
ST-LOG
THE ATARI ST OPERATOR'S MAGAZINE
JULY 1986
ISSUE 4
THIS ISSUE:
Function Key Helper
Fractions Using LOGO

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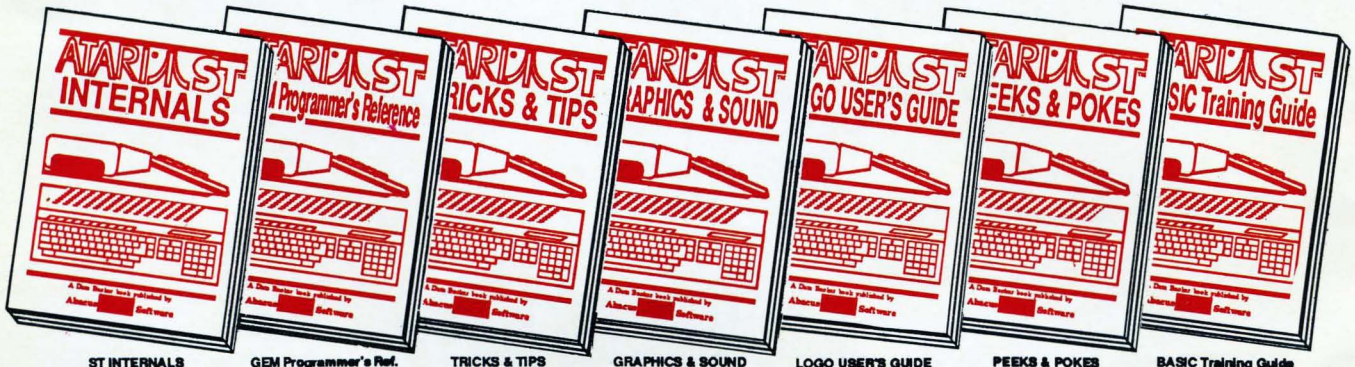


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ST·LOG
THE ATARI ST OPERATOR'S MAGAZINE

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## FEATURES



## REVIEWS



## COLUMNS




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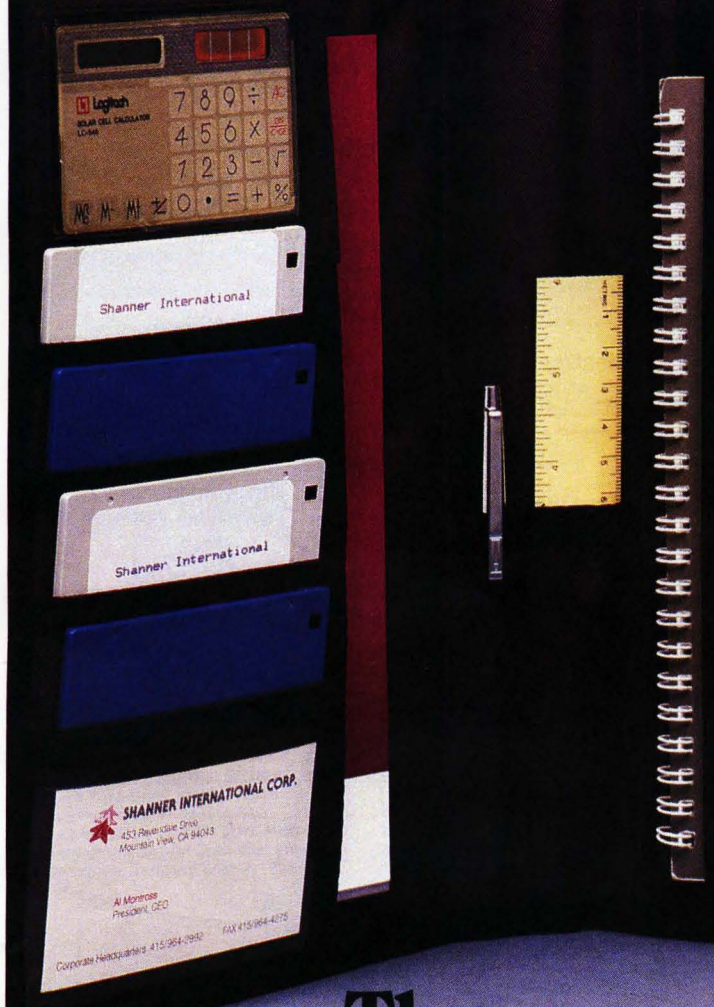


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# Personal Pascal

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**by Douglas Weir**

Often, choosing a compiler isn't simply a matter of deciding which high-level language you like best. Other considerations —ease of use, quality of documentation and (of course) price—can be just as important as the language definition. I think this was the biggest reason for the great success of Borland's **Turbo Pascal** for the IBM PC.

