_Ghosts works pretty much the same way as Read_Stick, except the random number generator substitutes for the stick. The enemies move about randomly, choosing a new direction whenever they encounter a wall, and at random intervals in-between. They aren't completely stupid, however—they'll chase the Roundman if they get close enough. The definition of "close enough" depends on what level you're on. On higher levels, the enemies get a bit smarter.

Since the enemies erase the dots they pass over, this procedure also looks behind the enemies and redraws the dots.

Notice how the program uses Hide_Mouse to hide the mouse and Begin_Update whenever it draws on the screen. Hide_Mouse prevents the screen from getting fouled up by drawing over the mouse, which leaves a hole behind. Begin_Update lets GEM know that the program is updating the screen, which can be pretty important. For example, if you leave out Begin_Update, and then drop down a menu during a game, the enemies will walk on top of the menu. By using Begin_Update, dropping down a menu freezes the action, which is just what you want.

You should be able to deduce the purpose of the remaining procedures in Mazemaker by reading the comments in the listing. If you're unsure about how to use menus, dialog boxes, or other techniques in *Personal Pascal*, study the examples in the source code.

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

ST

Alert Maker

David Lindsley

This handy desk accessory allows you to quickly and easily construct alert boxes for use in your own programs. It even creates the source code on disk—in C, Pascal, or Modula-2. It works on all STs in any screen resolution.

Alert boxes are useful for sending warnings to the user of a program and for offering a selection of two or three choices. Although some GEM features are difficult to implement, alert boxes are quite easy. For example, the following line generates the alert box pictured in Figure 1:

```
form_alert(1,"[1][This is an example      | of an alert box.]
  [ OK | No ]");
```

Figure 1: *Call form_alert( ), and an alert box pops up.*

You simply call the form_ alert( ) function and send two pieces of information: a number and a string. The first value can range from 0–3. It indicates the default exit button (0 means no default). To exit the alert, the user may click on any of the buttons or press Return to select the default.

The second parameter is a string containing three elements. Note that in the example above each of the three sections is surrounded by square brackets. The first parameter selects the icon to be displayed. It's up to you, the programmer, to decide which icon is most appropriate. You have four choices:

0 No icon
1 Exclamation point (information)
2 Question mark (choice)
3 Stop sign (warning)

The second element in brackets lists the text to be displayed within the alert box. You may include up to five lines of 40 characters each. Separate the individual lines with a vertical bar (the shifted character just below the Delete key).

The final parameter, also enclosed by square brackets, is the text for the exit buttons. You may use up to three exit buttons, and each button may contain up to 20 characters. The text for the buttons must be separated by a vertical bar.

The form_alert( ) function returns a value 1–3 that indicates which exit button the user selected.

Why Alert Maker?

Programming an alert box is certainly no challenge, since it requires only a single line of code. Why bother with a desk accessory that lets you experiment with alerts?

"Alert Maker" saves time because it allows you to see the alert box *immediately.* You can make changes on the spot and write the source code to disk. Without Alert Maker, you never know how an alert box is going to appear until you compile, link, and run the program—all of which takes time. The text might be off-center or too narrow for the number of buttons.

It's important to understand that the size of the alert box that GEM draws is governed by the length of the text. Sometimes there is not enough room for all of the buttons. Consider the following line, which

Figure 2: *A button is missing because the text is too narrow.*

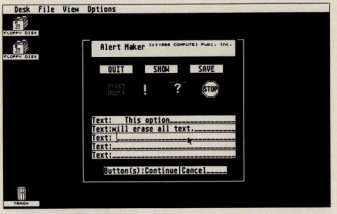

Figure 3: *Alert Maker's construction window.*

generates the alert box pictured in Figure 2:

```
form_alert(1,"[3][ These | lines | are | too | small ][YesⅈMaybeⅈNo]");
```

As you can see, the Yes button is missing entirely, the Maybe button looks fine, and the No button is falling off the right edge of the box. If this alert box were a warning about a certain type of disk error, you'd never notice the problem until the error occurred, at which point you wouldn't be able to select the first button.

Using The Accessory

Alert Maker is named ALERT.AC on the magazine disk. Since it's a desk accessory, it can't be run from the disk menu program or from the GEM desktop. Copy it to another disk—preferably your programming boot disk—and rename it to ALERT.ACC. You must also copy the resource file ALERT.RSC to the root directory of the same disk. To install the accessory, reboot your ST, press reset, or change resolutions.

(Note: If you have a hard disk or a ramdisk installed as drive C on your system, you must copy ALERT.ACC and ALERT.RSC to the root directory of drive C. The ST always looks for desk accessories on drive C if that drive is present. Also, keep in mind that current versions of the ST's operating system restrict you to a maximum of six desk accessories installed at one time.)

After you've installed the accessory, drop down the Desk menu and select Alert Maker. A window appears on the screen, and you're ready to start building an alert box. (See Figure 3.)

Alert Maker is like a miniature resource construction set for alert boxes. Select the icon you prefer by clicking on it with the mouse. Then position the cursor on any text field and type in your message. Move from line to line with the up- and down-arrow keys. The Escape key clears a text field. Type inside the button text field for the exit buttons; up to three buttons are allowed. Separate the button messages with a vertical bar.

When you're satisfied with the icon and the text, click on Show to see how the alert box will look. Play around with spacing and line breaks until the alert box looks just right. Then click on Save, and you'll be presented with an alert box asking which programming language you prefer: Pascal, Modula-2, or C. After you type the filename into the file-selector box that appears and either click on OK or press Return, Alert Maker saves the source file on disk.

Tips On Alert Boxes

Here are some ideas that may be useful when creating alert boxes for your programs.

If the alert box is a small one, you can usually create it with a single line of code. For example:

```
form_alert(1,"[1][Resource file not found.][ oops! ]");
```

Some C programmers like to define all of the string constants at the beginning of the program with the rest of the declarations. This cleans up the code so it's easier to find and modify a particular string of text. For example:

```
are_you_sure[ ]= "[2][Are you sure you want to do that?]
  [YESⅈNo]";
no_low_rez[ ]= "[3][This won't run in low resolution![ oh . . . ]";
oops_alert[ ]= "[1][You made another mistake.][Oops!]";
```

An alert box can then be called up at any time by using the variable name of the string you need:

```
form_alert(1,rezalert);
```

If your text is lengthy, you may break it up into two or more lines:

```
form_alert("[2][Now is the time for all good men to come to the
            aid of their party][Good Bad Not Sure]");
```

In OSS's *Personal Pascal*, Concat helps you construct long alert box strings. For example:

```
BEGIN
  part1 := '[1][The GEM alert box is used to';
  part2 :=          'convey a message to the user.';
  part3 :=          'issue errors or warnings, or';
  part4 :=          '    to make simple two-way or';
  part5 :=          '        three-way decisions.][ OK | Cancel ]';
  alerttext := Concat( part1, part2, part3, part4, part5 );
  choice := Do_Alert( alerttext, 1 );
END;
```

In C, you may want to use sprintf( ) to combine several strings into one, using a given format:

```
sprintf(str,"[1][%s%s%s%s%s][ Okay | Cancel ]",
   "The GEM alert box is used to ",
   "convey a message to the user,",
   "to issue errors or warnings, or",
   "     to make simple two-way or",
   "     three-way decisions.");
form_alert(1,str);
```

In any language, the vertical bar (|) must be used to indicate a new line. The bar also separates the individual button messages.

Error Boxes

While we're on the subject of alert boxes, here's something you may not have known. GEM has a set of six predefined alert boxes in the forms library under form_error. This is a seldom-used call unless you need to inform the user of a particular TOS error that just occurred.

Calling form_error(0), for example, gives the message, *TOS Error #0;* form_error(1) displays *TOS Error #1,* and so on up to form_ error(63). But there are six boxes with more specific messages located at 2, 3, 4, 5, 8, 10, 11, 15, 16, and 17 (four of these are duplicates of others).

Here is a very short program in C that displays all six error boxes, one by one, then exits.

```
main()
{
  appl_init( );

  form_error(2);      /* can't find folder        */
  form_error(4);      /* no room for documents    */
  form_error(5);      /* name already exists      */
  form_error(8);      /* not enough memory        */
  form_error(15);     /* drive does not exist     */
  form_error(16);     /* can't delete folder      */

  appl_exit( );
}
```

Programming Notes

Alert Maker was written in *Megamax* C and should be compatible with other versions of C with few or no changes. If you're interested in studying how the program works, the C source code is included on the magazine disk in a special compressed format. The source code file is named ALERT.C and is contained within the compressed file SOURCE .ARC. See "Uncompressing Source Files" for instructions on reading the source code.

