

ST LOG™

THE ATARI ST
OPERATOR'S
MAGAZINE

OCTOBER 1986

ISSUE 7

THIS ISSUE:

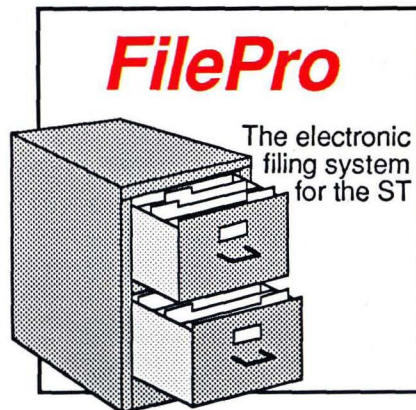
**A tutorial
on windows**

**Mark Skapinker's
Clock Boot**



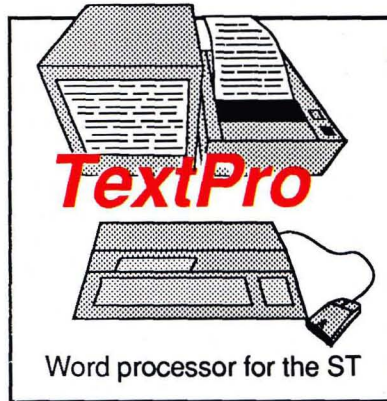
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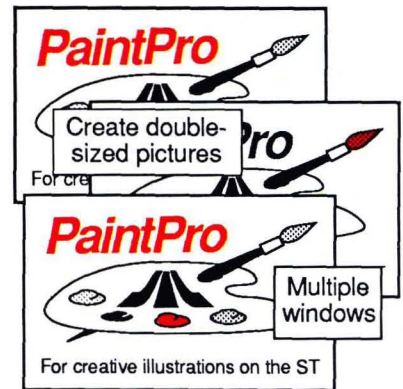
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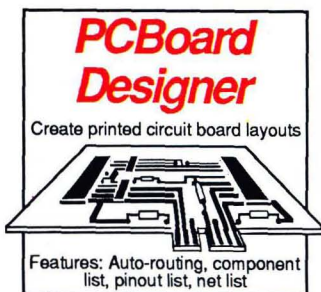
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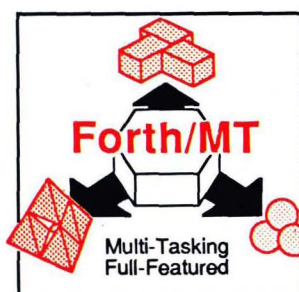
ST PaintPro

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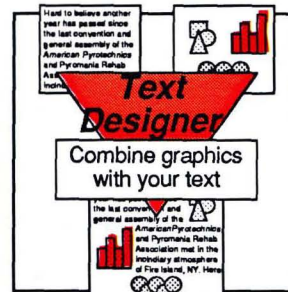
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FEATURES

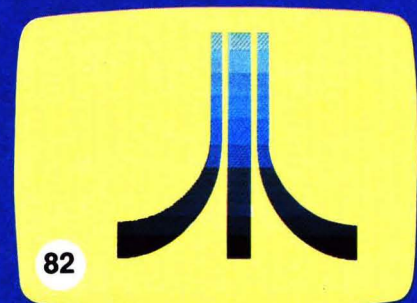
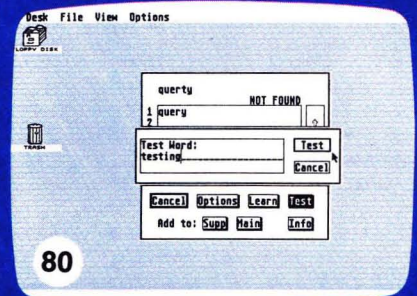
- Puzzle it out Douglas Weir 68ST
Doug explains how to use this multidimensional puzzle program from West Germany.
- BONUS—PROGRAM FOR DISK SUBSCRIBERS**
- Programming with GEM windows Douglas Weir 70ST
A deluxe shell program/tutorial which demonstrates how to create and use windows under GEM.
- Setting the clock on your ST Mark Skapinker 77ST
The author of this public domain program gives you the *hows* and *whys*.

REVIEWS

- Fast/BASIC-M Bruce D. Noonan, M.D. 53ST
(Philon, Inc.)
Similar to Microsoft BASIC and ST BASIC in syntax, but with the inclusion of a compiler.
- Thunder! Arthur Leyenberger 80ST
(Batteries Included)
Does this program continue to uphold Batteries Included's reputation for quality software?

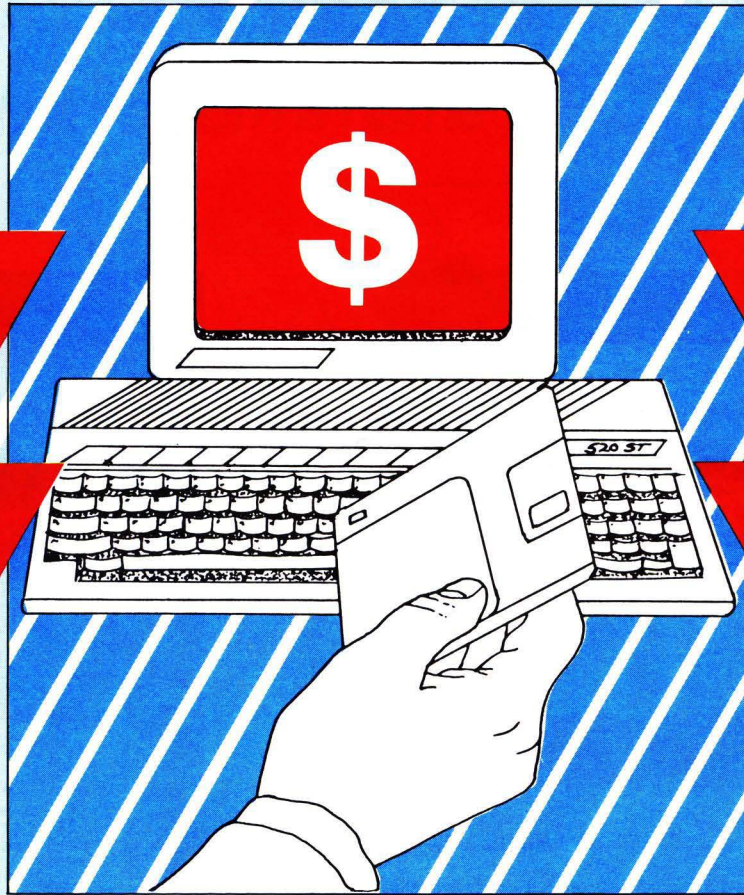
COLUMNS

- Ian's Quest Ian Chadwick 49ST
A look at software through the eyes of a program tester/reviewer.
- ST news 56ST
- C-manship Clayton Walnum 59ST
The topic this month: structures and their use.
- Atari ST best-sellers 82ST
- ST index to advertisers 86ST



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RULES AND REGULATIONS FOR THE ST-LOG ST PROGRAMMING CONTEST

1. All entries must be original creations and cannot be submitted, or be under consideration, anywhere else. This includes any other contests or competitions currently underway.

2. Feel free to submit as many entries as you like, as often as you like. The deadline for submissions to the contest is December 31, 1986. All entries must be in by that date to qualify for the contest judging (however, programs received after this date will be considered for regular **ST-Log** publication).

There is no limit to what types of programs we are looking for. Business or educational, graphics oriented or musically inclined, we want to see them all.

3. The entries can be in any programming language of your choice, on 3½-inch single- or double-sided disk, with both run-time and source code. It's quality that counts, not format. If your program is in a compiled language, the compiled object or run-time code must be a free-standing program—one which can be run by someone without a copy of that language. This rule does not apply to programs written in ST BASIC and Logo, which come with the ST. Also, we need to be able to distribute the program legally, without licensing fees or obligation to the language's maker. Contact the manufacturer to

find out if the language you're using has distribution requirements.

4. Please make sure that all entries have accompanying documentation, and that all written materials pertaining to the entries (including articles) are submitted as standard double-spaced typewritten manuscript. Please try to make the text as informative as possible, as it pertains to the usage of the program. This accompanying piece could be in the vein of a "making of" the entry, and could include some of your personal programming hints, etc.

5. Any submissions that do not qualify for prizes will be returned only if you supply us with a stamped, self-addressed envelope or mailer. Please do not send originals of your program—make sure you keep a copy for your own use.

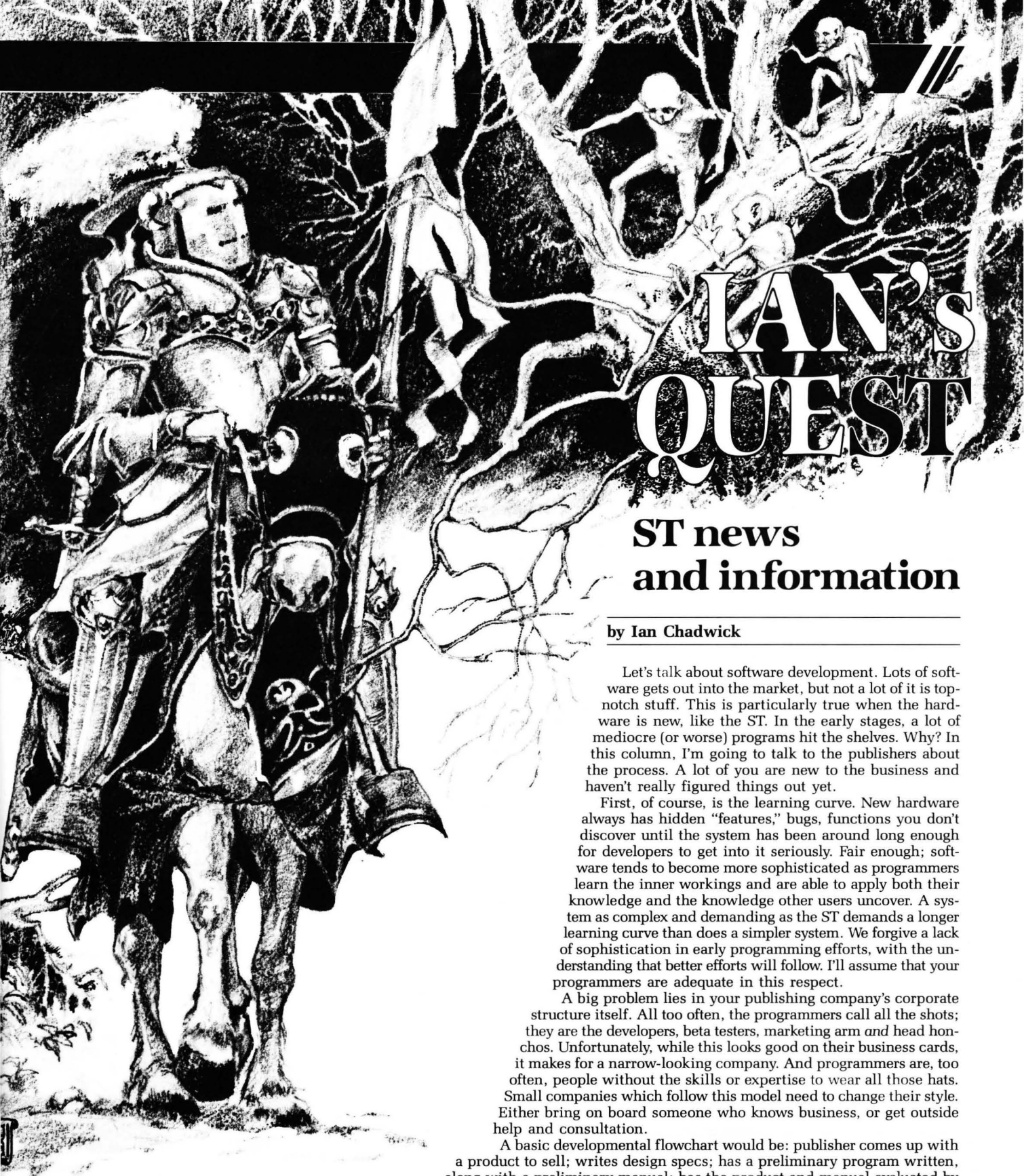
6. Contest judging will be done by the staff of **ST-Log**. The decision of the judges in all contest categories will be final. Contest winners will be announced in **ST-Log** during the first quarter of 1987.

7. This contest is void where prohibited by law. Full-time employees of ANALOG 400/800 Magazine Corp. are ineligible for this contest.

8. Send your entries to: **ST-Log**, c/o ANALOG 400/800 Magazine Corp., P.O. Box 23, Worcester, MA 01603.

Good luck!