Many programmers who might otherwise have preferred another language to Pascal were so attracted by **Turbo**'s convenient integration of edit, compile and run functions that they chose **Turbo Pascal**. And, compared to the other professional-quality compilers available at the time, **Turbo** was cheap. Now, Atari ST owners can enjoy practically all these features, plus some, in OSS's new **Personal Pascal**.

**Personal Pascal** comes complete on one 3½-inch, single-sided disk (not copy protected), with a 280-page manual. The disk contains four main programs (editor, compiler, linker, and a program to oversee and call the first three); three "include" source files, to allow you to use GEM routines; two libraries (*pasgem* and *paslib*); seven short demonstration programs illustrating various GEM programming techniques; a file containing corrections to the manual; a brief general file; and several files for internal use.

The manual is very well written. It includes six main sections: System Overview, Editor Reference, Compiler Reference, Linker Reference, GEM/Pascal Library and Language Reference. Its GEM section serves as a semi-tutorial introduction to both GEM and the Pascal implementation. A couple of appendices provide a list of compile-time error messages and ASCII codes. My one complaint is that there's no index.

If you haven't yet programmed under GEM and want to learn, the GEM/Pascal Library section should be one of the most useful parts of the package. **Personal Pascal** comes with a large library of external procedures and functions, which you can include in programs and use to access most GEM features.

GEM is a very complex system, and the **Personal Pascal** manual not only provides detailed explanations of all its GEM routines, it also prefaces each subsection with a very helpful overview of what's going on in GEM, why certain procedures are necessary, and so on.

This is especially helpful as you're learning about GEM's event-management system —how it handles user communication with an application program through the mouse and keyboard, and how the application must receive and respond to the GEM messages.

You get an additional bonus when you access GEM through **Personal Pascal**. In many cases, if you're programming at the "lowest" GEM level (in C or assembly language), you must call several functions just to get one thing done. **Personal Pascal** often simplifies this process for you.

For example, to specify how the interiors of graphics objects are filled, you must call (in C) both *vsf_interior()* and *vsf_style()*. In **Personal Pascal** this becomes one procedure call, *Paint_Style*. Granted, you'll lose some flexibility with this approach, but in most cases you probably won't need it.

I should make one thing clear: at present, not all of the GEM calls are implemented as **Personal Pascal** library routines. For example, the raster operations *vro_cpyform()*, *vr_trnfm()*, etc.) are one group of functions not directly accessible. However, you can perform just about anything you'd normally want through Pascal procedure or function calls—including windowing, using dialog and alert boxes, using the mouse (and changing its form, if you want), graphics, menus, window text style, and so on. There are about ninety routines in all, and the people at OSS say there are more to come. However, since you can easily link to assembly language object files, you're not limited to what **Personal Pascal** can "officially" do.

I found the editor fine for writing source code. It's a stripped-down, full-screen editor which doesn't use any GEM features. You can get a quick reference screen of the available commands by pressing the HELP key. Cursor movement can be controlled either with the cursor keys or with a series of CTRL-key sequences (the latter is a subset of the **Wordstar** system).

To load or save files, exit from the editor, etc., the function keys are used. You get only the eighty characters per line that you see on-screen. If you start inserting text at the beginning of an existing line and the previous text is "bumped" up to the

right edge of the screen, it refuses to move any further, so you can't insert any more text (until you hit RETURN, of course).

The **Personal Pascal** system is controlled from a standard desktop-like screen (the manual calls this level of the system the "Manager"). The drop-down menus at the top bar give you access to (besides, of course, the installed desk accessories) all the separate features of the system. There are two menu titles: Options, which allows you to specify certain linker and compiler options or to save the current options selected; and File, which contains the Edit, Compile, Link and Run Program items.

If the compiler detects an error in your source code, it will display a message box with an error number and a "plain English" description of the error. You decide whether you want to ignore the error and continue the compilation, cancel the compilation, or go straight back to the editor.

If you choose the last, and have enabled the debug option in the compiler, you'll be returned to the editor with the cursor marking where the error was detected, and a line of text at the top of the screen will describe the error. As soon as you press any key, the descriptive line disappears, and you can resume editing. Several compiler options are available.

The *.o* files generated by the compiler are compatible with the Link68 linker provided in the Atari Developer's Kit. At present there's no facility included in the package to obtain assembly language output from Pascal source files. According to OSS, this is a low priority. I for one would like to see such a feature.

Assuming that no errors are detected during compilation, the program can be linked. If an "undefined symbol" error occurs, an alert box will display the symbol and let you decide whether to continue the link or stop. I had some trouble with the continue option in my copy of the program: in most cases when I selected it, for a split-second the screen would display a four-mushroom system error message (illegal 68000 instruction) and return me to the top level of **Personal Pascal**. I've been told by OSS that they're looking into this problem, and I would expect it to be corrected in the next release (which is due in April, or perhaps sooner).