The main program uses a dialog box for interaction, gets the text typed into each field, and then inserts the lines into the alert box string. That string is also used in writing to the disk file. The dialog box was constructed with the Resource Construction Program supplied with *Megamax C.*

ST

Uncompressing Source Files

Todd Heimarck, Assistant Editor

The source code files for the programs on the magazine disk have been compressed and combined into a single archive file called SOURCE.ARC. To extract and uncompress them, you must use the program called ARCX.TTP, also included on the disk.

Note that *only the source code files* have been archived. Source files are mainly for the benefit of programmers who wish to study how the programs work; none of the source files are needed to run the programs. If you're not a programmer, you can ignore these instructions and simply run the programs as explained in "How to Use the Disk" and the corresponding articles.

To uncompress the archive file, follow these steps:

1. Copy both ARCX.TTP and SOURCE.ARC from the magazine disk to a second disk. If you're using a single-sided drive, make sure there are no other files on the other disk. Otherwise, the uncompressed files may not fit.

2. From the GEM desktop, double-click on the icon or filename for ARCX.TTP. A dialog box will appear.

3. In the dialog box, type the name of the archived file (SOURCE.ARC) and either press Return or click on the OK button. All source files are then automatically extracted and uncompressed. See the corresponding articles for explanations of the files.

The original ARC program for the IBM PC was developed by System Enhancement Associates and is covered by their copyright. The ST version was written by Harvey Johnson. ARCX.TTP appears on our disk with their permission. The full-featured shareware program ARC.TTP, which allows you to compress files, is widely available from bulletin board systems and user groups.

ST

Desktop Initializer

Tim Midkiff, Editorial Programmer

The Atari ST lets you set up your GEM desktop any way you like, then save it in a DESKTOP .INF file so the desktop appears the same way each time you boot up. But there's a catch—it works only if you install the Control Panel desk accessory. Now, with this short program, you can have your customized GEM desktop without wasting two desk accessory slots on the Control Panel. For all STs, color and monochrome.

Normally when you switch on an Atari ST, the computer determines the appearance of the GEM desktop. If you have a color monitor, the desktop appears in the low-resolution mode with a bright green background, two floppy disk icons along the left side of the screen, and the trashcan icon in the lower left corner. If you have a monochrome monitor, the screen is similar.

Fortunately, the ST lets you customize the desktop any way you like. You can rearrange icons, install or remove disk drives to match your system configuration, change the screen resolution and screen colors, specify whether disk directories should use icons or filenames, determine how directories should be sorted, switch the alert boxes for confirming copies and deletes on or off, adjust the keyboard repeat rates, and more.

To avoid making all these changes each time you use the computer, you can drop down the Options menu and select Save Desktop. This saves a configuration file called DESKTOP.INF on disk. In the future, whenever you boot up the ST with this disk in drive A, the computer reads the information in DESKTOP.INF and automatically restores your custom desktop.

But there's one catch—parts of your desktop are restored only if you have the Control Panel installed as a desk accessory. This accessory comes with all STs and is handy to have around, but it also uses about 20K of memory, takes up two precious slots in the Desk menu (the ST allows a maximum of only six accessories to be installed at one time), and makes the computer boot up more slowly. Without the Control Panel, however, the computer doesn't check DESKTOP.INF and doesn't completely restore your custom desktop.

Anything you've set from desktop menus is restored correctly, including installed applications, screen resolution, installed disks, directories, and so on. But any selections from the Control Panel and Install Printer accessories are unavailable if the Control Panel is missing from your boot disk.

Banish The Panel

Now there's a neat solution: a very short program called "Desktop Initializer." It performs all the necessary GEM desktop initializations without wasting any desk accessory slots, memory, or time.

You still need to install the Control Panel to customize certain aspects of the desktop, of course—such as the screen colors, key-repeat rate, keyboard click, mouse button, and so on. But once you make these changes and save DESKTOP.INF, you won't need to install the Control Panel again. Desktop Initializer reads DESKTOP.INF and restores all of your adjustments.

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You'll find Desktop Initializer on this issue's magazine disk under the filename DESKTOP.PRG. You can run it from the disk menu or from the GEM desktop like any other program. But make sure there is a DESKTOP.INF file in the current directory of the disk, or else Desktop Initializer will have no effect. (Note: The magazine disk does not have a DESKTOP .INF file, so nothing seems to happen if you run the program from the disk menu.)

Additional Notes

It would be nice if you could restore your desktop settings automatically each time the computer is booted up, but unfortunately, DESKTOP.PRG will not work from the AUTO folder. In its standard boot sequence, the ST first runs any programs from the AUTO folder, then initializes GEM and sets the default colors. Finally, it loads desk accessories. If Desktop Initializer is in the AUTO folder, it runs. But GEM then continues the boot sequence and resets all parameters. This means you must run Desktop Initializer from the desktop after booting.

If the ST system you're using has a drive C—either a hard disk or a ramdisk that installs itself from the AUTO folder—you must place a copy of DESKTOP.INF in the root directory of that drive in order for Desktop Initializer to work. The ST always looks for DESKTOP.INF in drive C if that drive exists.

Note that without a Control Panel, you won't be able to set the computer's realtime clock unless you have another program for that purpose (or a battery-powered clock). This isn't a great drawback, because clock-setting programs for the ST are widely available, and almost all command-line interfaces (such as *SuperDOS*, October 1987) include TIME and DATE commands.

Desktop Initializer was written using TDI's Modula-2. If you're interested in studying how the program works, the Modula-2 source code is included on the magazine disk in a special compressed format. The source code file for Desktop Initializer is named DESKTOP.MOD and is contained within the compressed file SOURCE.ARC. See "Uncompressing Source Files" elsewhere in this issue for instructions on reading the source code.

ST

VIP Professional

Thomas M. Castle

Requirements: Any ST, color or monochrome; printer optional.

When *VIP Professional* was first released about two years ago, it was a spreadsheet program tailored after the successful *Lotus 1-2-3* for IBM PC computers. In fact, *VIP Professional* was a virtual twin of *Lotus 1-2-3*. Now there's a new *VIP Professional* that's still functionally the same as *1-2-3*, but has the look and feel of the GEM user interface.

As a clone of *1-2-3*, *VIP Professional* was an important early entry in the Atari ST software market. It brought big-league software to a fast, powerful, but relatively inexpensive personal computer at a time when few other spreadsheets were available. With *VIP Professional*, you could bring your *1-2-3* spreadsheets home from work and load them into the ST, since *VIP* was compatible with *1-2-3* data files and ST disks are compatible with IBM's 3½-inch disk format. If your PC didn't have 3½-inch drives, you could hook up a 5¼-inch drive to the ST or transfer the files via modem.

This was a cost-effective alternative to buying a PC compatible for the home, since *1-2-3* costs about $400 and the original version of *VIP* listed for $175. If that was too much, a stripped-down *VIP Lite* was available for a discounted price of $100. *VIP Lite* eliminated macros and restricted worksheets to 256 × 2048 cells, compared to 256 × 8192 cells for the full-sized *VIP*. (Incidentally, the smaller worksheet size of *VIP Lite* was the same as the original *1-2-3* on the PC.)

Another good reason for running *VIP* on an ST was that it outperformed *1-2-3* on a PC. With a 68000 microprocessor and up to a megabyte of memory to work with, the ST/*VIP* combination simply ran circles around *1-2-3*.

What's New

Even if you already own a copy of the original *VIP*, you'll find several worthwhile improvements in the new *VIP*. Registered *VIP* owners can upgrade for $20 ($26.95 in Canada), but expect a four- to six-week wait.

The first thing you'll probably notice is that the new *VIP* is not copy-protected. VIP Technologies is using owner-registration cards to screen customer-service calls (which means it's very important to mail in your card). This is much nicer than the forced disk swaps in drive A required by the old key-disk protection system. You can install *VIP* on any drive, including hard drives.