ST-LOG
THE ATARI ST
OPERATOR'S
MAGAZINE



IAN'S QUEST

ST news and information

by Ian Chadwick

Let's talk about software development. Lots of software gets out into the market, but not a lot of it is top-notch stuff. This is particularly true when the hardware is new, like the ST. In the early stages, a lot of mediocre (or worse) programs hit the shelves. Why? In this column, I'm going to talk to the publishers about the process. A lot of you are new to the business and haven't really figured things out yet.

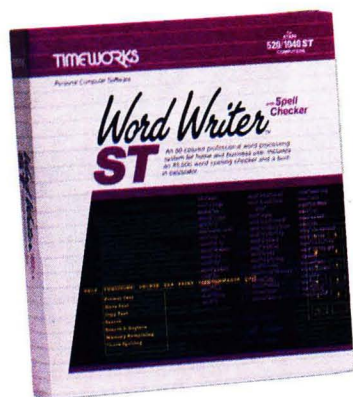
First, of course, is the learning curve. New hardware always has hidden "features," bugs, functions you don't discover until the system has been around long enough for developers to get into it seriously. Fair enough; software tends to become more sophisticated as programmers learn the inner workings and are able to apply both their knowledge and the knowledge other users uncover. A system as complex and demanding as the ST demands a longer learning curve than does a simpler system. We forgive a lack of sophistication in early programming efforts, with the understanding that better efforts will follow. I'll assume that your programmers are adequate in this respect.

A big problem lies in your publishing company's corporate structure itself. All too often, the programmers call all the shots; they are the developers, beta testers, marketing arm and head honchos. Unfortunately, while this looks good on their business cards, it makes for a narrow-looking company. And programmers are, too often, people without the skills or expertise to wear all those hats. Small companies which follow this model need to change their style. Either bring on board someone who knows business, or get outside help and consultation.

A basic developmental flowchart would be: publisher comes up with a product to sell; writes design specs; has a preliminary program written, along with a preliminary manual; has the product and manual evaluated by outsiders; has the program finished; goes through another testing cycle; rewrites and debugs; prepares final manual, disk and package; then places it in the distribution stream. Of course, there are a lot of other considerations—contracts with outside programmers, advertising and promotion, market research, project coordination, editing—all depending on the company involved. The weakest areas in this process are usually in market research, design specification compilation and evaluation.

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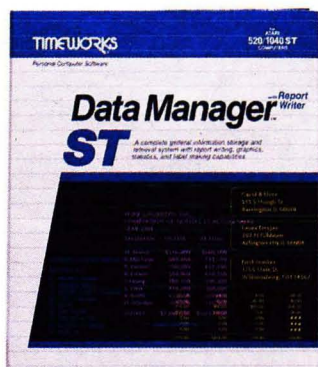
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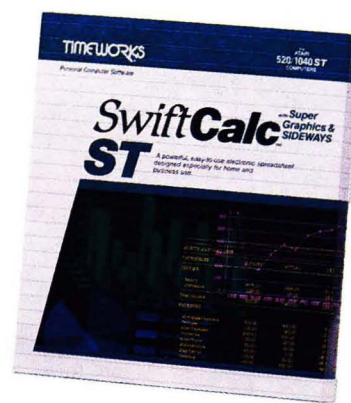
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**These Programs
INTERFACE
with Each Other**

First, I assume a company's research finds there is a need or a profitable market for a product. It goes without saying that some level of research is performed, or else you're talking Russian Roulette with your capital. Basic research involves a lot of foot and phone work; you call distributors and retailers first, asking them what's coming and what's been asked for. Read the trade journals and try to find trends or growth areas.

Check out the competition. See who has what out, what it does, and what's due in the next few months (or year). Read reviews to find the strong and weak points. Try to uncover sales figures to see if it's worthwhile and profitable (that's the magic word). Compare prices and see if there's enough margin to undersell or compete at the same price.

You can hire someone to do this for you, or you can have it all done in-house. But, whatever you do, make sure you know the market first. Find out why a product is demanded or is selling. Who is buying the machines? Will they also buy your program? At what price? Can you make money at that price? Will the program sell more machines or vice versa? Who will stock it? Sell it? Review it? Prepare a written analysis that tells whether or not there's a reason to go ahead and publish. This is done as standard practice in the book publishing industry; it fits the software business, as well.

Next, you write up the design specs for your product. Make sure you buy the competition's packages and see how they handle it. Try to find better, more elegant solutions or features. No, I don't recommend copying and plagiarism, but I do suggest you know what the other companies are doing, then aim at producing a better product with more features than what's currently on the market. The only way you'll know is to buy the competition and test it. Don't kid yourself: if you think other industries don't compare the competitor's products and try to outdo them, you're deluding yourself.

Design specs are *critical*. This is the working scaffold around which you'll build your product. Be as complete and detailed as possible. You may need to change the specs later; be prepared. Write up the essential features first, then potentially attractive features. This is where a lot of brainstorming is necessary. Don't attempt to do it alone; involve everyone in your office if you can. Never look down on ideas, no matter what their source.

With a basic design idea in mind, go outside the company. Ask the users and sellers what they want in a product of that type. Don't think you know it all. Ask the users. If your product is a professional one, ask the potential buyers what they want. Don't just program something and dump it on the market.

For example, say you decide we need another word processor (we do, but I'll cover that in another column). Go to professional writers, or users who write several hours daily. Ask them what they need, if they want mouse or keyboard commands, or both. Do they need or want GEM? How many keystrokes will they accept to implement a command? Do they need to search and replace bare carriage returns, and do they need windows and buffers? How large a document do they plan to write? Do they use a hard disk or a spelling checker? Is ASCII file output needed? Find out what they're using now, and why they like or dislike it. Ask about printers, speed, fonts, and everything else you can think of. Put it all in writing.

This is a critical, often overlooked step. It pays to talk to users and find out what they're doing and what they need. It also pays to examine the best-sellers and the well-reviewed products from another hardware system. You can see what's worked there—and why. Many of the ideas and innovations can be carried over to the ST environment. Don't be afraid to incorporate a good idea into your product, as long as you write it yourself.

“Get the specs right first... by asking users what they need.”

An amazing amount of software hits the market without ever going through an elementary design stage. How often have you wondered, “Why doesn't it do this?” or thought, “It would be so much easier if it did it this way...” or “Why haven't they included this painfully obvious and necessary feature?” I haven't found much software that *doesn't* bring up these thoughts. That's why it's important to get the specs right first. And the only way you'll do so is by asking users what they need. Remember, in any other manufacturing or publication industry, fully developed and understood design specs are crucial.

Evaluation is the second part of this two-stage process. It's done after you've got some of the program written, enough to test it outside. This is also a key issue: go outside. People in the real world will find bugs and make programs crash in ways you never even considered. If you ask a person to press a numeric key, they'll press A, or a function key. They'll change disks when they shouldn't, choose the worst menu option, enter bad filenames, forget to turn on the printer, and everything else. And more. They'll also be able to find de-

sign flaws and make suggestions to improve them. Your programmers can't see this; they've worked with the program too closely. They wrote it; they know not to press A when 6 is expected.

Evaluation is a barometer for your product. Get professional users (I feel I must hammer that word home... *Don't* depend on your friends, your wife or hubbie, your mother, or your kids to test the product). Get someone who knows the field, uses similar products, needs the product or would use it if available—and who's dependable and willing to be critical. Pay them for their efforts, or promise them a finished copy. Mention them in the credits, but make it a business transaction. Demand a written report and feel free to ask for clarification or expansion on points you don't understand.

This is the make-it-or-break-it point. If your evaluators come back with a lot of criticisms, you'd better decide whether to redesign and rewrite, or to scrap the project altogether. I do this type of work for several companies, including Batteries Included and Antic. My reports are deadly; I'm very critical and tear the products to pieces. I test everything, then recommend which points *must* be changed to sell the product and which *should* be changed to improve it. I can't foresee or find every technical flaw, but I cover the user end completely. When these companies combine my reports with those from other sources, they have a good, detailed, critical analysis of the program. That's the base they need, to decide where to go next.

Of course, the needs and demands of a professional user are different from those of the casual user. I'm a professional writer: I spend eight to twelve hours every day (weekends, too) in front of one of my computers, writing. I need different, often more powerful or complex things in a word processor than does the person who writes a few articles or letters. I've used a dozen different computer systems and know what most major word processors can and can't do. But my evaluation of a word processor will take this into account.

If the program suits my needs, it will suit almost anyone in the business or professional market. This isn't true the other way around. If your testers are casual users, the result will be a program they can use, but it's unlikely they'll be able to see or appreciate what a regular or demanding user requires. Know your intended market.

By the same token, I would only use a project management program casually, so my report can only deal properly with the user interface and bugs. I couldn't tell whether or not the program design would best suit a professional project manager. I use spreadsheets regularly, so I can evaluate them, but I can't evaluate an accounting package as competently.

for and know the basics. Some should be technically oriented and some just competent users. By getting technical and non-technical (not casual) reviewers, your company gets a well-rounded perspective on the product. Generally, if your original design specs were properly developed, you won't face major rewrites or redesign at this stage.

If your evaluations come back negative, go back to square one. It's better to redesign and produce a good, finished product than produce a half-finished one. You'll only get bad reviews, customer dissatisfaction and a bad reputation with the latter. Think about the general reaction to **VIP Professional** when it arrived; it had many bugs and lacked the promised GEM interface. Most of the negative reaction could have been avoided by following a reasonable design/evaluation cycle, rather than rushing it out.

Don't confuse evaluation with testing. Testing is done on a "finished" product to iron out any last bugs, wrinkles or problems. It is not an invitation for design analysis. This can be done by competent, but not necessarily professional, users. It can be done in-house by people who are unfamiliar with the program, but you should send a few outside as well, to cover all bases. You can never test software too much.

Most of my criticisms of programs are due to weaknesses in these steps—or the lack of them, in some companies. No amount of professional programming expertise can make up for sloppy research or design. My own background includes both software and trade book editing for major publishing houses. Nothing got published without market research, financial analysis, and, where appropriate, design and evaluation.

There are other issues which can change the reaction to your products: packaging and documentation are two of the more important. Both must be professional and complete. Don't leave ad copy, jacket copy, or—especially—your manuals in the programmers' hands. Get them written by people who understand *English* and can write it adequately. Have all copy read by outsiders. Have them comment on it, along with the program. This goes for all text *within* the program as well: make sure it is fully proofed and edited. Don't let something like your up \$1 appear, when you're was intended (as appears in *Soft Logik's Electro Solitaire & 21*).

Get good package design—done by artists, not someone in the back room who took art one year in school. Make sure they understand that it has to sit on a store shelf, both face and spine out. Make sure they understand color, type and the need for a readable package. Above all, be professional in every stage, in every activity and every outlook. **A**

Ian Chadwick is author of Mapping the Atari and several software manuals. He worked in the publishing business on and off for fifteen years. He was also an itinerant fruit picker, short order cook, game store manager, magazine editor and journalist. He lives in Toronto with Susan, their six cats and one dog. He is currently writing a murder mystery and trying to teach his dog Pascal.

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WHAT IS ST-CHECK?

Most program listings in **ST-Log** are followed by a table of numbers appearing as DATA statements, called "ST CHECKSUM DATA." These numbers are to be used in conjunction with **ST-Check** (which appeared in **ANALOG Computing/ST-Log** issue 41).

ST-Check (written by Clayton Walnum) is designed to find and correct typing errors when readers are entering programs from the magazine. For those readers who would like copies of the article, you may send for back issue 41 (\$4.00).

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by **Bruce D. Noonan, M.D.**

Learning a new language on a computer is a major chore for some of us. Many of today's ST programmers learned on the 8-bit Ataris. We had Atari BASIC, Atari Microsoft BASIC, assembly and a few others to choose from. Now that the ST has arrived, we have ST BASIC, Logo, C, 68000 assembly, Pascal, Prolog and Modula-2, plus promises of COBOL, FORTRAN and several others. What a programmer wants in a chosen language is flexibility, ease of use and accuracy, as well as maximum access to the capabilities of his computer.

Philon has produced a product which takes source code written in BASIC and compiles it into machine language for optimum speed. We refer to programs thus created as "stand alone" programs, since they don't require the presence of a language "interpreter" in order to run.

Programs written in Atari's ST BASIC, on the other hand, require that BASIC be run first, with the user's program loaded in afterward. If you've dealt with many ST BASIC programs, you know how incredibly slowly they run. If you constantly move the mouse while an ST BASIC program is running, you can bring a running program to a virtual standstill.

Fast/BASIC-M is close to Microsoft BASIC and ST BASIC in syntax. With the exception of a conspicuous absence of window, editing and debugging commands, it has commands and statements nearly identical to those of ST BASIC. Thus, you can write and debug your ST BASIC program prior to compiling it.

Most statements are compatible, such as those creating sequential files or random files by setting up fields. But you don't have the option of printing to a printer. What? LPRINT doesn't print to the printer? That's right, folks. The **Fast/BASIC** LPRINT function merely "prints" to a disk file.