It took me about 68 seconds to compile and link a tiny Pascal program that prints *hello world* to the screen. This compares with about 2 minutes, 47 seconds to compile and link a similar C program using the Atari Developer's Kit (and that doesn't include the time taken to switch disks and type in command names). Of the 68 seconds, 25 were spent in loading the compiler, about 2 or 3 in loading the linker. Obviously, these times will be greatly reduced with a ramdisk or a hard disk.

What's perhaps more remarkable is that the resulting Pascal program (compiled and linked as a TOS application) was 2240 bytes long, while the C version (no GEM calls) was 6971 bytes long. (I used *puts()* and not *printf()* to reduce the program's size.)

I don't know whether all non-GEM programs will compare the same way in their compactness of code, but I should point out that GEM-intensive programs will probably be bigger in **Personal Pascal** as opposed to C, since (as mentioned above) **Personal Pascal** tends to build "higher-level" constructs to manage all the primitive routines that one calls explicitly in C.

I wrote a Pascal version of the Sample.c program included with the Developer's Kit, and the resulting program was a little bigger (about 600 bytes) than the C version. Nevertheless, it's obvious that you can go through the compile and link phases much more quickly and conveniently with **Personal Pascal**. For many applications, this alone would be enough to make me choose it over C.

Once you've compiled and linked your program, you can run it from the **Personal Pascal** system by selecting the "run program" item from the File menu. If the program's running as a TOS application, **Personal Pascal** will insert a *hit any key to continue* message just before it ends, and wait for a keypress before exiting. This can be very handy (it doesn't happen when the program is run from the OS).

If you get a run-time error (I got most of mine as I was debugging a linked-list program using pointers), you'll see an alert box announcing the error with an ABORT button. When you click on the button, a second box will appear, giving the error's location in the program in the form of the source code line number and the hex value of the program counter.

Note that you must have enabled the debug option in the compiler to get this information. If the program was running as a TOS application, this information is simply printed on-screen and a *hit any key to continue* message is displayed. In any case, you end up in the top level of the **Personal Pascal** system.

There are a few minor problems. First, the compiler and the linker give you the option (via a button in the message boxes displayed while operating) of cancelling the compilation or link. This works during a link, but the compiler ignores all cancel requests.

Second, if you get a compile-time error and select the return-to-edit option, then (after editing) exit the editor by any means other than the automatic save-and-compile option (key F9), from then on the item selector box for the editor will display two or three groups of meaningless codes instead of the current selected filename. You can't backspace to enter a new filename if this happens, although you can select any pre-existing filename (the name still won't be correctly displayed in the box, but it will be loaded).

The only way out seems to be to reboot, since exiting, running another program, and re-entering **Personal Pascal** still won't fix things. Both these bugs will be fixed in the new release, according to OSS. In the meantime, they can easily be worked around.

This is a complete Pascal; nothing has been left out. I've tested the implementation of pointers, sets, records, arrays, files and strings (yes, there are strings)—and have found nothing lacking. The one exception concerns the use of disk files. This release of **Personal Pascal**will allow you to use the built-in *read*, *readln*, *write* and *writeln* procedures only with the standard files *input* and *output*.

This means that, when you use a disk file, you must write your own versions of these procedures, by making calls to the primitive Pascal procedures *get* and *put*. For example, to read from a file you call testfile, you would declare something like the following:

```
procedure f_read(var testfile:  item_file;
                 var item:      item_type);
begin
    item := testfile^;
    get(testfile)
    end;
```

where *item_file* and *item_type* are type declarations you've made at the top of your program. (Note that **Personal Pascal**, like many Pascal implementations, requires that formal parameters to procedures and functions have predeclared types—e.g., you wouldn't be able to have:

```
var testfile: file of item;
```

in the parameter declaration of *f_read* above). The next release will let you use *read*, etc., with any file (which is the way it should be).

It's nice to see, by the way, that file buffer pointers are implemented exactly as in the standard Pascal definition. This makes it easy to do things like take a look at the next character in a text file, without altering the values of the *eof* or *eoln* functions.

**Personal Pascal** also includes many useful extensions to "standard" Pascal. I've already mentioned the numerous GEM routines. Other extensions include *byte* and *long_integer* types, strings, bit-manipulation operators (like those in C), an otherwise option for case statements, and a loop statement that tests its exit condition(s) anywhere you want in the middle of a loop.

Also included are special language directives. These are appended to the top line of a function or procedure declaration (like the "forward" directive in standard Pascal). They allow you to tell **Personal Pascal** that a declaration is "external" (contained in another object file), a call to a C module, or a BIOS, extended BIOS or GEMDOS call.