Second, a bunch of goodies have been added. For instance, you can automatically load a worksheet by naming it AUTO-VIP and placing it in the appropriate folder. If you're accustomed to the IBM character set, an IBM PC font loader is included as an executable program (although the *d* is undersized for some reason). The font can be used outside *VIP* and stays resident until power shutdown. And to help you master the program, a guided tour demonstration and three macro templates are provided.

Everyone, at least once, should run the separate program that displays the *VIP* logo. Be sure to follow the advice on the screen: Turn up the volume on your monitor.

Standard Features

There are many features of *VIP Professional* that have become standard in quality spreadsheet programs. *VIP* offers variable-width cells, multiple windows for a given worksheet, unscrollable titles, and several cell manipulations such as copy, insert, delete, and move. Several data formats are available, including fixed decimal, currency, percent, date, and scientific notation. Various calculation protocols are also at your disposal.

Two features give *VIP* (and *1-2-3*) its real power: labeled cells and macros. Labels can be assigned to cells or ranges of cells. This permits calculations on cells relative to the situation rather than to a specific cell. The use of labeled cells is almost a necessity when employing the other major feature of *VIP*—macros.

A macro is a list of spreadsheet commands that is automatically executed in sequential order by a single keypress, just as if you manually typed the commands on the keyboard. In essence, a macro is a small program to be executed within a worksheet. Macros can perform any function you can enter from the keyboard, including retrieving the current date, moving the cursor around the worksheet, and performing complex calculations. Numerous books are available which contain a myriad of useful macros for *1-2-3*; these can be used unaltered with *VIP*.

In addition, *VIP* has a number of built-in functions that save you the trouble of performing

complex calculations manually, or constructing macros for that purpose. Financial functions perform such tasks as calculating internal rate of return, net present value of future cash flows, future and present values of an annuity, and payment due from fixed-term loans.

More of these predefined commands provide access to trigonometric functions such as sine, cosine, tangent, arc cosine, arc sine, arc tangent, and pi. Others include a random number generator, absolute value, exponentials, natural logarithms, base ten logarithms, modula division, selectable point rounding, and square roots. All in all, it's pretty impressive.

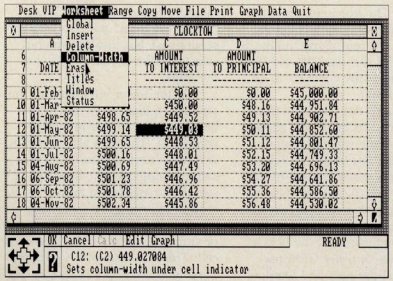
Utility functions include table lookup, summation, averaging, counting items in a list, minimum and maximum, and a function called CHOOSE which extracts the (n+1)th element in a list. Date funtions, which retrieve the current date, day, month, and year, save you the tedium of entering that routine information.

Of course, *VIP* includes standard file functions such as retrieve, save, delete, and list. Portions of a file may be extracted for inclusion in another file. Files or portions of files may also be imported from other programs and/or computers.

Database Functions

Another set of functions allows you to manage a database with *VIP*. Two essential elements of a database manager are sorts and searches. *VIP* offers sorts keyed to a maximum of two fields over a user-defined area. The menu-driven query functions allow you to search easily through a defined range of the database to find information which matches your criteria.

The database functions DCOUNT, DSUM, DMIN, DMAX, and DAVG all are analogous to their worksheet counterparts. Two functions specific to database statistical analysis are DVAR, which calculates the variance of a range



of data, and DSTD, which calculates the standard value over a range.

The Data Fill function allows you to enter a series of values into the database at specified steps. This could be used to quickly label the worksheet with row numbers. The Data Distribution function finds the frequency distribution of data over a specified range.

To perform "what-if" scenarios, *VIP* lets you construct data tables to illustrate how changes to an input range of cells can affect an output range. Two schemes can be employed. In the first, you can try a series of values for a given cell, and watch the changes it creates in all the calculations that depend on that value. In the second, the effect of changing one, or both, of two input cells lets you examine the calculations of the cell values depending on the test values.

Drawing Graphs

VIP Professional lets you draw five different types of graphs: bar, stacked bar, line, pie, or XY. How you select the ranges of data to be displayed depends on the type of graph you choose, but all of the procedures are well described in the manual. Switching from one type of graph to another is easy: Just pick the new type from a drop-down menu and select the View Graph option.

VIP displays graphs on the screen by opening a window that overlaps the worksheet. If you resize the window, the graph adjusts itself to fit the new proportions.

Copies of graphs can be made on compatible printers, and *VIP* also supports the Canon laser printer. Some printers may not be compatible, which is a general problem with GEM. If your printer works with other GEM-based programs, it will probably work with *VIP*.

Additional options make it easier to produce higher quality output. You can use colors if your printer has them. You can attach labels, legends, and titles, manually or automatically scale a graph, and superimpose a grid. Graph settings can be named and stored for use with different ranges of data. You can also save graphs on disk as picture files for later manipulation.

A Few Drawbacks

Despite the improvements, there are a few things you may not like about the GEM-based *VIP* if you're used to the old *VIP* (or *Lotus 1-2-3*). For one thing, the GEM overhead makes *VIP* huge. It was a large program before, but now 520ST owners will find a memory upgrade desirable.

One dubious improvement is that the new version creates only *1-2-3* compatible files. The old *VIP* let you choose between *1-2-3* format and a native format for

data files. The noncompatible native format was generally faster and more efficient. Fortunately, the new *VIP* can read the old files and automatically converts them to *1-2-3* format.

Although the GEM interface was intended to make *VIP* easier to use, in some ways it complicates things. For instance, the main menus are at the top of the screen (as usual), but the detailed explanations of each item, the dialog area for user input, and the interactive buttons are at the bottom.

Because of other GEM features like slider bars and window buttons, the new screen holds only 13 rows of cells instead of the previous 20. Macros that take the screen dimensions into account will have to be modified.

Menu selections using the slash key or arrows are perceptibly slow. There is also a noticeable pause between a mouse click on a slider bar and the screen refresh.

The worksheet cells are separated by a grid of hashed lines (which interfered with my header separators), but luckily, a menu selection allows you to remove the lines.

At the lower left corner of the screen is a large icon which can be clicked to move through the worksheet. The icon also performs several other functions and takes some getting used to, however. It seems just as easy to move around by using the slider bars, selecting the GOTO menu item, or simply clicking on the desired cell. The icon was most useful for moving quickly to a far corner of the worksheet.

GEM Or Non-GEM?

Overall, the GEM-based *VIP Professional* is a nice package. It's full-featured and easy to use. The manual is organized and quite readable. Although it costs more than the old non-GEM version, it's still considerably less than what you would pay for *Lotus 1-2-3*.

If you need *Lotus 1-2-3* file compatibility and don't want to buy a PC clone, *VIP* is a good choice. If you use *Lotus 1-2-3* a lot, though, you may want to stick with the non-GEM version of *VIP Professional*. You won't have to relearn the user interface, and it's still available at the old non-GEM price.

VIP Professional
VIP Technologies
132 Aero Camino
Santa Barbara, CA 93117
$249

ST Replay

David Plotkin

Requirements: Any ST, color or monochrome.

ST Replay is a sound digitizing cartridge that produces remarkably good quality samples of input. The software that comes with it allows for some limited manipulation of the sound sample, although this package is not as flexible as some more expensive digitizers.

Installing *ST Replay* is simplicity itself: Just plug the cartridge into your cartridge port and turn on the machine. The cartridge is equipped with two phono jacks, one each for input and output. Using easily available cables, you can hook up the input to a cassette recorder or microphone, and the output to a small amplifier. The output can be routed to the monitor's speaker if you don't have an amplifier.

Digitizing Sound

The principle of digitizing sound is fairly simple. The sound is sampled at a rate set by the user. Each sample associates the sound at that particular instant with a number value. The computer converts the constantly changing analog sound wave to a series of digital numbers. The more frequently you sample the sound—the sampling rate—the more accurate a measure of the sound wave you will obtain.

There is, however, a trade-off: More frequent samples use up more memory. Thus, while 5000 samples per second may be adequate for voice samples, you will want to use 20,000 samples per second for sampling high quality music. On my 2.5 megabyte ST, this allows for roughly 100 seconds of sample. (There are about two megabytes left after installing the software.) At high sampling rates, the digitized rock music output sounds exactly like the original (at least it does to me).