When you want to print, the program first creates and prints formatted data to the print file called LINEPRINTER. You must then terminate the program and return to the GEM desktop to dump the file, by double clicking the LINEPRINTER icon and selecting "print" instead of "show." This is, in my opinion, a handicap for commercial applications where you need to enter data and get immediate hard copy.

Although **Fast/BASIC** lacks sound and graphics commands, just before press time Philon sent me a free update. It contains two functions: VDISYS and GEMSYS. By poking in the proper numbers to GEM arrays, you can utilize the graphics capabilities for which the ST is renowned.

To set up functions, you must also define two other functions, to translate **Fast/BASIC's** 32-bit integers to 16-bit words and back again, in order to access the GEM routines. The documentation covers this thoroughly and adequately, although, to a beginner, these routines may appear somewhat difficult to implement.

The language is versatile enough, however, to permit saving the arrays and setup procedures in a %INCLUDE file, so that they needn't be typed in for every program, and can be accessed by the compiler at compile time. Trying to use the GEMSYS function to access AES routines (such as dialog boxes) would be very tedious, indeed. Without the Resource Construction

Set in the Atari GEM Programmer's Kit, merely designing a dialog box would consume many hours and volumes of code. Setting up the TEDINFO and OBJECT structures (which contain data relative to strings, coordinates of dialog boxes and their whereabouts in memory) could be very frustrating. It would be helpful if Philon would define the structures and include them in the package, along with a "Resource Construction Set" to output BASIC code %INCLUDE files.

The language itself has some peculiarities. The rather unusual setup of GOTOXY followed by PRINT statements of ST BASIC is replaced with the more common PRINT AT command of Microsoft BASIC. But strangely, the y variable precedes the x variable (as in C)—meaning that, when you're porting over 8-bit Microsoft BASIC programs, you'll have to reverse the x and y variables in all the PRINT AT statements.

Another unusual aspect of this language is the lack of necessity for line numbers, except for use as labels in GOTO and GOSUB commands. Line numbers are left in merely as a convenience. You could label several statements with the same line number, and the program would execute without a hitch—provided the line number wasn't referenced as a label. The statements are simply executed in sequence. Thus, since the line number is ignored when editing, you must be careful to insert the statement in the correct position, or the program won't run properly.

Furthermore, there's no limit to the length of a statement line. By simply appending the underscore character at the end of a line (e.g., GOSUB__ RETURN), the line may continue on the next line in

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the editor. You cannot break up string constants, keywords, identifiers or statement numbers with an underscore, however, and some statements (such as compiler directives) must appear on their own line. Blank lines may be inserted in the program for legibility.

On the plus side... the program works flawlessly. Well, almost. One little thing not mentioned in the documentation is that another file, TERMCAP, must reside on the same disk as the compiled program, or it won't run. Philon says this will also be corrected, but meanwhile, whenever a program file is copied to another disk, remember to copy TERMCAP, as well.

Imagine my frustration when my program ran on the compilation disk, but not on a copy. I had to systematically delete or rename files, until I found the necessary accompanying file.

Fast/BASIC-M comes with a 240-page loose-leaf manual, including an index. For the most part, it's well written, and examples are helpful and instructive. It is not a BASIC tutorial, however, and assumes familiarity with BASIC programming techniques.

There are two types of floating-point formats, yielding either fourteen or sixteen digits of accuracy: BCD (Binary Coded Decimal) and IEEE (Institute of Electrical and Electronics Engineers). This level of precision exceeds that in the Alcyon C compiler, initially released by Digital Research in Atari's own programmer's kit (although Atari now has a double precision version, available as a \$20.00 upgrade). The manual goes into some detail describing the uses of each, and the programmer must decide which to use when compiling.

The package also includes five unprotected single-sided disks, one of which is the "Developer Disk Utilities" from the Atari developer's kit. This contains the Microemac Editor, the LINK68PRG and RELMOD.PRG, and command files.

The compilation instructions are quite detailed and complete, and, if carefully followed, result in a working program. Just be sure to check the notes on which files must be moved to which disks for BCD math. Having a hard drive or 1 meg of memory with a RAMdisk really saves time and wear on the floppy drives.

There are stern warnings on the back of the binder, telling the user not to make more than three copies of the program and/or its run-time library. Only your own use of a compiled program on a single computer system is authorized, without royalty payments to Philon.

Philon told me verbally that this limitation no longer exists, as policing thousands of users would clearly be unmanageable. Thus, license to use compiled programs commercially is *gratis*—a reasonable decision. After all, who would want to invest \$130.00 in a system capable of producing

commercial programs on a "power without the price" computer, to find the cost of each compiled program sold would have to be hiked \$15.00 or so to pay the royalty?

All in all, I'm pleased with the ease with which **Fast/BASIC-M** compiles and produces working programs. It would be helpful to have an RS232 interface, and again, Philon is working on an upgrade to include this. Their upgrades are to be available (cost not known) to all registered purchasers, as changes are finished.

Philon was responsive to my questions and appears dedicated to supporting its customers. If the lack of a printer interface is corrected—and an interface containing the AES supporting structures is added—this would become a terrific package. In its present state, however, I would have to rate **Fast/BASIC-M** a B. **A**

Dr. Noonan is an ophthalmic surgeon in Edmonds, Washington. He's been interested in computing since college, and has developed a program on the 8-bit Atari that magnifies text files on the screen, plotting the text in graphics modes 5 and 7, for low-vision patients.

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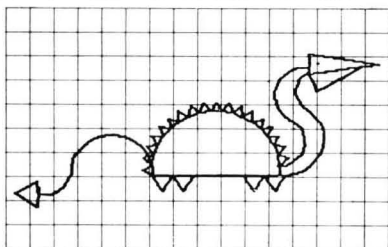
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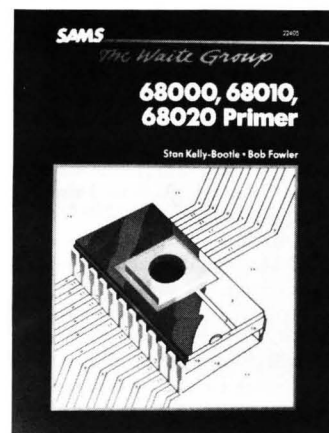
Howard W. Sams & Company has recently released the **68000 Primer**, a book written to introduce novice or experienced computer programmers to the instruction set and addressing modes common to the 68000 chip family (including the 68000, 68101 and 68020).

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BMC	Oct/1/84	200	17	7	\$1,400.00	(58.82%)
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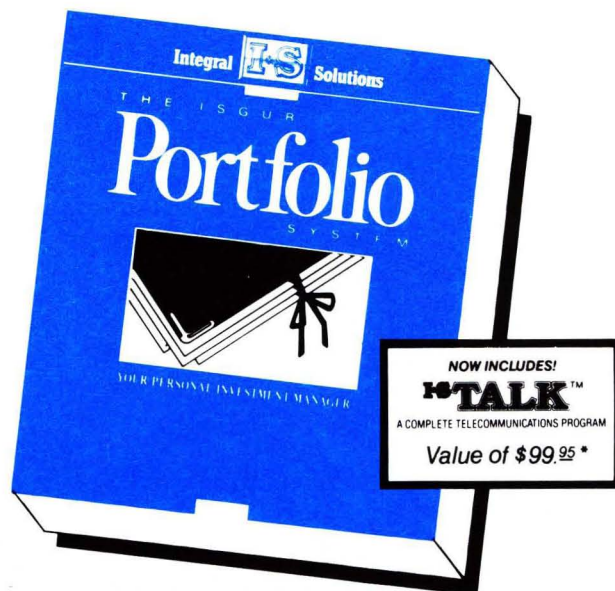
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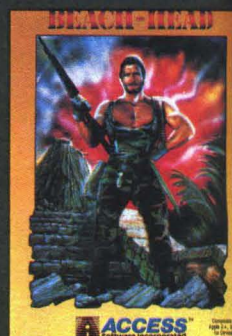
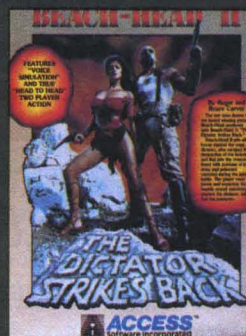


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C-MANSHIP

by Clayton Walnum

Most of you, I hope, noticed the absence of this column last month. No, I didn't skip town. The summer CES reared its ugly (but interesting) head and gobbled up all my time. Add the fact that I had to finish programming last month's 8-bit feature game, **Moonlord**, and you'd be correct in envisioning your friendly author scurrying about like a squirrel desperately storing nuts for the winter even as the first flakes of snow drift from above. I still haven't got my breath back, and, as you can see by the length of this month's listing, I haven't begun to relax yet.

A week's trip to Chicago also gave the mailman a chance to play the trick he's so fond of. It took me a couple of days to locate my desk under the stack of submissions and letters threatening to overflow onto the floor. In that stack was a question from John Lambert.

I... noticed in your last article that the commands `open()`, and `write()` were used in the program. In both my developer's documentation and a book on C that I purchased, I did not notice any such command. There is, of course, `fopen()` and `fwrite()`, which I assume to be the same. What worries me is that there are other commands available that are not documented... is there any way to find all the commands available?

First of all, `fopen()` and `fwrite()` are not the same as `open()` and `write()`. The former are higher-level functions. When you open a file with `fopen()`, you have access to such functions as `fwrite()`, which allow *formatted* output, just like `printf()`. You can see these higher-level functions used in this month's sample program. Both `open()` and `write()` are low-level functions. If you look at their descriptions in your documentation, you'll see you have to do a lot of the work to get the output the way you want it. There's a good

discussion of I/O functions in chapters 7 and 8 of *The C Programming Language* by Kernighan and Ritchie, published by Prentice-Hall.

As for the documentation, the functions are all there if you look hard enough. For instance, you can find `open()` on page 2-39 of the developer's kit's C programming guide, or on page 10-17 of the **Megamax** documentation. When you're looking for a particular function, you may have to look in several places. There are the standard C functions, as well as all the routines for the AES, VDI, Bios, Xbios and GEM DOS. Nobody said programming an ST was going to be easy. When you jump into a new project, be prepared for a lot of manual hunting.

The tough stuff.

Our last journey took us through a strange, sometimes confusing region of C, pointers. It was our first confrontation with some of the more sophisticated citizens of that world. As we move deeper, we'll have to stay on our toes, checking every street and alley, lest that great mind befuddler confusion leap out and bring us down.

It all sounds a bit grim, but from this point on, alertness and perseverance will be your best friends. We'll get back to pointers again; you can be sure of that. Right now, let's check into a convenient way of organizing data, "structures."

Just your type.

Structures offer a way to keep related data items together, allowing easy access to each element. Database applications are a perfect example. Suppose you're the owner of a store and want to keep track of your receivables. You'll need to know, at a minimum, the customer's name, address and amount owed. It would be nice if there were an array type that could store both character strings and floating point numbers. Guess what? Structures to the rescue.

Setting up a structure is really defining a new data type,

one that's custom designed for your own use. Each "member" of the structure can be any data type you wish, even another structure. Let's set up a structure for our store's receivables:

```
struct account {
    char name[20];
    char address[36];
    char city[30];
    float balance;
};
```

The keyword `struct`, followed by the name `account`, tells the compiler we're going to set up our own data type, and that we're going to call this data type `account`. The structure's members are declared in the same way you'd declare conventional variables, though enclosed with C's ubiquitous braces. The structure declared above contains four members: a 20-element character array called `name`, a 36-element character array called `address`, a 30-element character array called `city`, and a floating-point variable called `balance`.

Now that we've declared our structure, we have a new data type at our disposal, but we still don't have a variable of that type we can use. Think about it for a minute. If we want an integer variable, we must declare it as type `int`. If we want a character variable, we must declare it as type `char`. So it follows that, if we want an account variable (the name we gave our new data type), we must declare it as type `account`:

```
struct account record;
```

We've just told the compiler we want a variable called `record` which is a structure of type `account`. That's all there is to it, almost.

Filling it in.

We've got our variable `record` all set up, but there's still one minor problem. It contains no data. As I'm sure you suspect, initializing a structure is going to be different from initializing the simpler data types. Well, yes. . . and no.

```
struct account record = {
    "Clay Walnum",
    "15 Notgonnagivemyaddress Ave.",
    "Atariland, MA 06116",
    155.97
};
```

The main difference between this initialization and that of other data types is that we don't have to include the element's name along with the data. We only have to fill in the information. The compiler knows the first element goes into the field called `name`, the second into the field called `address`, etc. We gave it that information when we defined the structure type `account`.

When initializing a structure, be sure to enclose the data in braces and separate each element with a comma.

Getting it out.