The directives all work as described, except that when you link to assembly lan-

guage modules you must declare the labels referenced from Pascal as external (*.globl* in AS68) in the assembly source file. These external labels must be all capital letters in the assembly source file. To use C routines, just code and compile the function(s) you reference in Pascal (leave *main()* empty or omit it). To link the files together, you need a command line similar to the following:

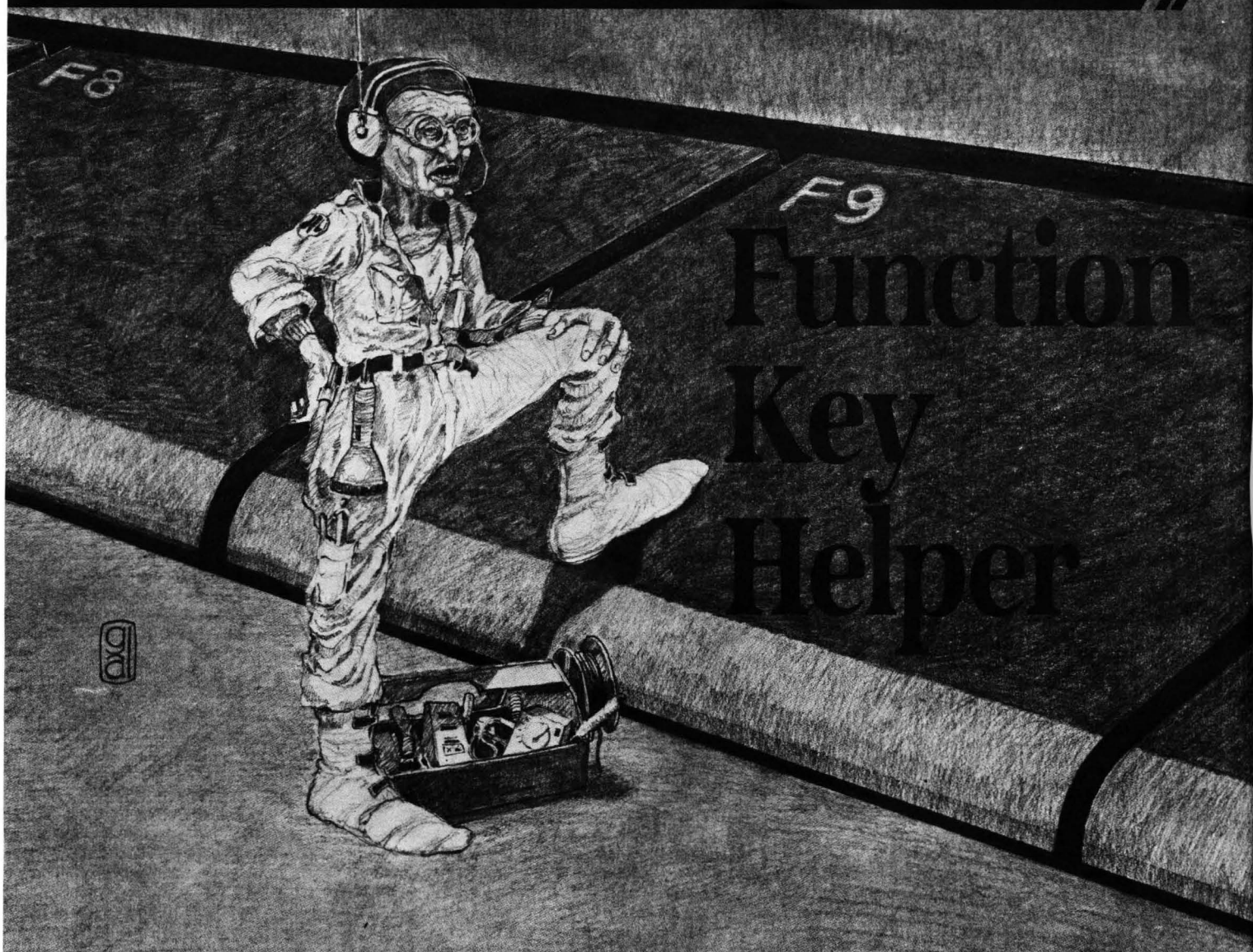
```
link68 [u] pn.68k=pn,cn,paslib,gemstart,gemlib,libf,osbind
```

where *pn* is the *.o* filename of the Pascal program, and *cn* is the *.o* filename of the C routine(s). (If you leave *main()* out of your C file, ignore the linker's complaint about *__main* being undefined.) Because the file information for standard input and output is filled in by some run-time startup code at the beginning of a normal C program, you can't use C functions (like *puts()*, *printf()*, etc.) that use these file pointers. You *can* use all the other functions, including those that create and use disk files. Also note that you can use C routines in a TOS application, but not under GEM (because both the Pascal and the C routines want to open a virtual workstation). I am indebted to Bill Wilkinson of OSS for much of the information included in this paragraph.