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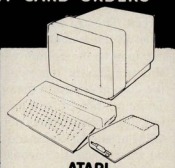

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NB–15	$759
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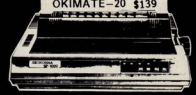

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In addition to simply sampling sounds, a sound digitizer should let you manipulate the sounds you have digitized to create your own sounds. The software included with *ST Replay* allows for some customization of the sound. When you first run this software, two full-width windows open on the screen. The top window summarizes all the available keyboard commands; the bottom window shows a graphic representation of the current sound in memory. These are not GEM windows—in fact, the program does not support GEM at all. All commands must be entered via the keyboard—no mouse input is allowed.

Saving Sounds

Getting digitized sound into memory is not hard. The first step is to play the sound while the Volume function is engaged. A measure of the current volume appears on the screen so you can adjust the volume on the input source. This is important for good quality sound. Pressing F8 puts the system in Monitor mode, where you can hear the sampled sound in real-time for fine adjustments. After setting the sampling frequency using F1-F6 (5KHz to 31KHz), you can start sampling with the F9 key. To replay the sample, press F10. You may also save and load sound samples to disk.

The key to controlling and manipulating sound in *ST Replay* are the memory cursors. These are lines which can be moved in the memory buffer using the arrow keys. There are two cursors that define the upper and lower limits in the memory buffer of all operations, including where in memory an input signal will be digitized, where a sound will be loaded to (from disk) or saved from, and how much of the buffer will be replayed by F10. These cursors are also important for inserting, deleting, and copying sections of the buffer.

The Insert key makes a copy of everything between the cursors and inserts it at the current position of the upper cursor, moving everything else up in memory. Deleting removes everything between the cursors, moving everything else down in memory. The Wipe function clears the memory between the cursors. You may also mark the cursors. After activating this function, pressing the arrow keys moves the cursors through memory together, and pressing the C key makes a copy at the current cursor location of what was between the cursors when they were marked. You may also overlay samples, taking the area currently under the cursor and adding to it the contents of what was defined by the cursors when they were marked.

Attending To Details

For detail work, *ST Replay* allows you to magnify the section of buffer between the cursors to fill the whole window. Multiple levels of magnification are possible by adjusting the cursor positions and then pressing F7. It is thus possible to enlarge a small portion of the sampled sound and work on it (insert, delete, and so on). Since the cursors move in preset increments, it is usually not possible to surround just the portion of the buffer on which you want to work at low magnification. In this case, you must continue to magnify the buffer until the resolution of the cursor movement is high enough to let you work on the portion of the sample you select. Since you can't move the cursors outside the portion of the buffer currently visible in the window, you must return to the regular view (via the UNDO key) to shift the cursors to another section of the buffer.

ST Replay supports a few special effects, such as reversing a sample, replaying a loop over and over, and fading. You cannot individually adjust the waveform of the sample, and unmarking a block requires that you press the Undo key multiple times, which also deactivates the magnification. Because GEM is not supported, the software is more difficult to use.

One of the cursors moves left and right when you press the up- and down-arrow keys, which is confusing. The manual is poorly organized, using in its explanations commands which have not been described. The wording is also confusing in places. Fortunately, the program is fairly simple, so you can figure it out despite the manual.

Music Programs

In addition to the *ST Replay* software itself, there are several other sample programs on the disk. An echo program is provided that simulates some reverb effects. Also, there are sample listings that show how to include digitized sound in your own programs, with examples given for *Fast BASIC*, *GFA BASIC*, ST BASIC, and machine language.

I tested the *GFA* programs; they locked up with long samples (80K or bigger), although they seemed to work fine with short samples. The information for using your own samples in the listings is sketchy, so the problem could have been my failure to adjust certain parameters correctly.

ST Replay is a lot of fun and has the potential to be a valuable programming tool. It is by no means a professional sound package, but despite the limited software which does not support GEM, it is a good value, doing what it is supposed to.

ST Replay
Michtron
576 S. Telegraph
Pontiac, MI 48053
$159.95

ST Sprite Factory

Thomas M. Castle

Requirements: ST with a color monitor.

ST Sprite Factory is a programmer's tool for preparing *DEGAS*-format, low-resolution sprites. Sprites are graphics images which can be manipulated as individual objects on the screen. They can be animated and made to appear and disappear, and they interact in various ways with background colors and other graphics images.

ST Sprite Factory has two GEM-based work screens for creating your sprite files. The first screen is for sprite construction. This is a 32 × 32 pixel grid on which you actually draw your sprite images. Each square on the grid represents one pixel (screen dot) on the video screen. The grid looks like the magnified pixel view common to many drawing programs.

The second screen is a frame organizer. Each sprite file produced with *ST Sprite Factory* may contain up to 60 frames with one sprite per frame. The frame organizer screen is divided into 6 rows of 10 frames each. This lets you select which frame will be used in the sprite construction screen, and it lets you select the sequence of frames for animation.

Most of your time with *ST Sprite Factory* is spent drawing sprites on the grid. Selector buttons occupy about half of the screen; the grid takes up the rest. The sprite can be viewed actual-size in a small box in the lower right corner.

Drawing Tools

Several features are provided to aid the drawing process. An Undo button or the Undo key on the keyboard counteracts any previous action (except the Undo feature itself). Graphics primitives such as boxes, frames, circles, and lines are available with the click of the mouse button. A mirror option duplicates whatever you're drawing vertically and/or horizontally. You can also flip, rotate, shrink, and shift any frame.

ST Sprite Factory also gives you full control over the color palette. You can change any color, blend colors, and swap background and foreground colors. A palette file can be created for each sprite file.

The editing features are fairly complete, too. Portions of a graphics image can be cut from a grid and transferred into a paste buffer. The image in the buffer can then be manipulated with several of the same drawing tools accessible from the main grid. When you're done, the image in the buffer can be pasted back into the current frame. It's also possible to transfer frames from one file to another and to create copies of frames within a file.

A few problems were encountered with some of the drawing and editing features, however. For instance, after a frame is rotated 90 degrees, typically a blank line appears along one of the edges. Rotations of less than 90 degrees sometimes result in gaps at some points in the lines. The line-drawing tool is a bit awkward because it requires a substantial button press on the mouse to mark the line's end points; a simple click was rarely sufficient.

The circle-drawing tool is also tricky to use. You select the center of the circle and click the mouse; then you click 45 degrees from the center to make a perfect circle. Anything other than 45 degrees results in ellipses. The circle tool doesn't let you preview and change the circle as it's being created, unlike the "rubber band" circles found in most drawing programs. With *ST Sprite Factory*, you have to click, move, click, and hope for the best.

Creating Animation

A valuable feature in *ST Sprite Factory* is the graphics mask generator. Because of the way the ST's GEM VDI calls work, it's convenient (if not necessary) to have a monoplane bit mask of your image on which you can superimpose your sprite when you move it over a background. (All of this is explained in the program's manual.) With *ST Sprite Factory*, a simple press of the F9 key creates a complete file of masks for each sprite in the current file.

Once you've created all of your sprites, you can splice the frames into a sequence for the built-in animator. You merely click on the frames in the order in which you want them to appear in the animation. The program allows you to include as many as 1,000 frames in each animation file.

To control animation speed, you can select a time interval between frames ranging from 1 to 99 *Vblanks* (Vertical blanks). A Vblank is the time it takes for the electron beam in the video monitor to move from the bottom right corner of the screen back to the top left corner to trace another

frame. Because the scanning rate of the color video screen is linked to the alternating current frequency of the power supply, video frames are drawn every 1/60 second in the U.S. (where AC flows at 60 hertz) and every 1/50 second in Europe (where it flows at 50 hertz). During the vertical blanking interval, a program can do all kinds of things without affecting the video display.

ST Sprite Factory uses the vertical blanking interval to perform a trick called *frame-flipping* to create animation in a stationary box. Frame-flipping is like the cartoon technique of rapidly flipping through a series of gradually changing frames. While one frame is shown, the other is being manipulated. When the next vertical-blanking interval comes around, the frames are swapped before the screen is redrawn.

Comprehensive Tutorials

Because *ST Sprite Factory* is a programmer's tool—its purpose is to let you create sprites for use in your own programs—the built-in animator is the only way to move your sprites within the program itself. However, the authors of *ST Sprite Factory* have included several tutorials to help you incorporate your sprites into your own programs.