We now have our structure declared and initialized with data. Just as we need access to each element of an array, we need access to each member of a structure. How can we get at the data? We simply refer to the name of the structure and the name of the element within the structure, separating each with a period:

```
record.name
record.address
record.city
record.balance
```

The first example will give us the string *Clay Walnum*. We can manipulate this data the same way we would any string of characters. For example:

```
s = record.name;
```

will point the character pointer `s` to the string stored in the first member of the structure `record`.

The second and third examples are similar to the first.

The fourth example will give us the floating-point value of 155.97. We might want to use it in this way:

```
printf("Bal = %f\n", record.balance);
```

Layers upon layers.

I stated that the elements of a structure could be of any data type, including another structure. Let's take the structure we've created one step further. It might be nice to have the city, state and zip code in their own elements. We could, of course, just add a couple of members to our original structure. But what if we wanted, for the sake of clarity, to keep all the information within the member `city`? We'd do it like this:

```
struct where {
    char c[20];
    char s[2];
    char z[5];
};

struct account {
    char name[20];
    char address[36];
    struct where city;
    float balance;
};
```

```
struct account record;
```

Now take a deep breath, and we'll attempt to wade through this. Our structure `account` still contains the same information. The difference is that the member `city` is now a structure of type `where`, and `where` contains the members `c`, `s`, and `z`.

Got that? Try to imagine the structure `account` as a big box. Inside this box are three other boxes called `name`, `address`, `city`, and `balance`. Inside the `city` box are three even smaller boxes called `c`, `s`, and `z`.

Now when we refer to the `city` member, we need to access the nested members `c`, `s`, and `z`. If you think about it for a minute, you might come up with the following:

```
record.city.c
record.city.s
record.city.z
```

And you'd be correct. In the first case, we're accessing `c`, which is a member of `city`, which is a member of `record`. In the second, we end up with `s`, which is a member of `city`, which is a member of `record`. I bet you can figure the third one out for yourself.

More layers!

I'm not through confusing you, yet. Just as you can have arrays of integers or arrays of characters, you can have arrays of structures. In fact, in the case of the database for our imaginary store, arrays of structures are a necessity.

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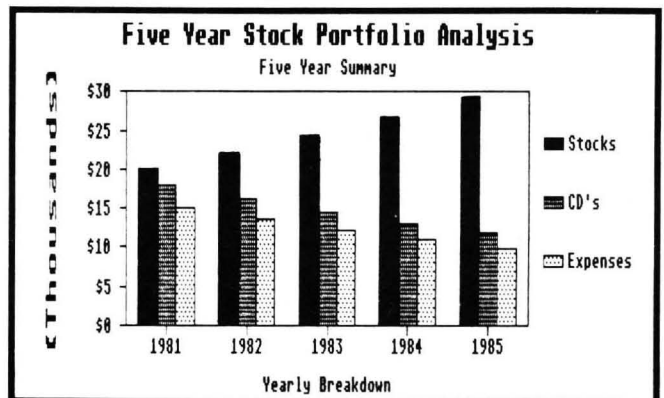
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What good is a database with only one entry? We could leave things the way they are and load the records from disk one at a time, but that would be inefficient. Imagine trying to sort a database that way. Not me, buddy. I want them all in memory where I can play with them *fast*.

Arrays of structures aren't as scary as they sound. One small change to your structure variable declaration, and you've got it:

```
struct account record[100];
```

We now have room for one hundred records of type account.

Accessing each element of our structure array is just as simple:

```
record[index].name  
record[index].address  
record[index].city.c  
record[index].city.s  
record[index].city.z  
record[index].balance
```

As we vary index from zero to the maximum number of elements in our array, we can access each member as shown above. We also retain control over arrays that make up some of the members of our structure. For instance, if we wanted the third letter in the character array name:

```
record[index].name[2]
```

An important point.

In the last column, we talked about pointers. Can we use pointers with structures? Sure can. The first step is to declare our pointer, a simple process:

```
struct account *sptr;
```

Now that we have our pointer, we must initialize it:

```
sptr = &record[0];  
or  
sptr = record;
```

This assigns the address of the first byte of our array of structures to the pointer *sptr*. Suppose this address turned out to be 72000. Using what you've learned about pointers and structures, see if you can calculate the address we'd be pointing to if we added 1 to *sptr*.

The answer is 72096. How did you do? Remember that a pointer is kept well informed about the data type it's associated with, even if that data type is made up, as is a structure. *sptr* knows that there are 96 bytes in each of our array elements. We get this figure by adding together the length of each structure member:

name	30
address	35
c	20
s	2
z	5
balance	4

	96 bytes

Let's say that *x* is the length, in bytes, of the data type we're pointing to. Then, when we increment a pointer, we're asking it to point to a location in memory which is *x* bytes ahead of our current location. In the case of our array, we're pointing to the next element, *record[1]*, which begins at an address 96 bytes higher than our current address, or a final address of 72096.

Pointing to a member.

A pointer to the first member of a structure is only slightly useful. We need to get at the rest of the members, as well. As always, C is there with the answer. Assuming *sptr* equals *&record[0]*, then:

```
(*sptr).name equals record[0].name  
(*sptr).city.c equals record[0].city.c
```

A more popular (and less cryptic) way of writing the above would be:

```
sptr->name equals record[0].name  
sptr->city.c equals record[0].city.c
```

Either method is fine—and gives the same results.

Functions and structures.

The last thing we need to know in order to take full advantage of structures is how to pass them to functions. As has been evident throughout this article, structures aren't handled any differently, for the most part, than is any other data type. Nothing's going to change now.

The most obvious method of passing information from a structure to a function is by value:

```
t=add_em( record[index].balance,  
          record[index+1].balance );
```

```
float add_em(x, y)  
float x, y;  
{  
    return(x + y);  
}
```

Here, two values from our array of structures are passed into the parameters *x* and *y*. The values are added, and the result returned to the calling function.

But what if we want to modify the contents of the structure directly? As in the past, we resort to pointers:

```
change_em(&record[1]);  
  
change_em(sptr)  
struct account *sptr;  
{  
    sptr->name = "Felix";  
}
```

In the above example, we've passed the address of the second member of our array of structures to the function *change_em()*. This address is stored in the pointer *sptr*, where it's used to access the member name.

The listing.

This month's sample program is larger than anything we've done in the past. I got overzealous, but I wanted to put something moderately usable together. There are many things in the program we haven't covered, and I've run out of space (and then some). Next month, we'll clear up some of the leftover mysteries. At any rate, the program contains working examples of everything we've discussed here, as well as a lot of other little tidbits you can sort through.

What does it do? I thought you'd never ask. The program is a simple address database. You can enter addresses from the keyboard or disk, then print them to the screen—or to the printer in label format. As I said, it's simple. There's plenty of room for enhancements. A sorting feature could be added, or maybe a fancier input routine. To keep data from scrolling off the screen, labels are limited

to a maximum of eight. You could add some code that would wait for a keypress each time the screen fills, then increase the number of addresses in the database.

Due to the size of this program, I wasn't able to spend the time necessary to make it compatible with both the Megamax and Atari developer's kit compilers. I used Megamax (otherwise, I'd still be waiting for the first compile) to develop it, so you'll have to do a little fiddling to get it to work with the developer's package. I know the printer routines act strangely under Alcyon. It will compile cleanly, though, with either package.

That's it. Next month, we'll clean up loose ends and prepare for the exciting exploration of GEM itself. **A**

The author would like to thank Douglas Weir for his programming assistance.

Listing 1.
C listing.

```

/*****
/* C-Manship listing 1, St-Log #7 */
/* Developed with Megamax-C */
*****/
#include <stdio.h>
#include <osbind.h>

#define RETURN 13
#define BACKSPACE 8
#define MAX 8
#define PRINTER_OFF 0
#define NOFILE ((FILE *)0)

FILE *fopen();
FILE *fclose();

int work_in[11];
int work_out[57];
int handle;

int contrl[12];
int intin[128];
int ptsin[128];
int intout[128];
int ptsout[128];

struct name {
    char fname[11];
    char lname[11];
};

struct rec {
    struct name names;
    char street[30];
    char city[30];
};

main()
{
    int num_recs, load;
    struct rec address[MAX];

    open_vwork();
    num_recs = load_file(address, &load);
    output(address, num_recs);
    if (load=='M' || load=='n')
        save_file(address, num_recs);
    printf("press key\n");
    Cconin();
    v_clsawk(handle);
}

open_vwork()
{
    int i;
    for (i=0; i<10; work_in[i++] = 1);
    work_in[10] = 2;
    v_opnvwk(work_in, &handle, work_out);
}

```

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// C-manship *continued*

```
}

load_file(recp, load)
struct rec *recp;
int *load;
{
    int num_recs;

    Cconws("Load file? ");
    while ((*load=Cconin())!='Y' && *load!='y' && *load!='N' && *load!='n');
    printf("\n\n");
    if (*load == 'N' || *load == 'n')
        num_recs = get_records(recp);
    else
        num_recs = disk_file(recp);
    return(num_recs);
}

get_records(recp)
struct rec *recp;
{
    int ans, i;

    ans = 'y';
    i = -1;
    while ((ans=='Y' || ans=='y') && i+1<MAX) {
        ++i;
        Cconws("FIRST NAME: ");
        get_str(recp->names.fname, 10);
        Cconws("\n LAST NAME: ");
        get_str(recp->names.lname, 10);
        Cconws("\n STREET: ");
        get_str(recp->street, 29);
        Cconws("\n CITY: ");
        get_str(recp->city, 29);
        Cconws("\n\nAnother (y/n)? ");
        ans = Cconin();
        printf("\n\n");
        ++recp;
    }
    return(i+1);
}

disk_file(recp)
struct rec *recp;
{
    FILE *p_file;
    char filename[15];
    int num_recs, x;

    p_file = NOFILE;
    while (p_file == NOFILE) {
        Cconws("Filename: ");
        get_str(filename, 14);
        printf("\n\n");
        p_file = fopen(filename, "r");
        if (p_file == NOFILE)
            printf("No such file!\n\n");
    }
    fscanf(p_file, "%d", &num_recs);
    for (x=0; x<num_recs; ++x) {
        fscanf(p_file, "%s", recp->names.fname);
        fscanf(p_file, "%s", recp->names.lname);
        fscanf(p_file, "%s", recp->street);
        fscanf(p_file, "%s", recp->city);
        ++recp;
    }
    return(num_recs);
}

output(recp, num_recs)
struct rec *recp;
int num_recs;
{
    int status, device;

    status = PRINTER_OFF;
    while (status==PRINTER_OFF) {
        Cconws("Print to screen or printer (s/p)? ");
        device = Cconin();
        printf("\n\n");
        if (device == 'p' || device == 'P')
            status = printer(recp, num_recs);
        else {

```



```

        screen(recp, num_recs);
        status = -1;
    }
}

save_file(recp, num_recs)
struct rec *recp;
int num_recs;
{
    FILE *p_file;
    char r, x;
    char filename[15];

    Cconws("Save file? ");
    while ((r=Cconin())!='Y' && r!='y' && r!='N' && r!='n');
    printf("\n\n");
    if (r == 'Y' || r == 'y') {
        p_file = NOFILE;
        while (p_file == NOFILE) {
            Cconws("Filename: ");
            get_str(filename, 14);
            printf("\n\n");
            if ((p_file=fopen(filename, "r")) == NOFILE)
                p_file = fopen(filename, "w");
            else {
                p_file = NOFILE;
                Cconws("File already exists. Delete it? ");
                if ((r=Cconin()) == 'Y' || r == 'y')
                    p_file = fopen(filename, "w");
                printf("\n\n");
            }
        }
        fprintf(p_file, "%d\n", num_recs);
        for (x=0; x<num_recs; ++x) {
            fprintf(p_file, "%s\n", recp->names.fname);
            fprintf(p_file, "%s\n", recp->names.lname);
            fprintf(p_file, "%s\n", recp->street);
            fprintf(p_file, "%s\n", recp->city);
            ++recp;
        }
        fclose(p_file);
    }
}

screen(recp, num_recs)
struct rec *recp;
int num_recs;
{
    int x;
    v_enter_cur(handle);
    for (x=0; x<num_recs-1; ++x) {
        pos_cur(x,0);
        printf("Record #%d\n", x+1);
        pos_cur(x,1);
        printf("%s %s\n", recp->names.fname, recp->names.lname);
        pos_cur(x,2);
        printf("%s\n", recp->street);
        pos_cur(x,3);
        printf("%s\n\n", recp->city);
        ++recp;
    }
}

printer(recp, num_recs)
struct rec *recp;
int num_recs;
{
    int x, status;
    FILE *p_file;

    status = Cprnout(0);
    if (status == PRINTER_OFF) {
        printf("Turn on printer!\n");
        return(status);
    }
    p_file = fopen("LST:", "w");
    p_file->_fd = 3;
    for (x=0; x<num_recs; ++x) {
        fprintf(p_file, "%s %s\n", recp->names.fname, recp->names.lname);
        fprintf(p_file, "%s\n", recp->street);
        fprintf(p_file, "%s\n", recp->city);
        fprintf(p_file, "\n\n\n");
    }
}