There are many miscellaneous extras. These include a set of routines that give a TOS application access to the parameters passed on its command line (to use these routines—*cmd_args*, *cmd_getarg* and *option*—you must specify *paslib* as an additional link file as a linker option, even though it's automatically read once by the linker. This is a bug which will be fixed in the next release). A procedure "chain" lets you execute another program and return to the caller afterward. However, note that you must set aside some memory with either the *S* or the *U* compiler directive to do this, and reserving too much or too little memory can be equally disastrous.

The function *filename* will tell you if a string is a valid TOS filename or not. To use it, you must link to *paslib* a second time, just as with the command line routines mentioned above. The procedure *io_check* and the function *io_result* allow you to suppress run-time supervision of i/o operations by **Personal Pascal** and do the checking yourself. However, you must explicitly declare these two routines in your program as "external," in order to use them (they'll then be linked into *paslib* by the linker). I understand that this won't be necessary after the next release. Finally, the function *sizeof* acts just like its C namesake: it will return the size (in bytes) of any data type (and this includes structured types).

I would recommend this package to anyone. Its documentation sets a (much-needed) new standard among ST/GEM tools. Ideally, I prefer C to Pascal, but Pascal's much more elaborate error-checking makes it a better learning language than C, and **Personal Pascal**'s extensions and extra features eliminate many of my complaints about Pascal as a language. If you were to buy **Personal Pascal** and two of the new ST books just published by Abacus (*ST Internals* and the *GEM Programmer's Reference*) you'd have more than enough to start serious GEM programming projects. If you're looking for a compiled language for your ST, you should look seriously at **Personal Pascal**.




# Function Key Helper

by Matthew J.W. Ratcliff

There are two philosophies on the control of special functions in computer applications these days. The IBM PC uses ten function keys, while the Macintosh uses a mouse. Atari gave us both with the 520ST.

Most software "ported" over to the ST from the IBM realm uses function keys. Atari's **ST-Writer** and ST-BASIC use function keys, while the graphics drawing programs **DEGAS** and **NEO-Chrome** primarily use mouse controls.

I hate function keys myself. Every time you boot a different program, your function keys are redefined. I just can't memorize them all. The GEM operating system interface, **NEO-Chrome** and **DEGAS** have proven mouse control can be elegant, simple to use and complete. But, due primarily to the immense popularity of the IBM PC, we must deal with annoying function key controls, as software continues to be ported over from the IBM world.

As a matter of fact, there's a big business in function key templates for the IBM PC. I wrote **Function Key Helper** (**FKH** from here on) to alleviate the problem of having to memorize function keys for the ST. See the sample templates on the next page for **ST-Writer** and ST-BASIC.

## How to use the program.

**FKH** makes it easy to create, update and print function key templates for your ST software. You can edit for SHIFT, CONTROL and ALTERNATE definitions, as well. The editor of **FKH** allows you to enter up to five words of eleven characters (maximum) as a description, for each type of function keypress.

The template may be saved to or loaded from disk. This comes in handy with software allowing for user-programmable macro functions, such as **ST-TERM**. You may not need to define all function keypresses (i.e., function and SHIFT-function, but not CONTROL or ALTERNATE).

When the template is printed on your Epson, Gemini, or compatible printer, you have the option of suppressing empty key sets. They may be printed, however, so you can pencil in additions later.