Although the manual is only 50 pages long, the tutorials are comprehensive and lucid. They cover frame-flipping, raster operations and other VDI calls, collision detection, the video display, *DEGAS* file architecture, and sprite priority handling. Files of sample sprites are included to demonstrate various aspects of graphics programming.

In addition to the tutorials, four programs are included as accessories. These programs are quite large and come compressed as .ARC files. A copy of ARCX.TTP is included to uncompress these files onto separate disks. To use the programs, you'll have to remove any desk accessories you may have installed. You'll also need a joystick for a couple of them.

The four programs let you manipulate sprites under joystick control, create maps up to 500 screens large, learn how to manipulate sprites with *GFA BASIC*, and observe a demonstration of fine text scrolling. Except for the *GFA BASIC* demo, the programs are written in OSS's *Personal Pascal*. The source code files are included on the disk. Although the manual says the routines are well-documented and easy to understand, I didn't find them to be that well-documented. Also, there is no discussion of the scrolling or *GFA BASIC* demos in the manual.

For Programmers Only

All in all, *ST Sprite Factory* is a blessing if you're an aspiring game designer. With this utility, it's easy to construct sprites and to incorporate them into your own programs. But if you're not a programmer—and don't want to be—you probably won't get much out of *ST Sprite Factory*.

My only major gripe with the program is that the largest sprite you can create is 32 × 32 pixels. This isn't big enough for some purposes. Although I understand the reasons for this limitation, I still think it's too small.

Despite this drawback, *ST Sprite Factory* is a nice package. You can generate files of small sprites relatively quickly, and a good deal of instruction on graphics programming is provided.

ST Sprite Factory
Future Software Systems
21125 Chatworth St.
Chatworth, CA 91311
$39.95

Empire: Wargame Of The Century

Todd Heimarck, Assistant Editor

Requirements: Any ST system, color or monochrome.

War game aficionados will enjoy *Empire*. Air, land, and sea forces wage a world war on a 58 × 98 playing grid—that's 5,684 squares, approximately the size of 90 chess boards. At the peak of a typical game, you have several hundred independent fighting units. Your goal is to thwart the plans of one or two other empire builders, who may be controlled by the computer or by another player. A complete game takes four or more hours when you battle the computer, and even more if you're playing against friends.

The rules of *Empire* are simple, but they take time to master. The only available land forces are armies, which move slowly and are relatively weak. In the air, jet fighters are fast, but they don't pack much punch. The remaining forces are all sea-based: transports, destroyers, submarines, cruisers, battleships, and aircraft carriers.

Other Worldly War II

Although *Empire* is billed as a scenario from the *Star Fleet* series (which author/columnist Jerry Pournelle has acclaimed as one of the best strategic computer games), there's no real link between the two. The technology level of *Empire* is best described as pre-atomic World War II.

Each city under your control can produce one armed force, arranged below in order from least expensive to most costly:

	Speed	Hits	Damage
Army	1	1	1
Fighter	5	1	1
Destroyer	3	1	1
Submarine	2	2	3
Transport	2	3	1
Cruiser	2	8	2
Carrier	2	8	1
Battleship	2	12	3

The prices are measured in the time required to produce each unit. For instance, in a normal game, the first army produced by a city takes six turns to recruit. Thereafter, additional armies appear every five turns. Fighters take 12 turns to manufacture initially, then 10. The prices increase up to the maximum of 60 turns for a first battleship, after which the production time is 50. Thus, if you set aside a city to build battleships, you must keep it safe from enemy occupation for a period of 60 rounds.

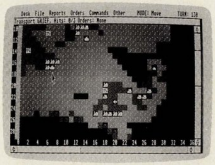
Armies are important because they're the only units capable of capturing cities (which, in turn, are the only way to produce more armed forces). Early in the game, you have to start building troop transports, because most of the worlds created by the program are 60–80 percent ocean, and armies can't walk on water.

Destroyers are less expensive than other ships—in terms of production time—and they move quickly, which makes them useful tools for exploration. Subs are strong on offense but weak on defense. Cruisers and battleships take a long time to build, but they are powerful and can bombard armies on the coast. As mobile airfields, aircraft carriers have their uses, but they're vulnerable to attacks from smaller ships. Fighters are very fast (5 spaces per turn), but their fuel tanks limit them to a range of 20 spaces (10 spaces for a round trip).

The New World

The *Empire* disk contains several maps. It's best to use one you've never seen before. When you learn the landscapes of the built-in worlds, you may create your own custom battlefields with the map editor. In the random-world option, the computer builds a new map. After creating a map, you can save it to disk.

All of the maps have only two types of terrain: land and water. On land, cities appear as grid icons. Only one unit may occupy



each space, with the exception of cities, which can hold any number of friendly troops. Armies move about only on land, although up to six may board a transport for a trip across the ocean. Ships must stay in the water, but they are allowed to dock and undergo repairs in friendly coastal cities. Fighters can move over any unoccupied terrain except for hostile or neutral cities.

At the beginning of a game, most of the world is *terra incognita*, a tapestry of black. Your first priority is to send out scouting parties to discover some of the 50–100 cities. In turn one, you own a single city. The map tells you the status of your city and its neighbors—only 9 of the 5,684 squares. (If it's any consolation, your opponents also begin with only one city.) Should you choose to start producing armies, in six turns one will appear, and you can send it off to explore and conquer.

The first 100 moves are relatively peaceful. Whenever you find a city, it's usually neutral (not yet claimed), and a few armies suffice to bring it into your sphere of influence. Your empire begins to take shape.

As the game progresses, you'll gradually capture more and more cities, each of which produces an army, fighter, or ship. You may reserve a few armies and ships for defense, but most available units should spend their time exploring uncharted territory and conquering new cities. In the early stages of *Empire*, acquiring cities is crucial—the more you have, the bigger your production base.

First Contact

Between turns 100 and 200, the edges of your expanding territory are bound to collide with the edges of a neighboring nation. At this point, the war's intensity increases. If the border is near a densely populated region or is strategically placed, you may wish to divert armies and fighters to defend it. Moving large forces to one area means you give up some control of other areas, however. Your opponent's feint to the north may be a ploy to draw you away from the big attack in the south.

With the exception of destroyers, all ships move two spaces per turn. A battleship at the South Pole needs 29 turns to move the 58 spaces to the North Pole. By the time it arrives at a battle site, the engagement may be over. Therefore, it's wise to plan ahead, splitting your navy into fleets that patrol selected oceans.

The role of the maverick explorer, the key to the early rounds, becomes less important as the ships start traveling in battle groups. It's sometimes worthwhile to retreat when you encounter an enemy cruiser or battleship. But if you run across a weaker ship such as a troop transport or aircraft carrier, attack it.

Defensively, isthmuses and straits are easy to hold because they're like funnels—hostile forces must travel through them in single file.

Tipping The Balance

Eventually, all neutral cities come under the control of one side or another, and the borders jell. Cities at the edges of an empire often trade hands in this phase of the game. One side attacks and wins a city; then the other side counterattacks and regains it. The end-game becomes a war of attrition.

To establish a successful beachhead for a seaborne invasion, you need armies and troop transports. Just before the invasion, dispatch cruisers and battleships to bombard any armies on the coast, and send in fighters to soften up

the inland forces. Your easily sunk transports are less vulnerable if they're supported by escorts (destroyers and submarines). It's not much fun to load up a transport and send it on a long journey only to have it destroyed just before it reaches its destination.

As in most other war games, the general rule is that the strong get stronger. An empire of 40 cities has twice the production capacity of a 20-city empire and will usually smother the smaller nation. As one player grows in strength, the balance tilts more and more to his or her side. The weaker nation dwindles and, finally, loses the game.

The computer player is gracious enough to offer its surrender when the situation becomes utterly hopeless. You may accept the resignation or play out the final battles.

New players make mistakes and generally lose a few games before learning the basic strategies and tactics. After several wars, you'll discover that the computer players are increasingly easy to beat. As you gain expertise, you may want to handicap the games, adjusting the production efficiency and combat efficiency. If you lower production, armed units take longer to create. If you weaken your combat rating, you'll generally lose more battles than you'll win. No matter how much ability you have, you can always alter the game parameters to even things out.

A Well-Designed Game

The copyright on *Empire* goes all the way back to 1978 because it was originally written for minicomputers (including the PDP-11 and DEC VAX). Later, the authors wrote versions for micros such as the IBM PC and Atari ST. This is both good and bad.