```


// C-manship *continued*

```

    ++recp;
}
fclose(p_file);
unlink("LST1.in");
return(status);
}

pos_cur(i,1)
int i,1)
{
    int x, y;
    if ((i+1)*2 == 0)
        x = 50;
    else
        x = 10;
    y = ((i/2)*5)+4+1;
    vs_curaddress(handle,y,x);
}

int get_str(s, mx)
char s[];
int mx;
{
    int p, code;
    p = 0;
    code = cconin();
    while (code != RETURN && p <= mx-1) {
        if (code != BACKSPACE) {
            s[p++] = code;
        }
        else if (p > 0) {
            s[--p] = '\0';
            putchar(BACKSPACE);
            putchar(' ');
            putchar(BACKSPACE);
        }
        code = cconin();
        s[p] = '\0';
    }
    if (p == mx)
        printf("\r\n");
}

```

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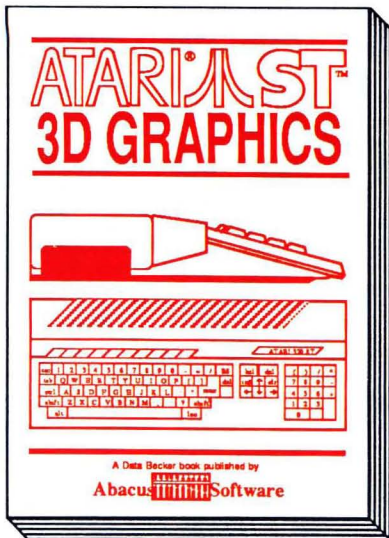
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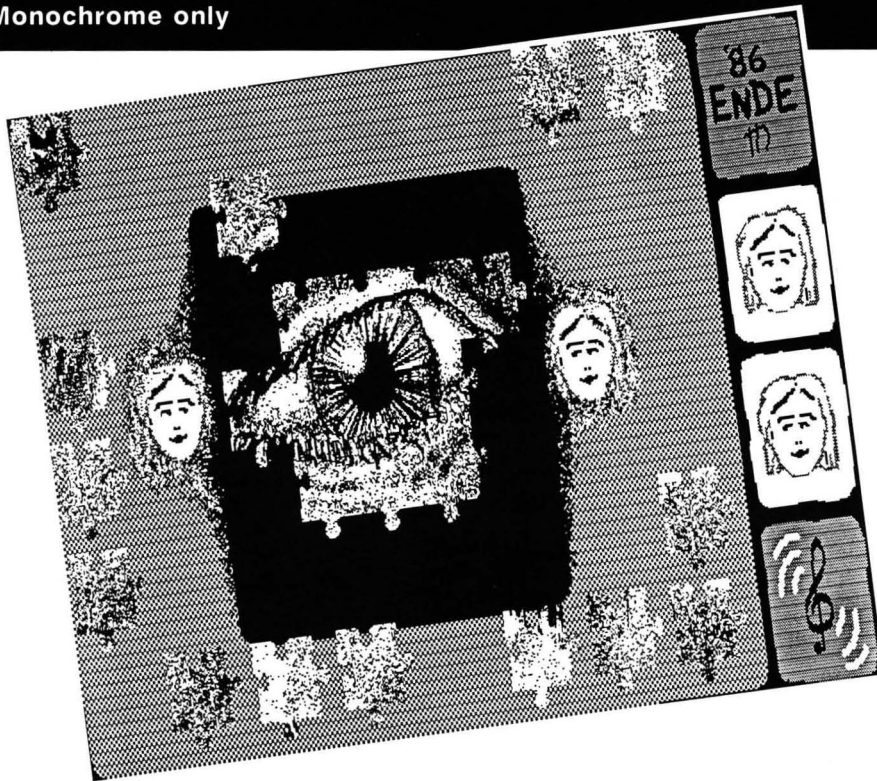
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software available
for your ST.

WITH A BONUS PUZZLE PROGRAM FOR DISK SUBSCRIBERS

by Douglas Weir

This month, **ST-Log** disk subscribers get (among other things) **PuzzlePuzzle**, a delightful "multidimensional puzzle game" produced by TommySoftware, a West German company. **PuzzlePuzzle** comes with its own original music and is being distributed as "shareware" by its developer (for more information, see the title screen). **ANALOG Computing** urges readers who enjoy the program (just about everybody, we believe) to send the requested \$10.00 to the address below.

Mr. Thomas Maier, head of TommySoftware, writes that the response to **PuzzlePuzzle** so far has been "very, very bad." It will be a shame if this program, which is a real work of art (and there are very few ST programs of which that can be said), does not repay its developers for some of the effort required to produce it.

For those who aren't disk subscribers, here's a brief description of the program: **PuzzlePuzzle** consists of a cleverly arranged sequence of (not difficult) puzzles, which the player assembles using the mouse. A distinctive and haunting musical accompaniment can be switched on or off. We haven't counted the puzzles, but TommySoftware says there are over twenty-five. There are a couple of surprises for the player, which we don't want to give away here. But we do suggest that you look at the customized mouse cursor closely when you end the program.

Note: **PuzzlePuzzle** runs only in high resolution (i.e., on a monochrome monitor). It's a good excuse for color monitor owners to look for one of the many bargains that seem to be available now on monochrome monitors.

We were so impressed by this program that we wrote to TommySoftware (with our \$10.00 check), asking for information on other ST programs they might have under development. Here's a list of titles currently or soon to be available.

Crypt_it — A GEM-driven program that encrypts "data and program files." Allows different levels of coding through usage of individual passwords. Requires ST, disk drive, monochrome or color monitor, for 98 DM (Deutsch Marks) plus postage. Available now.

LineWorks — A programmable 3D animator, GEM and TOS compatible. Runs with C and Pascal programs (future version will run with BASIC). Executes X32 files produced by MUSIX32. Requires ST, disk drive, monochrome or color monitor, for 148 DM plus postage. Available August 1, 1986.

LisPas II ST — Fast GEM-driven List interpreter (with windows, mouse usage, etc.). Contains over 130 functions; usable with any ASCII editor. Has "easy-to-use redraw routines for windows." Requires ST, disk drive, monochrome or color monitor (medium or high resolution), for 298 DM plus postage. Available now.

LisPas III ST — Enhanced version of **LisPas II**, with expanded graphics facili-

ties, expanded GEM access, and more. Requirements: same as for **LisPas II**. Cost is 298 DM plus postage. Upgrades to **LisPas II** will be available "at a low price." Available November 1986.

Lock_it I — GEM-driven copy protection program. Runs with C and Pascal programs. Requires disk drive, monochrome or color monitor, for 298 DM plus postage. Available now.

MUSIX32 — Full-featured GEM-driven, mouse-controlled music construction set (apparently used to create the music for **PuzzlePuzzle**). Requires disk drive, monochrome or color monitor, for 89 DM plus postage. Available now.

Personal Address — GEM-driven program "stores address data and allows various printouts" (telephone and mailing lists, address labels, mailmerge, etc.). Requires ST, disk drive, monochrome monitor. Available in German only for 98 DM plus postage, August 1, 1986.

Except for **Personal Address**, all programs are available in English and German. We hope to publish reviews of some of these programs in the near future.

TommySoftware is still searching for a U.S. distributor; until then you'll have to order software direct from them. Their address is: TommySoftware, Mainzer Landstrasse 147, D-6000 Frankfurt/M. 1, West Germany.

Please note that prices are given in German, not U.S., currency. **A**

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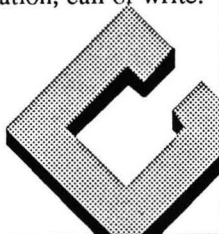
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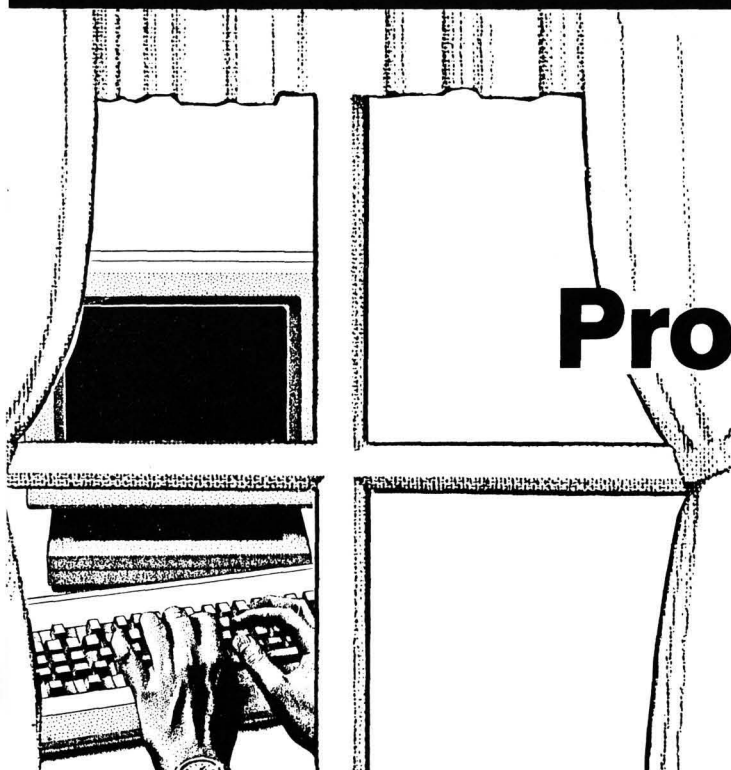
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Programming with

by Douglas Weir

Here's something I wish had been available when I started learning GEM—a deluxe shell program that demonstrates how to create and use windows under GEM. But I should begin with a couple of warnings.

First, the entire source code for `wwx.c` is long—too long to be reprinted in its entirety here. It can be found on the ST subscription disk. However, the essence of the program lies in two relatively short functions and their associated data declarations. These two functions handle screen-area clipping and window buffer manipulation, and window redrawing, respectively. The source code for this part of the program is printed here, surrounded by some other crucial fragments.

The second warning is a corollary of the first. Because the part of `wwx.c` given here is not a complete program, and because so much territory is covered, I assume you're reasonably familiar with C and have already done some GEM programming. You'll need (besides a C compiler, of course) a fairly good set of GEM documentation—for example, the *Abacus Atari ST GEM Programmer's Reference* or the *Megamax C* manual should be adequate.

Finally, it will be very helpful if you have one of the many versions of Atari's `apskel.c` program floating around. Pages 172-178 of *Atari ST Tricks and Tips*, also published by Abacus, contain an almost exact copy of `apskel.c`. Since this program seems to have become a *de facto* standard, I've tried to make `wwx` resemble it as nearly as possible.

I must emphasize that the code in this article is only a part of `wwx` and is not "stand-alone." But, if you have the ingredients listed above, it shouldn't be difficult for you to write the rest of your own program. ST disk subscribers will have the complete version of `wwx`, which is ready to use as a GEM shell.

Window workings.

For me, GEM is windows. The VDI graphics routines are important, but their ancestors can be found in BASIC's "circle" and "line" statements, and it isn't very difficult to use them effectively. But try bulling your way through some code that will create and manipulate two or three (or more) windows simultaneously—and will let the user change their contents, resize them, move them around and activate desk accessories on top of them...and yet will always restore each window's current contents when necessary. Try this working with `apskel` as a model and you'll be in trouble quicker than you can say "ten thousand global variables."

The `apskel` program shows how to make the simplest use of one window. It's fine if you want to use only one window, and if you're satisfied with its restricted definition of a "redraw" operation.

The scheme followed in `apskel` is simply to redraw the window's original contents whenever GEM says the window must be "redrawn." But what if the contents have changed (say, due to user input)? Obviously, the current contents of all windows must be preserved somehow and then used as input for redraw operations. Yet the documentation isn't at all clear as to how one should go about accomplishing this.

The idea is simple: for each window used in your program, you reserve a memory area equal to the maximum size of the window. Usually, this will be the same as the ST screen memory size, 32K bytes. Every time the contents of a window change, you must update the contents of that window's buffer. Then when a window must be redrawn, your program simply transfers the contents of the window's buffer back to the window.

Of course, there's a bit more to it than that. The most important detail involves clipping. Suppose your program

GEM windows

displays two windows, and suppose the top ("active") window partially hides the window underneath it. Now the user moves the active window slightly, so that more (but still not all) of the bottom window is displayed. Your program must now redraw the visible part of the bottom window. However, the portion still hidden by the top window must be "clipped" (i.e., must not be redrawn).