A template works best if rubber cemented to a piece of

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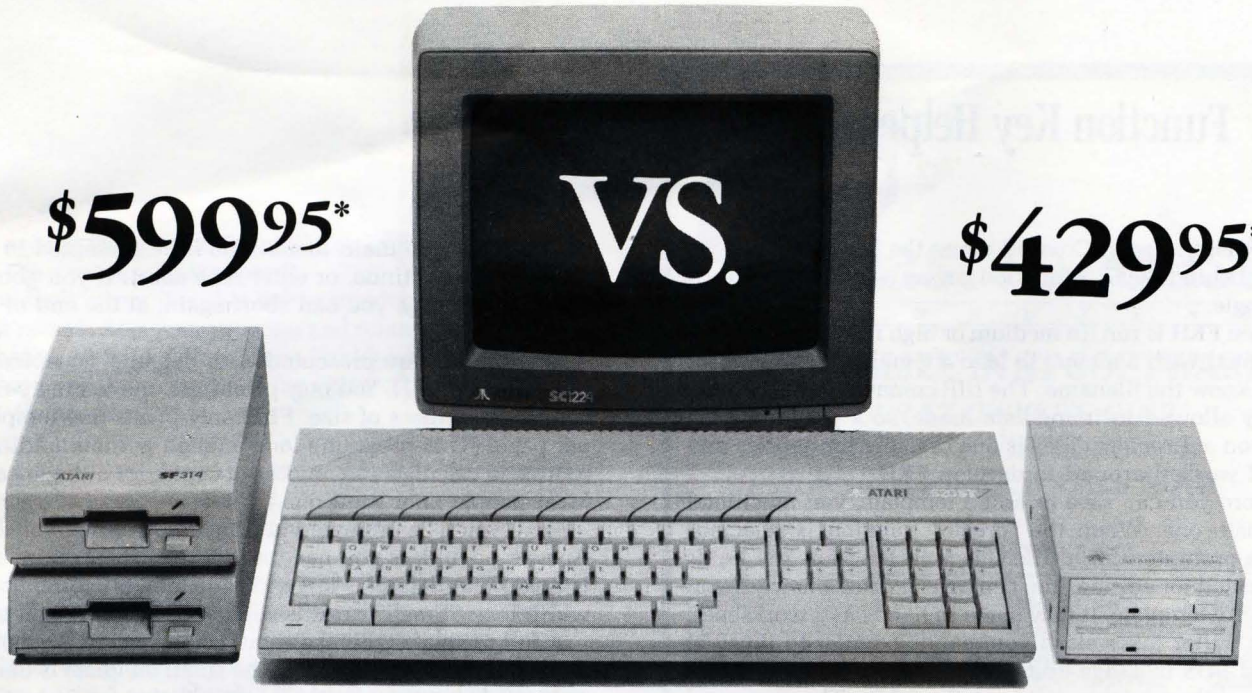

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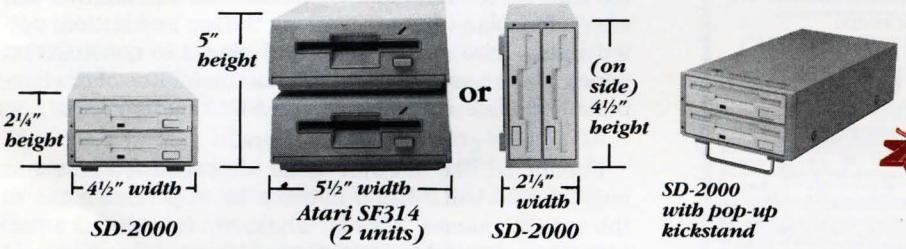


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construction paper. Creased along the last line, it'll slip neatly behind the ST's function keys at a comfortable reading angle.

When **FKH** is run (in medium or high resolution), you're presented with a menu. To load a template, you must already know the filename. The *DIR* command of ST-BASIC is only allowed in immediate mode, so a program can't give you a directory. This is one of many limitations and bugs I worked around to develop **FKH**.

Before you can save or edit a template, you must load or create one. When the "create" function is selected, you're prompted for a title. Then all function key fields are created for editing. You can save or print a newly created empty template. It may come in handy as a worksheet.

The editor takes slash commands (similar to those of FoReM BBS message editor). Full-screen editing on the ST is not the trivial task it is on the 8-bits. The command editor was easier to create, and is still fairly easy to use.

You start out editing descriptions for function key F-1. Just type the descriptions and press RETURN on each line. The */F* command will skip you forward to the next set, SHIFT function keys. The */B* will back up one set.

If a word description is already defined, it's displayed to the left of your edit window. A */C* will clear out the current word, if you wish to delete it. If no changes to the word are desired, press the RETURN key to move on.

Pressing RETURN on the last description line will move you to the next function key in the current set, or continue with the next set if function number 10 was the last edited. The */N* will move you to the next function key (from, say, F-1 to F-2). A */P* will back up to the previous function key edited.

The */G* command is used to "goto" a particular key within the current set. The */G* should be immediately followed, with no space, by the number of the key (1 through 10) you wish to edit next.

You may move */Up* or */Down* the word list for the current function key, too. Pressing RETURN past the last function key edit (ALT-F-10) or the */E* exit command will RETURN control to the main menu. Slash commands are displayed at the bottom of the editing screen.

### Printing the template.

Once you've edited and saved your template, select "print" from the main menu. You'll be prompted to hit RETURN to continue, or enter *A* to abort. If you goofed up along the way, you can abort again, at the end of the set-up.

Your options are presented with defaults, accepted by pressing RETURN. You may print from one to ninety-nine copies. Regardless of size, **FKH** only prints one template per page. (This program's long enough *without* adding a routine to calculate the number of copies for a single page. Most people only want one.)

Next, you'll be prompted to print empty function fields. Answer no, unless you need it as a worksheet. Print size is next. The default, "large," is full height, compressed width text. "Small" print is superscript, half-height text.

A full template will take about half a page in large print and a quarter page in small. The small template is tougher to read, but may be the preferred size for more than two sets of function key descriptions. If you select large, you'll be asked for double strike (small is always double strike). If your ribbon is wearing thin, or you want a quality print to photocopy, double strike is preferable.