On the plus side, the game is ten years old. It has been playtested and refined over the years. It's well-designed and well-polished. On the minus side, when a game is translated from minicomputers (variations of *Trek* and *Adventure* come to mind), the user interface is often text-based, ignoring the graphics capabilities of the microcomputer.

Happily, this is not the case with *Empire*. It takes full advantage of the ST's GEM interface: the mouse, menus, and windows. An extensive series of drop-down menus allow you to change modes and get information. All menu commands have keyboard equivalents, which significantly speeds up play. For common commands, you don't need to select a menu item and click; just push a key. The map, which is too big to fit on a single screen, is kept in a scrollable GEM window.

Toward the end of the game, you'll often have 300–400 or more fighting units under your command. But you don't have to make 400 moves each turn. In Move mode, you can issue orders telling a given unit to travel to a certain location. Each succeeding turn, the army, fighter, or ship automatically moves toward its goal. The Sentry command puts armies to sleep until you wake them up or until an enemy appears in a zone of control. You can also put units in Patrol mode, where they march, fly, or steam back and forth. Ships can be told to escort other ships as well.

Various other menus provide useful information about your current situation. On the normal screen, only a portion of the map is visible. The World Map window allows you to view the entire known world (with unexplored territory in black). The Status window indicates at a glance the number of troops and ships you own and have under construction. Production mode marks all cities you own with an icon representing the type of unit under construction.

Empire is not copy-protected. You can make backup copies and, if you like, transfer it to a hard disk or a ramdisk. To make unauthorized copies of the program useless to those who didn't buy it, the game asks you at the start of the game to type in a certain word from a certain page of the instruction manual. If you don't type the correct word, you can't play the game.

Does *Empire* deserve its subtitle: *Wargame of the Century*? That's a boastful claim. After all, the century doesn't end for another 12 years. But when the judges gather in the year 2001 to pick the best software of the twentieth century, they might agree that *Empire* deserves a place in the top ten—at least within the *War Games That Require Less Than a Terabyte of Memory* category. Empire is both challenging and enjoyable.

Empire: Wargame of the Century
Interstel/Electronic Arts
1820 Gateway Dr.
San Mateo, CA 94404
$54.95

The Golden Path

Neil Randall

Requirements: Atari ST with a color monitor.

With such offerings as *Starglider*, *The Pawn*, and *Guild of Thieves*, Firebird has established a solid reputation for games with excellent graphics and intelligent interfaces. The keynote of a Firebird game is its recognition of the player, as well as an effort to keep annoyances to a minimum.

The Golden Path, a graphics adventure, continues this tradition. It puts you in the role of Y'in Hsi, a Chinese monk trapped in his father's reincarnated body. To escape this body and solve other problems, you must travel the Golden Path of Enlightenment in search of your fate. This introductory information is found in a 20-page novella included in the package; after reading it, you're ready to begin.

The Road Not Taken

The screens in *The Golden Path* are attractive and usefully designed. The top (and larger) portion of each screen shows the monk (you) in a particular scene. You start, for instance, on the left side of a bridge, with a book lying on one side and an apple or a key on the other. To move, you simply use the mouse to move the cursor (a Chinese symbol) to another part of the screen and push the left button. The monk walks towards the cursor at a speed determined by his current physical condition.

You can't walk just anywhere, though. At the bottom right of the screen is a miniature replica of the larger screen, this one showing one or more gold lines running from one side to the other. This line is the Golden Path, and your monk will follow it. At certain places the path forks, and here you must decide which branch to follow.

This is an excellent concept: I only wish it were more complex.

Perhaps choosing one fork in the Path could negate the other, thereby enhancing the metaphor of the journey through life. Still, as a means of controlling movement, it works well, easing play considerably.

The other portions of the screen show the Book of Knowledge, the Vine, and your empty pockets. When you click on the Book of Knowledge, the playing screen changes from graphics to text, showing what you see and what you can pick up. The Vine is your energy indicator; it increases as you do things right and decreases when you are attacked. The Vine also shrinks if you do something reprehensible, like kicking the starving man you encounter in one of the scenes. When the Vine disappears, the monk dies, and you must start the journey anew.

An Acquisitive Monk

Picking up and using objects, always a problem in graphics adventures, is handled well in *The Golden Path*. When the monk finds an object on the path, you simply press the left mouse button to make him bend down and pick it up. He can either carry it, use it, or put it in an empty pocket of his robe. To pocket it, you need only click on the empty pocket at the bottom of the screen; the object appears there instantly, and the monk's hands will be empty.

To use an object, you point the cursor over the monk's head and click. If the monk is in a position to use the object, an exclamation point appears. If not, a question mark shows instead. Much of the adventure consists of using objects in the right places, a system which works smoothly and easily.

Learning the game's interface takes only a few minutes, after which you can concentrate on following the path. Like most adventure games, you must move from screen to screen figuring out what to do. You'll have to solve puzzles, give appropriate objects to the right characters (or beasts), release a prisoner in a castle, and get a banana to a monkey.

A Question Of Complexity

The Golden Path stumbles somewhat in actual play, however. With all of the attention paid to the excellent player interface, the quest itself seems a bit mundane. More could have been done with the mysterious side of Chinese mythology, and there could have been more emphasis on making decisions. Getting rid of some of the more frustrating features of adventure games (knowing which objects to carry, for example) would have set this game apart even more.

On the whole, though, *The Golden Path* is very good. Its mouse-driven interface and graphics are excellent, and its Chinese theme offers a break from the usual dungeons-and-dragons adventure. A bit more complexity would be appreciated by experienced gamesters, but it's still good entertainment. For those interested in a unique graphics adventure, *The Golden Path* is highly recommended.

The Golden Path
Firebird
P.O. Box 49
Ramsey, NJ 07446
$44.95

MollyScope II

Steve Blair

Here's a graphics demo that's colorful, relaxing, and just plain fun to watch. When your eyes are bleary from long hours of doing something productive on your computer, give yourself a MollyScope break. For all STs with color monitors.

In the February 1987 issue of COMPUTE!'s Atari ST Disk & Magazine, there was an eye-pleasing graphics demo called "MollyScope" by Philip I. Nelson and Tim Victor. It drew colorful, shifting patterns on the screen using a succession of overlapping circles. The source code was included on the magazine disk, so I began to play around with some modifications.

The result—"MollyScope II"—is on this issue's disk under the filename MOLLY2.PRG. It runs only in the low-resolution mode on STs with color monitors. (My apologies to monochrome users, but the program depends on color cycling to achieve its effect.) You can run MollyScope II from the disk menu or GEM desktop like any other program.

To exit the program, press Return. Any other key clears the screen and starts a new pattern.

There are two other files on the magazine disk associated with MollyScope II: MOLLY2.C and PALETTE.S. These are the C and machine language source code files, respectively. They aren't required to run the demo; they're mainly of interest to programmers. The following section is for those who'd like to know how the program works.

Color Cycling With VBI

I began my modifications by trying to add three more circles to the basic MollyScope pattern, but found the results to be too slow. Changing the circles to boxes made the program run at an acceptable speed, since rectangles are easier for the computer to draw than circles.

With four boxes repeatedly being drawn on the screen, and the size of the boxes constantly changing, the speed of the color cycling varied with the size of the boxes. That produced an undesirable effect: The colors didn't cycle at a constant rate. They'd speed up, slow down, speed up, and so on.

Enter the vertical blank interrupt, or VBI, which occurs when the electron beam inside the video monitor reaches the bottom right corner of the screen, blanks out briefly, and then moves diagonally back to the top left corner to retrace the screen. If the color cycling is triggered by the VBI, it works independently of the box-drawing routine. The VBI happens 60 times a second; I set the color cycling to a rate of 30 times per second.

I decided to make the program cycle through all 512 colors available on the ST, and to display all 16 colors which are available in the low-resolution mode at one time (15 colors, if you don't count the background color). I couldn't find an acceptable method of choosing the order of the colors, so I used *NEOchrome* to create several palettes.

Afterward, I decided something else was missing. When the boxes hit the edges of the screen, they changed direction. This didn't add much to the complexity of the design. So I added a small modification to continuously change the boundary, thus introducing some chaos in the process.