This means that, whenever you transfer window data to or from its buffer, you must make sure the screen area is properly clipped—in other words, that you're working only with the portion of the screen which really "belongs" to that window.

In practice, clipping isn't as complicated as it may sound. After all, when you're updating a window's buffer (transferring data from the screen memory), the clip area will always be a simple square or rectangle. This is because, by definition, only the contents of the active window can be changed, and the active window never has other windows on top of it. Doing a redraw of a partially hidden inactive window sounds more difficult—in this case, the area to be redrawn could be L- or U-shaped, or worse.

GEM provides a VDI function—`vs_clip()`—which sets the clip area of a window. However, it doesn't do the whole job, and must be preceded by some additional code for our purposes. The details of figuring out just what portions of an inactive window are to be redrawn are demonstrated in the function `do_redraw()`, which is listed below. Here, I want to explain the mechanics of setting up the window buffers, and of transferring data between them and the screen memory.

We'll use a GEM VDI function, `vro_cpyfm()`, one of the so-called "raster" functions. This one simply copies blocks of data from one memory area to another, very quickly. It expects five parameters. The first two will never change

in our program. The first is the application's handle. The second is a code specifying how we want the source data to be combined with the contents of the destination. In our case, we will always want a window to "cover" whatever is "underneath" it, so we specify that the destination should contain only the source data when the transfer is completed.

The next parameter is an array of eight integers, containing the dimensions of the source and destination memory areas, respectively. The dimensions are expressed as the x- and y-coordinates of the top left and bottom right corners of both areas. The contents of this array will change as we save or redraw different portions of various windows.

The last two parameters are pointers to two GEM structures (called FDBs, for "form definition blocks") which describe the source and destination memory blocks, respectively. The GEM header file `gemdefs.h` contains a declaration for this structure, and a commented version can be found in the listing below. Once the window buffers have been set up and described with an FDB (one for each buffer), and once the screen memory has been described in its own FDB, the contents of these structures will not change.

To use `vro_cpyfm()` in window buffering and redraw operations, we must do the following. First, we declare an FDB for the screen memory (I call mine `wind_actv`) and fill in the proper values. Next, we initialize an FDB for each window we plan to use. In `wwx`, each window's FDB is found in a structure describing the window. The structures are organized into an array, called `ww[]` (see below for more details). So, to access the first member of the FDB for `ww[0]`, you would refer to `ww[0].wind_buff.fid_addr`.

Now we're ready to use `vro_cpyfm()`. Let's look at the

// GEM windows *continued*

portions of `wwx.c` reprinted here and see how you can use these to write your own window-handling shell program.

The data declarations come first. The most important of these is the structure type `w_pack`. Your program should declare an array of these structures; I call mine `ww`, and the number of its elements is determined by `NR_WWS`. Each element of the array will contain all the pertinent data for one of your program's windows. If you want to have three windows, your array will contain three elements; if you want only one window, your array will consist of a single element. (Feel free to add members to this structure declaration if there is additional information about your windows that you want to keep track of.)

Within your program, the subscript numbers of the array elements will be your means of identifying separate windows. Suppose you have three windows; you'll have three array elements, namely `ww[0]`, `ww[1]` and `ww[2]`, containing the data that describes each window.

After a newly created window is first drawn, the contents must be saved to its buffer. This is accomplished by calling `set_clip()`, which figures out the window's real clip area on the screen, the corresponding area in its buffer, and the source/destination coordinates to be passed to `vro_cpyfm()`. The sixth parameter to `set_clip()` has the value `TRUE` if a redraw operation is being prepared (i.e., if

data is to be transferred from the buffer to the screen), or `FALSE` if the buffer is being updated (data transferred from the screen to the buffer). In this case, obviously, the parameter will have the value `FALSE`.

After the call to `set_clip()`, `vro_cpyfm()` is called to perform the actual transfer. The process of creating the window and drawing it for the first time is now complete.

Further redraw or save operations follow the same pattern. In all cases `set_clip()` must first be called, both to set the clip area for GEM and to establish which kind of operation (redraw or save) is about to take place, and, of course, to determine the coordinates for the data transfer.

A redraw operation is a bit more complex than a save, however. This is because a redraw is performed in stages, as GEM passes to the application a series of rectangles which define possibly irregular areas of inactive windows to be redrawn. Each rectangle is first clipped, then redrawn. The listing of `do_redraw()` below will show how this is done.

The following sketch of the overall plan of `wwx`, which includes the complete listings for `set_clip()` and `do_redraw()`, will, I hope, make clear how a program determines when to save or redraw windows, and how it manages more than one window. ■

(see listing, opposite)


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ST-LOG

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```

/* Following is an outline of the program's main interpretive loop:
int gen_loop(w,wind_actv,rz_pts)
/* Window structure array
/* Screen memory fdb for 'vrs_cpyfmc'.
/* Source/dst packet for 'vrs_cpyfmc'.
{
    int i; /* Index variable
    int wml_ix; /* Array subscript of current window structure

    do /* do the following till user closes main window or what-
    { /* ever you want him to do to show that he's finished
        for (i = 0; i < MR_WHS; i++) /* Look at all windows

            /* 1. Call 'event_multi()'
            /* 2. Figure out the array subscript of the window
            /*   'msbuff_glt3'. With that by computing members of
            /*   'msbuff_glt3'. With that by computing members of
            /*   each of the array elements. Put this subscript
            /*   into 'wml_ix'.
            SWITCH (msbuff_glt3)
            {
                /* 3. Check for possible window management messages--
                /*   for example...
                case WM_REDRAW:
                    do_redraw(wmw_ix,msbuff_glt3,msbuff_glt3,
                        msbuff_glt3,msbuff_glt3,wind_actv,rz_pts);
                    break;
                /* ... NOTE that you have to watch out for a lot
                /*   more than is suggested by the rather sparse
                /*   code in 'apkel.c'. For example, a WM_SIZE Mes-
                /*   sage will require a redraw operation, even
                /*   though apkel essentially does nothing about
                /*   this message.
                /* 4. Here you could process some possible keyboard
                /*   input. If so, when you detected a mouse button
                /*   pressed or mouse movement or anything that would
                /*   change the location of the window, you would
                /*   have to update the window contents to its buffer
                /*   before leaving your keyboard-input subroutine
                /*   and continuing with AES processing in
                /*   'gen_loop()...'
            }
            /* end of 'for' loop
            while ( /* while the user doesn't close the main window,
                /* or whatever-- your own stopping condition goes
                /* here
            ) /* 5. Close any other windows not already closed, and exit from
            /* the program.
        }
    }
}
/* Following are the two important user-programmed functions for
/* window manipulation --THESE FUNCTIONS ARE COMPLETE...
*****
*****
set_clip-- set clipping rectangle for draw or redraw, and set up
/* coordinates for raster operation.
*****
*****
void set_clip(w, x, y, h, redraw, rz_pts, wind_actv)
/* pointer to window structure
/* dimensions to be transformed into clip rect
/* TRUE => this is preparatory to a redraw
int redraw; /* source/dst packet for raster operation
int rz_pts; /* pointer to fdb for screen
DBB *wind_actv;
{
    int clip_x; /* coordinates of clipping rectangle

    /* find the region in the window buffer corresponding
    /* to the area to be redrawn in this window
    /* this is a GEM call
    wind_get(w,wind_actv,handle,WP_WORXWHM,&(w->xwork),&(w->ywork),
        &(w->xwork),&(w->ywork));
    /* truncate dimensions extending beyond screen edge
    if ((x + w) > P_Width)
        w = P_Width - x;
    if ((y + h) > P_Height)
        h = P_Height - y;

    /* calculate rectangle for 'vs_clip()'
    clip_x = x;
    clip_y = y;
    clip_x2 = x + w - ONE;
    clip_y2 = y + h - ONE;