Finally, you're prompted to see that the printer is ready to go, then press RETURN.

**##ST-Writer Function Keys##**

| F 1 | F 2 | F 3 | F 4 | F 5 | F 6 | F 7 | F 8 | F 9 | F 10 |
|---|---|---|---|---|---|---|---|---|---|
| Goto End of Text | Goto End of Line | Case Toggle | Set Tab Stop | Block Delete | Search Foreward | Replace with Query | Merge File at Cursor | Form Print Blank Mark | Start Subscript or End Superscript |
| sF 1 | sF 2 | sF 3 | sF 4 | sF 5 | sF 6 | sF 7 | sF 8 | sF 9 | sF 10 |
| Goto Top of Text | Goto Start of Line | Toggle Underline | Clear Tab Stop | Text Block Marker | Search in Reverse | Global Replace | Save Marked Text Block | Elongated Print Toggle | Start Superscript End Subscript |

**##ST-BASIC Edit Functions##**

| F 1 | F 2 | F 3 | F 4 | F 5 | F 6 | F 7 | F 8 | F 9 | F 10 |
|---|---|---|---|---|---|---|---|---|---|
| Insert Space | Delete Character | Insert Line | Delete Line | Page Up | Page Down | Load Text | Save Text | New Buffer | Exit Editor |

**Figure 1. — Sample templates.**

### Printer controls.

A few pointers on the printer controls are in order here. To fit all the information on an 80-column printer, the compressed print mode is always set in Line 1990 (even compressed superscript). Unidirectional printing is selected in Line 2000, to ensure proper alignment of the columns.

In bidirectional printing, there's always a ½-dot difference in print directions. This isn't noticeable in most text, but would be in this application.

Lines 2020 and 2030 set superscript and 5/72 line spacing for small print. Line 2050 sets ⅛ line spacing for large print, and 2060 sets double strike if enabled.

Lines 2070-2090 print a series of numbers across the top of the page. This will be handy for reference, especially while debugging your entries.

Your template begins with a horizontal bar, followed by the title, all the function key definitions and another bar, after a few blank lines. Cut along the top and bottom dotted lines. Trim off the sides and glue it to construction paper. Make a crease at the last horizontal line of the template and slide it in behind the ST's function keys.

### Almost there.

Finally, I'd like to cover some important features and bugs of ST-BASIC. You'll notice a lot of percent signs in the variable names in **FKH**. These are integers. If a percent sign isn't used, ST-BASIC treats them as floating point numbers. Always use integers where applicable. It's more efficient in terms of memory (not that we're going to run out) and makes for *faster* running code.

While testing **FKH**, I'd sometimes get garbage in the title string or some of the description strings, for no apparent reason. This happened a lot during development of the program, but has not cropped up in the final version.

I do know, though, that the problems were not due to bugs in **FKH**. When the title string kept getting goofed up, I started studying the program listing. It didn't seem

to be getting changed accidentally, so I rebooted the system. The problem disappeared!

If oddball errors like this start cropping up for no apparent reason, save your program and reboot the machine. Another problem to look out for—"hidden keywords." Notice that I use the string fc$ (Lines 2190-2220) in the program. Originally, it was fnc$.

Every time the program hit a line with the fnc$ string name, I got errors. I haven't found any fnc$ or fnc reserved words in the ST-BASIC manual, however. (Apparently, ST-BASIC thought I was referring to an undefined function. See DEF FN in the manual.)

Notice, when loading a file in **FKH**, that I open the file for input, close it and open it again, before actually reading the file. Editor Clay Walnum pointed this fix out to me. Apparently, the first time a file is opened, the file pointers can get scrambled. The open-close-open procedure seems to work fine.

You don't want to use the *a$ = input$(1)* command to grab a single key from the keyboard. It works, but, whenever that statement is executed, the screens are flipped from the output screen to the command screen and back.

This is extremely annoying. That's why I use *inputs* throughout **FKH**. If you do use the single key grab command, you should note one particular bug that took me a while to discover. Try the following:

```
10 a$=input$(1)
20 if a$="" then ? "Return only":end
30 ? "You pressed ";a$;" length of ";l
en(a$):end
```

If you just press RETURN, the program will end at Line 30, not 20 as expected. And you'll notice that a$ contains one character, a carriage return. A print asc(a$) would return a *13*, however, the LEN function would return a *0*. Watch out for this one, if you use it with disk I/O.

There seems to be no way to read the ST keyboard on the fly without VDI or machine language USR calls. The INP *-4*, keyboard status check, doesn't work at all. It always returns a *16*, not a *0* or *-1* as expected. The INP *-2*, console status check, works at random for the keyboard (even if you close windows not in use).