If you're interested in the VBI and how to use it, study the source code files included on the disk. They were linked and compiled with *Alcyon C*, but they should work with other versions of C with minor modifications. The machine language code is commented and contains generic routines to enable and disable the VBI routines. **ST**

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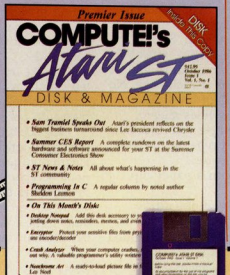

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Most of the following suggestions serve to improve the speed and accuracy of publication. We are much more concerned with the content of an article than with its style, but articles should be clear and well-explained. The guidelines below will permit your good ideas and programs to be more easily edited and published:

1. The upper left corner of the first page of your article should contain your name, address, daytime telephone number, and the date of submission.

2. The following information should appear in the upper right corner of the first page: the language in which your program was written and the maker of that language, if applicable (for example, if your program was written in C, which compiler was used); the size, in kilobytes, of both your source code and executable object code; color or monochrome; screen resolution (low, medium, high); 512K or 1040K; double- or single-sided disks; and one drive or two.

3. The underlined title of the article should start about ⅔ of the way down the first page.

4. Following pages should be typed normally, except that in the upper right corner there should be an abbreviation of the title, your last name, and the page number—for example: Memory Map/Smith/2.

5. All lines within the text of the article must be double- or triple-spaced. A one-inch margin should be left at the right, left, top, and bottom of each page. No words should be divided at the ends of lines. And please do not right-justify. Leave the lines ragged.

6. Please use standard typing paper (no erasable, onionskin, or other thin paper), and type on one side of the paper only (upper- and lowercase).

7. Sheets should be attached with a paper clip. Please do not use staples.

8. If you are submitting more than one article, send each one in a separate mailer with its own disk.

9. Short programs (under 20 lines) can be included within the text. Longer programs should be separate listings. *It is essential that we have a copy of the program, recorded twice, on disk (single- or double-sided).* Include both the source code and the executable object code. The object code must be a self-standing run-time package that can be used by readers who do not own a copy of the language in which the program was written. In addition, we must be able to legally distribute the runtime code without incurring licensing fees or other obligations to the maker of the language. Check with the maker if you aren't sure. If your article was written with a word processor, we also appreciate a copy of the text file on the disk. The disk should be labeled with your name, the title of the article, and whether the disk is single- or double-sided. Disks should be enclosed within plastic or cardboard mailers (available at photography, stationery, or computer supply stores).

10. A good general rule is to spell out the numbers zero through ten in your article and write higher numbers as numerals (1024). The exceptions to this are: Figure 5, Table 3, TAB(4), and so on. Within ordinary text, however, the zero through ten should appear as words, not numbers. Also, symbols and abbreviations should not be used within text: Use "and" (not &), "reference" (not ref.), "through" (not thru).

11. For greater clarity, use all capitals when referring to keys (RETURN, TAB, ESC, SHIFT), language commands (LIST, RND, GOTO, CASE OF), and languages which are acronyms (such as, BASIC, PILOT, and FORTRAN, but not Forth, Pascal, or Logo). Headlines and subheads should, however, be initial caps only. Do not capitalize words for emphasis; instead, underline words you wish to emphasize, indicating italics.

12. Articles can be of any length—from a single-line routine to a multi-issue series. The average article is four to eight double-spaced, typed pages.

13. If you want to include photographs, they should be either 5×7 black-and-white glossies or color slides.

14. We do not consider articles which are submitted simultaneously to other publishers. If you wish to send an article to another magazine for consideration, please do not submit it to us.

15. COMPUTE! pays between $100 and $600 for published articles. In general, the rate reflects the length and quality of the article. Payment is made upon acceptance. In addition to the initial payment, royalties are paid based on the sales of the issue in which the article appears. The royalties are divided among the contributors to each issue on a pro rata basis. Following submission (Submissions Reviewer, COMPUTE!'s Atari ST Disk & Magazine, P.O. Box 5406, Greensboro, NC 27403), allow four to eight weeks for a reply. If your work is accepted, you will be notified by a letter which will include a contract for you to sign and return. *Rejected manuscripts are returned only to authors who enclose a self-addressed, stamped envelope.*

16. If your article is accepted and you have since made improvements to the program, please submit an entirely new disk and a new copy of the article reflecting the update. Send the revised version as if it were a new submission entirely, but be sure to indicate that your submission is a revised version by writing "Revision" on the envelope and the article.

17. COMPUTE!'s Atari ST Disk & Magazine does not accept unsolicited product reviews.

Sprite Factory Supplement

Future Software Systems has released *The Chameleon*, a utility for *ST Sprite Factory*. Users can generate source code from *DEGAS, NEOchrome, Sprite Factory*, and IFF-format files. The utility allows you to choose either BASIC, machine language, or C code.

With The Chameleon, *users can generate source code from* DEGAS, NEOchrome, Sprite Factory, *and IFF-format files in BASIC, machine language, or C code.*

Users can also convert files between *DEGAS, NEOchrome, Sprite Factory*, and IFF formats, and can cut out and move both regular and irregular shapes into or out of any of these formats.

Suggested retail price is $29.95.

Future Software Systems, 21125 Chatsworth St., Chatsworth, CA 91311
Circle Reader Service Number 200.

Role-Playing Adventure

Paragon Software has recently released *Alien Fires-2199* for the Atari ST. Players assume the role of a Time Lord in this futuristic science fiction role-playing game. Custom characters can be created by determining their strengths and weaknesses in areas such as fighting, diplomacy, dexterity, and quickness.

Players are sent into the distant future to a small planet called Galaxy's End at the edge of the universe. Their mission is find a mysteriously vanished man named Samuel Kurtz and destroy all traces of his time-transportation device that threatens the fabric of time.

Features include a digitized rock soundtrack, science-fiction game artwork, scrolling 3-D color graphics, character interaction, and speech synthesis.

Suggested retail price is $39.95.

Paragon Software, 600 Rugh St., Greensburg, PA 15601
Circle Reader Service Number 201.

Business Tools For The ST

Two new programs that help transform the ST into a business tool have been recently released. *Inventory Master* and *Payroll Master* are now available from Royal Software.

Inventory Master helps users keep track of sales histories for the past 12 months and allows up to three vendors for each inventory item. The program can estimate the next three months' sales figures and compute the reorder level to insure sufficient stock levels to meet projected demand. The purchase-order section allows users to issue, view, receive, and fill orders. The report section includes daily reports, period reports, inventory listings, file records, vendor records, P.O. records, sales records, overstocked items reports, slow-moving items reports, price analysis, special sorts, and sales shifts.

The program takes advantage of the ST's GEM interface and comes with a manual and tutorial. Suggested retail price is $99.95.

Payroll Master is a business payroll program for the ST, designed for small- to medium-sized businesses. The program features a GEM interface and supports multiple pay types, all pay periods, and vacation and sick pay. Up to 400 employees can be handled with this program.

Features include user-defined tax tables that allow the user to enter new tax information if the tax structure changes. There are also up to five user-defined deductions in four categories.

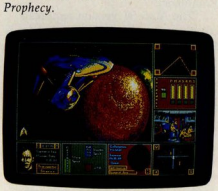
The program will print payroll checks with user-defined custom check formats. It also prints address labels; W-2 Forms; employee information reports; local, state, and federal tax reports; 941 reports; a general ledger transaction register; and employer's FICA, federal, and state unemployment tax reports.

Suggested retail price $79.95.

Royal Software, 710 McKinley, Eugene, OR 97402
Circle Reader Service Number 202.

Trekkies Must Save The Federation

Simon & Schuster Software has announced the release of *Star Trek: The Rebel Universe* for the Atari ST. This new graphics adventure is the third in a series of Star Trek games that include *Star Trek: The Kobayashi Alternative* and *Star Trek: The Promethean Prophecy*.



In Star Trek: The Rebel Universe, *players have access to eight high-resolution graphics screens.*

The crew members of the starship U.S.S. *Enterprise* are depicted in eight high-resolution graphics screens, each providing their individual expertise. Players can call up Mr. Spock's knowledge of the solar systems and planets, McCoy's medical files, or any advice from Scotty, Sulu, Uhura, Chekov, or Kirk.