    /* calculate coordinates for raster operation
    if (redraw)
    {
        /* buffer == source
        rz_pts[0] = screen_x + x - w - xwork;

```

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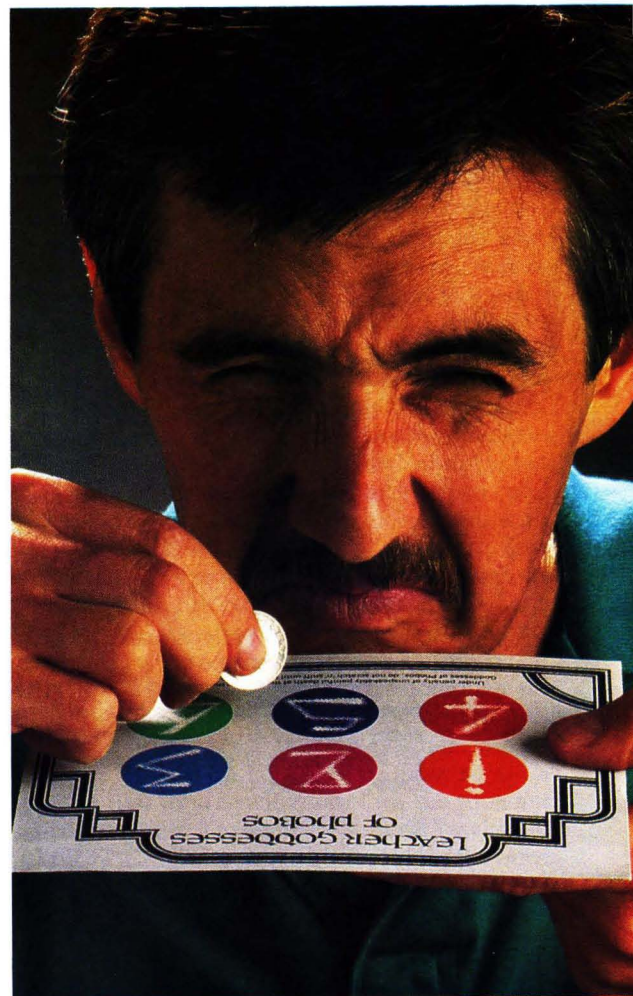
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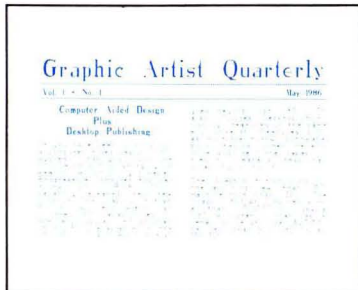
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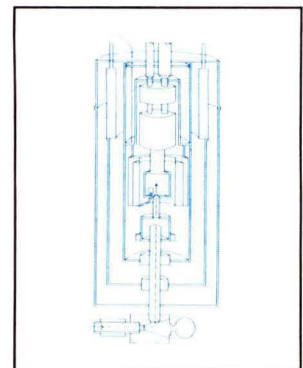
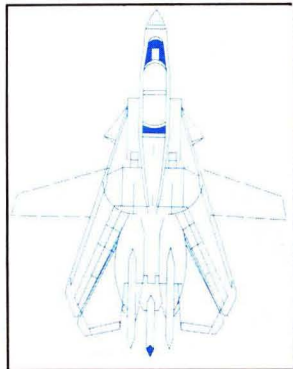


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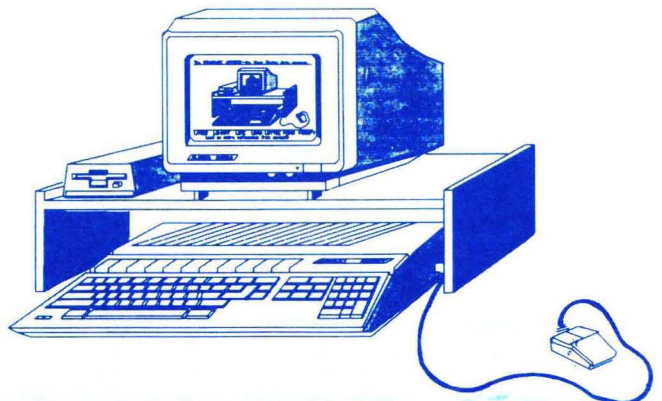
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Setting the clock on your ST

A simple alternative to using the control panel desk accessory

(or: How to “Include the Batteries” where one was excluded)

by Mark Skapinker

The Atari ST is designed with an internal clock. What's been left out is a battery to allow the ST to “remember” the time from the point at which it was switched off until next time you switch it on—an oversight by Atari, when you consider that a simple battery would cost just a dollar or two. Having the date and time set is a help in using your ST; when you create new files, the ST writes the time and date of their generation. This capability is also important to some programs that use the date and time—**Thunder!**, for example, which can automatically insert the information into documents for you.

This means that, every time you switch on your ST, you need to reset the date and time. A number of companies have developed “clock cards,” which plug into the ST to do this for you. If you don't own such a card, the only way to set the time and date in each case is by using the “control panel” desk accessory. This method isn't convenient at all, because it means you must have the desk accessory present always; you must remember to go and set the clock; and you need to type in the complete date and time in each instance, from the default of November 25/85. It's hardly worth the effort!

There had to be an easier way. For that reason, I developed the little program BICLOCK.PRG for Batteries Included, who have decided to place the program into public distribution, as a service to the ST community. Feel free to make copies of this program.

It's based on three very simple principles: first, the ST has a way of allowing you to run a program automatically every time you switch on your computer. Second, you should only have to change the date and time since last time you set them, rather than November 25/85 each time. Finally, the time and date should be very easy to change.

On your “boot” disk (the disk you place in drive A when you switch on your computer), the ST always looks to see if there's a folder called AUTO. If there is such a folder, it will automatically run any programs found there. For that reason, if you don't have a folder called AUTO on your boot disk, create one (using the “make folder” option from the desktop). Copy the program BICLOCK.PRG into this folder, and it will run every time you start your ST.

The program displays three dates. The first is the “system date” (usually November 25/85) in the computer when you start up. The second is the “date when you last set the date” using BICLOCK.PRG, and the third is the date you're now setting (defaulting to the second date).

By using the up and down arrow keys, you can increase or decrease the day, and by using the left and right arrow, you can increase or decrease the month. Press the TAB key, and you can use the arrow keys to increase or decrease the hour and minute. When you're finished, simply press RETURN to set the computer's date and time to those you've selected, or press ESC to leave the program without changing the date and time at all. (All this is explained on the screen with the program). Next time you run the program (or next time you switch on your ST), you'll only have to advance the date and time from the setting last noted.

How will this help you? Most people's computer use takes place at a similar time each session, so the date need only be advanced since the last use. For example, let's say you're like me—I switch on my ST every morning at the same time. The first time I switch on, I set the time and date to the current ones. Thereafter, whenever I switch on my ST and BICLOCK.PRG comes up, I just press the down arrow to advance by one day and press RETURN. Let's say you use your ST less often, every few days—you only have to press the down arrow for a short while as it scrolls through the days. Of course, it automatically goes on to

the next month if you reach the last day of a month (except for February on a leap year). It's worth the few seconds to set the date and time, isn't it?

The inside scoop.

How does it work? Every file on the ST has a date and time associated with it (the ones you see when you choose "show info," or when you view the files in "text"). This date and time is known as the "timestamp." When you start BICLOCK, the program reads its own timestamp. This time is given to you as the default time, when you last used the program. When you set the date and time, the program does two things: it sets the internal date and time of the ST, and it changes the timestamp associated with BICLOCK.PRG to the new date and time—a simple, but very useful method! (One warning, because it writes the new date and time to your boot disk, you should make sure that disk isn't write protected.)

Sorry the program wasn't written to use the GEM interface (which would have been easier for us all), but the ST only loads in the GEM "engine" after running all files in the AUTO folder. You can use the program at any time after the machine is on, but don't move your mouse, or it will make a "hole" in the screen.

Enjoy! **A**

EASY CLOCK SETTER
By Mark Skapinker, V1.0 1986.
A gift from Batteries Included, Inc.
38 Mural St, Richmond Hill
Ontario, L4B 1B5 Canada.
Tel: (416) 881-9941

System Date: 29/May/1985 17:33
Last Used: 29/May/1985 17:34
New Setting: 25/JUL/1985 12:31

Press:
LEFT ARROW Decrease Month
RIGHT ARROW Increase Month
DOWN ARROW Decrease Day
UP ARROW Increase Day
S Use 'System Date'
L Use 'Last Used Date'
TAB Change Time
HELP Help
RETURN Use New Setting
ESC Abort

Mark Skapinker is Director of Product Development for Batteries Included, Toronto, Canada. He's in charge of such software as **DEGAS**, and is the author of **Thunder!**

For you technical types, the following page provides the program's principles, with examples of C code used in getting the ST date and time, and changing a file's timestamp. (Please note that the C binding to get/set the timestamp is exactly the opposite of that in most documentation.)

Readers should also realize that the "Easy Clock Setter" is a public domain program, available on some BBSs, Delphi and CompuServe. The listing which follows is not to be typed in, but for information only.

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```

/*FILE DEFINITIONS:*/
#define ESC '\033'
#define CR '\015'
#define UPARROW 0x48
#define DOWNARROW 0x50
int hnd1; /* file handle */
unsigned int timeptr[2]; /* long ptr */
unsigned int sdate,time; /* system date and time*/
int day, month, year; /* date */
int hrs, mins,secs; /* time */
int uday,umonth,uyear,uhrs,umins,usecs;
long retc; /* keycode from keyboard*/
char chr1,chr2;

/* Get the dates and convert them to integers: */
/* In order to get the timestamp, the program file must be "opened"
   First open the program file in the current directory/folder: */
hnd1 = Fopen("biclock.prg",0); /* returns a file handle:hnd1 */
if (hnd1<0) /* hnd1 less than 0 means that the file could not
   be opened in this folder.
   On bootup, even though your program is in the
   AUTO directory, the default current directory
   is still the root directory so try open the
   program file in the auto folder:*/
{hnd1=Fopen("\\auto\\biclock.prg",0); /* try in the auto folder*/
if (hnd1<0) /* still not open*/
{Cconws("Cannot find biclock.prg. Press Any Key.");
Cnecin(); /* wait for a key*/
exit(); /* exit the program */
}
} /* successful open:*/
Fdatetime(timeptr, hnd1, 0); /* get the timestamp 0=get*/
sdate=Tgetdate(); /* get the ST system date*/
stime=Tgettime(); /* get the ST system time*/

/* Now format the dates and times:*/
day = sdate & 0x1F; /* put system day in integer*/
month = (sdate & 0x1E0) >> 5; /* put system month in int*/
year = ((sdate & 0xFE00) >> 9)+1980; /* put system year in int*/
secs = stime & 0x1F; /* put system secs in int*/
mins = (stime & 0x7E0) >> 5; /* put system mins in int*/
hrs = (stime & 0xF800) >> 11; /* put system hrs in int*/
uday = timeptr[1] & 0x1F; /* put timestamp day in integer*/
umonth = ((timeptr[1] & 0x1E0) >> 5); /* put timestamp month in int*/
uyear = ((timeptr[1] & 0xFE00) >> 9)+1980; /* year*/
usecs = timeptr[0] & 0x1F; /* seconds */
umins = (timeptr[0] & 0x7E0) >> 5; /* minutes */
uhrs = (timeptr[0] & 0xF800) >> 11; /* hours */

/* We now have the date and time, We display it on the screen and allow
   the user to change it: */
while(1) /* Main loop waiting for input */
{retc=Bconin(2); /* wait for keycode from keyboard */
chr1=retc; /* keycodes from keyboard */
chr2=(retc & 0xFF0000L) >> 16;
if (chr1== ESC || chr1==CR) break; /* Return or ESC means END */
else if (chr1==0 && chr2==UPARROW) day_up(); /* Move to next day and display */
else if (chr1==0 && chr2==DOWNARROW) day_down(); /* move to previous day and display */
/* do the same for the others */
} /* end loop */

if (chr1==ESC) exit(); /* ESC pressed. Exit the program*/

/* If the user wants to use the date and time we set thedate and time: */
timeptr[0]= (hrs << 11) | (mins<<5) | (secs >>1); /* 1st int is time*/
year=year-1980; /* year - 1980*/
timeptr[1]= (year<<9) | (month<<5) | day; /* second int is date*/
Tsetdate(timeptr[1]); /* Set system date*/
Tsettime(timeptr[0]); /* Set system time*/
Fdatetime(timeptr, hnd1, 1); /* Change timestamp 1=set*/
exit();

/* the following is a little routine to set the month name given the
   month number. Please note that you should ensure than mon_num is 1
   to 12. The routine does not check this.
*/
BYTE monstr[13]; /* string for Month name */
set_mon(mon_num)
int mon_num; /* pass 1 to 12 Month number */
{
static char *mon_array[12]={"Jan","Feb","Mar","Apr","May","Jun","Jul",
"Aug","Sep","Oct","Nov","Dec"};
/* a static array with month names */
strcpy(monstr,mon_array[mon_num-1]);
/* place correct string according to month number */
}

```

Thunder!

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by Arthur Leyenberger

Thunder! is three programs in one: a real-time, 50,000-word spelling checker, a word expander and corrector, and a writing analysis tool. It was designed and programmed by Mark Skapinker and is published by the Canadian company Batteries Included, a long-time publisher of quality 8-bit (and now ST) Atari software.

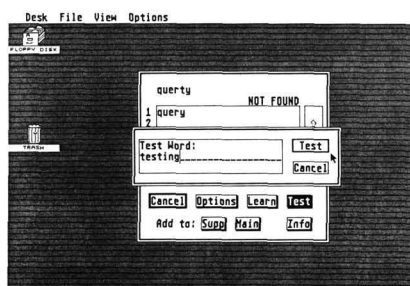
Two versions of **Thunder!** are provided on the distribution disk. One is a desktop accessory. This version only works with GEM-based word processors. Actually, it will work with any GEM-based program—but may not be appropriate with some. For example, there's little need for a spelling checker in a graphic design program. In such cases, **Thunder!**'s "Autoproof" feature can be temporarily turned off, via the option command.

Here's how it works: once **Thunder!** has been loaded as an accessory, and when Autoproof is turned on, the program follows your keystrokes. Whenever the program detects an end-of-word, such as a carriage return or space, it checks in its memory-based dictionary to see if the previous word exists. If it doesn't, you're offered several suggestions, or given the opportunity to add the word to a supplemental dictionary. If you accept one of the suggested spellings, **Thunder!** will backspace over the word and automatically type the correct spelling.

The other version of **Thunder!** is a stand-alone program to use with any file. It's convenient for checking files created by non-

GEM programs, as well as for examining an entire file created by a GEM program.

This second version of **Thunder!** runs from the desktop, and the possible word error is highlighted in context. The technique lets you see immediately whether you've made a mistake, or the word's correct but not yet in the dictionary. Adding new words is easy, and they can be saved to separate, supplemental dictionaries.



Thunder!

In addition to doing a spelling check, **Thunder!** provides you with a range of statistics, such as: character, syllable, word and sentence count, and two types of readability indices. Both the Fog and Flesch indexes are used. These widely used tests indicate how many years of schooling are required for the average reader to understand what you've written. (Incidentally, this review is written at the 10th-grade reading level.)

When **Thunder!** tries to find the correct spelling of a word, it displays alternatives,

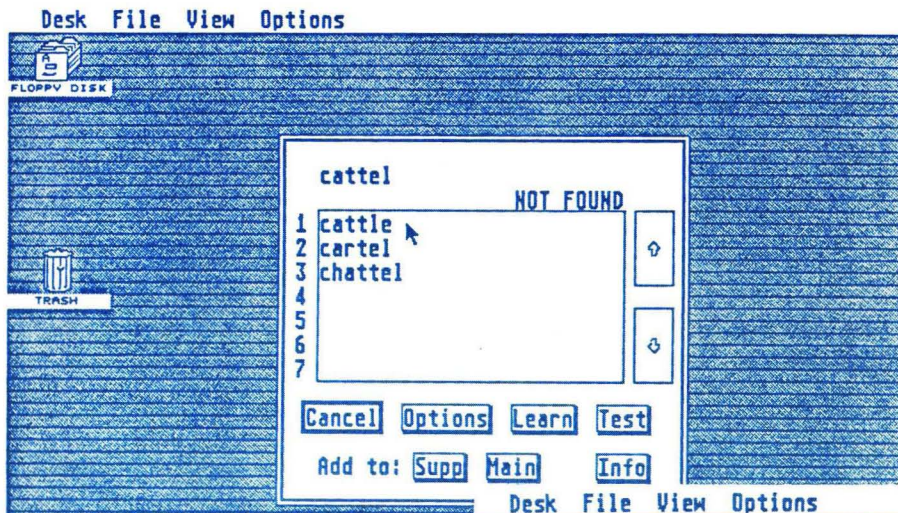
based on letters in different positions of the word originally typed. How? It looks at the first letter and substitutes various words spelled the same except for that letter. Then it looks at the second letter with the first letter, then, finally, at similar words. In this way, the list of alternatives is based on the type and frequency of errors most people make. Most of the time, **Thunder!** gets it right.

One of the unique features of the program is its ability to correctly check a word which contains a number. No other spelling checker currently on the market—for any computer—can handle this type of spelling error.

As mentioned earlier, **Thunder!** has 50,000 words in its dictionary. Other products may claim as many or even more words, but may be counting word derivations separately. For example, the words *walk*, *walks*, *walked* and *walking* could be counted as four separate words in some spelling checker programs. In **Thunder!**, these four derivations are considered as one word, just as in an English dictionary.

A note of caution should be given about the statistics segment. Since it's very difficult for a program to define a syllable, the statistics are not 100-percent accurate for short documents. For longer documents, though, **Thunder!**'s stats are quite accurate.