Onboard equipment includes three levels of star map magnification to chart the course of the Enterprise; engines with warp speed and impulse power, for travel among the solar sys-

tems and planets; a weapons system that includes photon torpedoes and phaser banks for combat; and a transporter that beams players and objects back and forth between the ship and the surfaces of planets.

The object of the game is to save the United Federation of Planets. A mind control scheme by Klingon forces is turning loyal Federation members into violent rebels. The player's five-year mission is to lead the *Enterprise* crew through the Quarantine Zone, where hostile Klingons will be encountered along with Romulans and rebel Federation vessels. The player must stop the rebellion or be eternally exiled.

During the action, the player will encounter simulated battle scenes as well as sound effects, such as crew voices, red-alert sirens, and communications hailing whistles. The mission can be completed by using strategy and the advice of the crew.

The program is accompanied by an illustrated manual that provides complete background information on the rebellion, instructions for employing the various functions of the crew members, strategies, and Captain Kirk's log, which provides wisdom on how to deal with Klingons and Romulans.

The Atari ST version requires a color monitor. Suggested retail price is $39.95.

Simon and Schuster Software, One Gulf+Western Plaza, New York, NY 10023

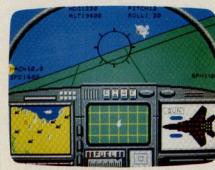
Circle Reader Service Number 203.

F-15 Strike Eagle Enhanced

Microprose has released an enhanced version of *F-15 Strike Eagle* for the Atari ST. The new version features higher resolution, added detail, color, and additional game play.

The jet simulation game puts the player in the cockpit of an F-15 all-weather, air-superiority, and ground-attack fighter with more than 24 flight, weapons, and electronic countermeasure controls. Players must face mission scenarios ranging from Southeast Asia to the Persian Gulf. There are four skill levels.

The new version is designed to take advantage of the graphics capabilities of the Atari ST. Higher resolution and additional colors reinforce the authenticity of the heads-up cockpit display. Features also include target, missile, map, and explosion graphics.



The enhanced F-15 Strike Eagle *features better graphics and color.*

The Atari ST version includes an additional mission that allows players to recreate the United States' 1986 retaliatory strike against Libya.

Cumulative and multiple scores can be recorded on a separate disk. A Hall of Fame of high scores is also provided. The game can be played on an Atari ST, using a mouse or a joystick. Suggested retail price is $39.95.

Microprose, 120 Lakefront Dr., Hunt Valley, MD 21030

Circle Reader Service Number 204.

ST Talks To VAX

Engineering & Computer Services has recently developed *ECSCOM*, a VT240 emulation package designed to communicate between an Atari ST and a Digital VAX host computer.

ECSCOM supports VT52, VT100, and VT240 emulation. The program also supports DEC line-drawing graphics, DEC application keypad definitions and arrow keys, and DEC's interactive graphics package, *ReGIS*. Features include scrolled regions on the screen and the ability to conduct file transfers to and from the Atari. DEC character attributes are supported, as are all DEC VAX compatible programs.

The program requires an ST with a color monitor. Suggested retail price is $100. Documentation is included.

Engineering & Computer Services, 2411 Anthony Ave., Broomall, PA 19008

Circle Reader Service Number 205.

Rule An Alien World

Firebird has recently released *Sentry* for the Atari 520ST. Players get a lone robot to battle against The Sentry and her Landgazers.

The object of the game is to overtake her as ruler of the alien landscape. To accomplish this objective, players must avoid the energy-absorbing stares of The Sentry and her pawns. Energy is the life-sustaining commodity of the alien land as well as its only constant. Strategy and skillful maneuvering puts players in position to absorb The Sentry and assume the position of ruler.

Once ruler status has been achieved, players are then faced with a new landscape to begin a new struggle and continue game play.

The program comes with an illustrated booklet, a key guide, and a pin-on Sentry button. The Atari ST version has a suggested retail price of $44.95.

Firebird, 71 N. Franklin Turnpike, Waldwick, NJ 07463

Circle Reader Service Number 206.

Price Reduction For APL

Spencer Organization has announced a price reduction for *APL.68000*, an APL interpreter for the Atari ST. Full versions are now available for $99 and are shipped with a complete *APL.68000 Language Manual*, machine-specific documentation, and keyboard labels.

The program is fully integrated with the Atari ST environment, allowing systems written in APL to integrate with other Atari ST software. *APL.68000* is fully integrated with GEM and uses a standard Atari ST user interface. The program features a full-screen function editor and access to TOS native files. Applications can detect mouse position and state, and can use a standard ASCII keyboard. The program uses mouse editing and a clipboard, and offers full printer support. User-defined pull-down menus, dialogs, and alert boxes are included.

Additional features include full interface to ST graphics; arbitrary input/output, via serial ports; a session manager, which allows editing of screen lines; and a machine code interface.

Spencer Organization, 366 Kinderkamack Rd., P.O. Box 248, Westwood, NJ 07675

Circle Reader Service Number 207.

Examine ST Programs

TMON ST is now available from ICOM Simulations. The cartridge allows users to examine the inner workings of an Atari ST program while using a minimum of system memory. The utility's menu bar and windows allow multiple views of a program during debugging. The monitor can be invoked by any system error, *TMON*

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ST breakpoint, or user-definable system call.

The utility can halt any running program, examine it, disassemble it, dump it to the printer, and then return to where the user left off. A built-in programmer's calculator and electronic notepad are also included.

Packed with the utility is a user's guide and technical reference manual. Both the guide and manual are designed to aid novices as well as experienced developers.

TMON ST can run on all Atari ST computers with either monochrome or color monitors. Suggested retail price is $149.95.

ICOM Simulations, 648 S. Wheeling Rd., Wheeling, IL 60090
Circle Reader Service Number 208.

Keep Your Bits In A Bucket

The Original Bit Bucket from J-Bar Associates is designed to store a variety of objects, including pens, pencils, and rulers. The container can hang by its handle, stand upright on its own, or adhere to any smooth, hard surface with the double-sided foam tape included. Made of a high-impact material and a metal handle, the bucket is available in custom colors and with custom printing when purchased in quantities of 500 or more.

Suggested retail price is $3.95 each.

J-BAR Associates, Box 9101, 200 Turnpike Rd., Southborough, MA 01772-9101
Circle Reader Service Number 209.

Eliminate Disk Labels

Weber & Sons has announced a new computer disk identification system. The NoLabelSystem eliminates the use of all labels on computer disks. A thin, clear, plastic window pocket is affixed to the disk, allowing a card to be inserted in the pocket. Information about the disk's contents can be written or printed on the card. Notes can be made on the card as data on the disk is changed.

The kit includes 100 plastic pockets for both 5¼- and 3½-inch disks; 100 white insert cards, which can be tractor-fed in 5¼-inch size; and 100 color-coded insert cards.

Suggested retail price for each kit is $22.45.

NoLabelSystem Division, Weber & Sons, 3468 Hwy 9, Freehold, NJ 07728
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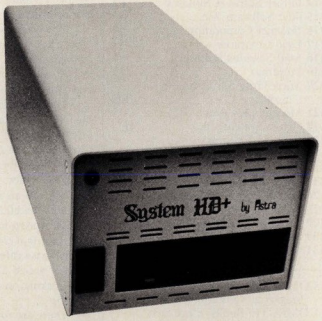

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How To Use The Disk

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 then 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 as usual. Or you can use the custom disk 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.PRG. It works in all screen modes, color or monochrome.

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

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 are 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 a runnable 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 a runnable program, you'll be alerted to this fact.

Note that many files on the disk require special instructions or explanations; 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.PRG, DISKMENU.RSC, MONOMENU.RSC, and CONTENTS.FEB. These files do not appear on the disk menu itself. Do not delete them 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, with royalties according to the volume of sales, we ask that you respect the copyright.

Special Notes

If you run the "Mollyscope II" program from the disk menu, you'll find that the mouse is turned off when you return to the menu. To avoid this problem, run Mollyscope II from the desktop instead of from the disk menu.

Readers with single-sided disk drives cannot use ARCX.TTP to extract all the source files from the SOURCE.ARC file. The ARCX program returns a *disk full* message, and part of the machine language source file START.S will be missing (all other source files are present and whole, however). To work around this problem, readers may use a double-sided disk, a ramdisk (at least 375K), or a hard disk; or they may selectively extract the START.S file with the ARC.TTP program, which is widely available.

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IBM EGA screen shown

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