Another problem is that there are, unfortunately, still a few bugs in TOS. If the program opens a virtual workstation in a desk accessory, TOS is supposed to allocate 300 bytes. It doesn't do so correctly and, therefore, can waste from 40 to 60K. What this means is that **Thunder!** can re-



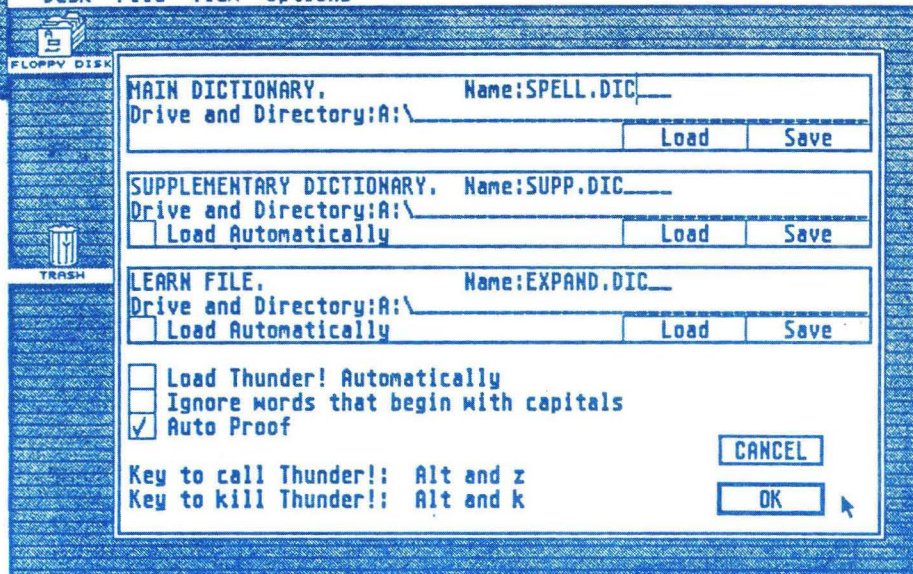
quire 100 to 140K of memory. Once the bug is fixed, only 100K will be used by the program.

Another TOS bug, out of the control of any programmer, can result in a system crash. This bug may occur with any desk accessory, and Atari's aware of it. If, with a desk accessory active, you get a message like *put disk B into drive A*, or *your disk is corrupt*, or any system error message at all, the next time a similar message appears with an active accessory the system will crash (three bombs). All you can do is be sure to save your work often... especially after you've received a system error message.

The dictionary is 80K, and the program itself about 40K. But, whenever the ST's booted, the program asks if you want to load the checker. In its desk accessory guise, **Thunder!** and its dictionary need 100K. Fortunately, should you need that extra memory at any time, you can simply call up **Thunder!** (the accessory) and disable it. You've immediately freed up 100K—and saved the hassle of rebooting. Thanks, BI, for a very handy feature.

In addition to a spelling checker desktop accessory, **Thunder!** provides a word expansion feature. For example, say I've defined BI as *Batteries Included*. Whenever I type BI, *Batteries Included* is typed in.

As many files as you want can be set on your disk, each containing up to 100 expansions. In addition, the expansion isn't limited to just one or two words. An entire paragraph or block of text can be defined.



Another use of the expansion feature is for automatic word correction. For example, I type fairly rapidly, but often mistakenly capitalize the first two characters of a word instead of just the first. This is because I don't let go of the SHIFT key fast enough. Therefore, I often spell *Atari* as *ATari*. With **Thunder!**'s expansion feature, I can tell the program ahead of time to correct the word *ATari* whenever it sees it.

Here's a little on **Thunder!**'s roots. It's an unusual program from an interesting company. Batteries Included is the type of small company that can bring a product from conception to market in less than three months. Take, for example, **Thunder!**'s creation.

Back in early March, President Michael Reichmann and Product Development Director Mark Skapinker were having their usual morning coffee. They were discuss-

ing the Turbo Lightning spelling checker for the IBM PC and clones. Both agreed that BI could easily do a program like it—do it better and do it quickly. Less than three months later, **Thunder!** was shipping and being shown at Chicago's Summer CES.

The bottom line for me: **Thunder!** from Batteries Included represents the first serious desktop accessory for the Atari ST. Author Mark Skapinker has shown what can be done with a useful idea, good programming and a company willing to support the ST.

Thunder! isn't copy protected, so please don't give or receive unpurchased copies of the program. Doing so will only hurt you, the ST user, and the ST software market in general.

If you write, you need **Thunder!** I recommend it highly. **A**

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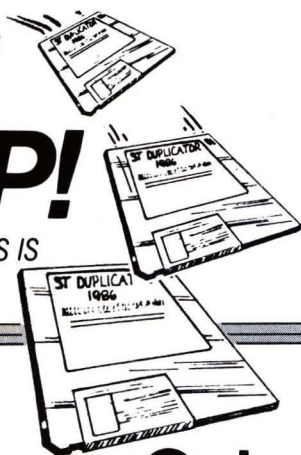
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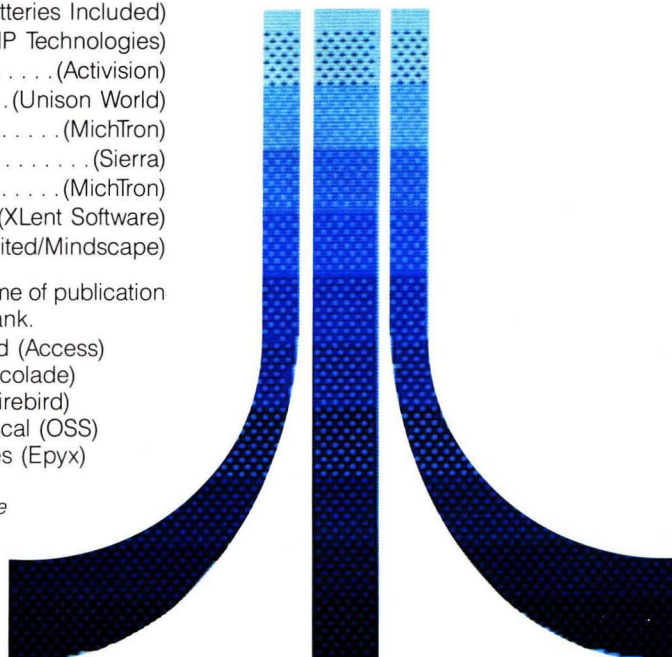
The following is a list of the best-selling ST software titles, collated since the ST's introduction in the summer of 1985. Please note that these are not the current best-sellers, but those which have sold more copies over the entire period.

1. Sundog: The Frozen Legacy (FTL Games)
2. DEGAS (Batteries Included)
3. VIP Professional (VIP Technologies)
4. Music Studio (Activision)
5. PrintMaster (Unison World)
6. Time Bandit (MichTron)
7. King's Quest II (Sierra)
8. Major Motion (MichTron)
9. Typesetter ST (XLent Software)
10. Brataccas (Psygnosis Limited/Mindscape)

The following were the fastest up-and-coming titles at the time of publication (August 1986). They're listed in alphabetical order, not by rank.

Black Cauldron (Sierra)	Leader Board (Access)
dB Man (Versasoft/Atari)	Mean 18 (Accolade)
Easy Draw (Migraph)	The Pawn (Firebird)
N-Vision (Audio Light)	Personal Pascal (OSS)
Lattice C (Metacomco)	Winter Games (Epyx)

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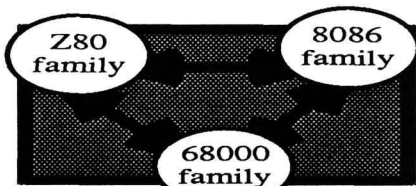
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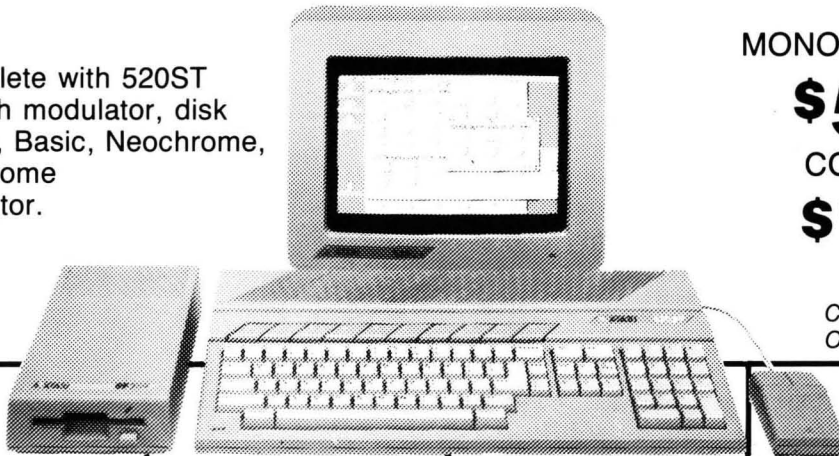
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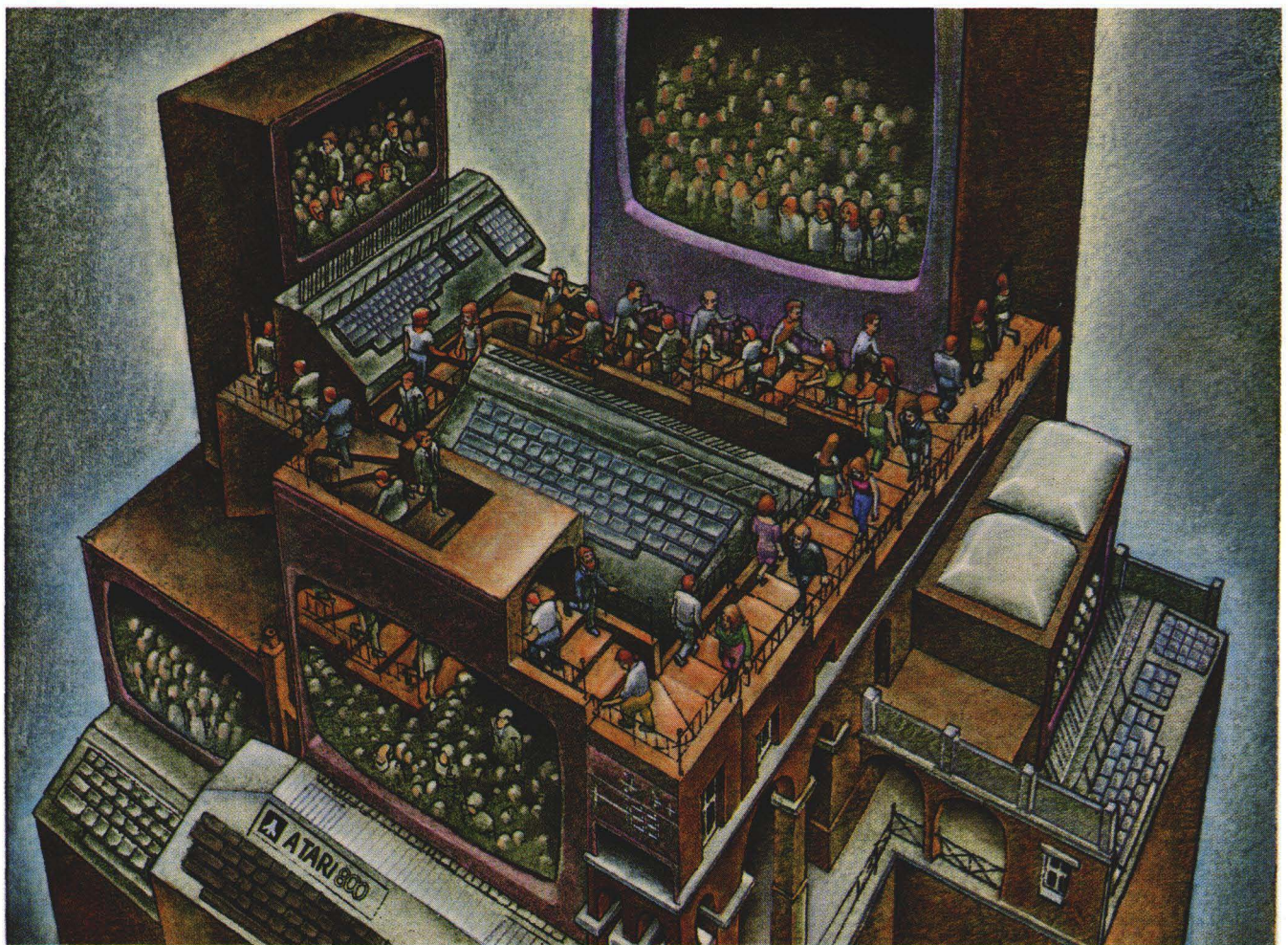
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