The few times I locked up the ST while programming in ST-BASIC were when attempting to break out of a program with a CTRL-C or CTRL-G keypress. Selecting BREAK from the pull-down menu had the same effect. Often, while waiting for an input, for example, the BREAK was completely ignored.

*Always* save a valuable program before test running it, and provide for exiting the program.

ST-BASIC's editor has been widely criticized, because it's cumbersome to use. Always POKE SYSTAB+2,33 before editing your program. Then your text will turn into boldface, not ghost characters, when you edit a line. If you hate the editor *that* much, use **ST-Writer**. Even that won't be simple.

The older Ataris used a nonstandard carriage return character, ASCII 155. The ST has the standard ASCII 13, except for **ST-Writer**! It uses ASCII *0*s for carriage return markers.

You can load an ST-BASIC program into **ST-Writer**. You'll

be informed that it's "converting" a non-**ST-Writer** file as it loads. Once in memory, you can edit to your heart's content. When finished, *do not* save the file, however. You must print it to a disk file.

It would be wise to set the left margin (^L at the top of the file) to *1* and the right margin to *80* (or, possibly, *120*), to prevent **ST-Writer** from parsing any of your program lines into shorter ones.

You may wish to make a test print to the screen before printing to disk. I even created a huge update file for **FKH** with **ST-Writer**, printed it to disk and merged it with an earlier version of **FKH** in ST-BASIC.

In the "conversion" process, you lose the default control codes line of **ST-Writer**. Setting the margins is most important.

You may wish to add a header and use **ST-Writer** to print your listings for you. It works fine!

One final note: never, never *ever* close all your ST-BASIC windows, from program control or with the mouse. If you do, the ST will be hopelessly locked up and you must reboot.

If you're wondering if ST-BASIC is bug-ridden, the answer is *yes*. However, it's still quite functional—and a very fast BASIC (when run, not for program development and debugging). Once the bugs are documented and understood, you can program around them . . . as you can see with **FKH**. Total computer lockup from ST-BASIC was a rarity, and I found program editing with **ST-Writer** made ST-BASIC programming much easier.

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**Listing 1.**
**BASIC listing.**

```
10 dim F$(10,5),sF$(10,5),cF$(10,5),aF
$(10,5),wF$(10,5)
20 er$="New Run":file$="":width lprint
 132
30 openw 2:fullw 2:created%=0
40 clearw 2:poke systab+2,33:' For ST-
BASIC Edit Mode
50 gotoxy 0,0:? "    Function Key Help
er"
60 ? "    (c) ANALOG Computing"
70 ? "    by Matthew Ratcliff"
80 ? er$;chr$(7):close
90 ? "L)oad function help template."
100 ? "C)reate new function helper."
110 ? "E)dit function key definitions.
"
120 ? "S)ave template."
130 ? "P)rint function helper."
140 ? "Q)uit program."
150 ?:? "Press letter key & [RETURN] "
;:input a$
160 a%=asc(a$):if a%>96 then a%=a%-32:
' Adjust for lower case
170 if a%<>81 then 200:' Quit
180 ?:? "Quit now. Are you sure (Y/N)
?"
190 input a$:if a$="Y" or a$="y" then
close:end
200 if a%<>76 then 390:' Load Template
210 ? "Filename of template to load ?"
220 input file$:if file$="" then 40:'
Return only aborts
230 on error goto 240:open "I",#1,file
$:goto 260
240 if err=62 then 380
250 er$="Filename Error!":goto 40
260 close #1:open "I",#1,file$
270 f%=1:input #1,ttl$:? "Loading ";tt
l$
280 for i%=1 to 10
290 for j%=1 to 5
300 on f% goto 310,320,330,340
310 input #1,F$(i%,j%):goto 350
320 input #1,sF$(i%,j%):goto 350
330 input #1,cF$(i%,j%):goto 350
340 input #1,aF$(i%,j%)
350 next j%
360 next i%
370 f%=f%+1:if f%<5 then 280
380 close #1:created%=1:er$="Load Comp
lete":goto 40
390 if a%<>67 then 540:' Create
```

```
400 ? "* Create New Function Template
*"
410 ? "Input help template title,"
420 ? "(press [RETURN] only to abort)
?"
430 input a$:if a$="" then er$="No Cre
ate":goto 40
440 ttl$=a$:? "Working...":created%=1
450 for j%=1 to 5
460 for i%=1 to 10
470 F$(i%,j%)="\":' Backslash indicate
s empty field
480 sF$(i%,j%)="\"
490 cF$(i%,j%)="\"
500 aF$(i%,j%)="\"
510 next i%
520 next j%
530 er$="Create Complete - Ready to Ed
it":goto 40
540 if a%<>69 then 1300:' Edit now
550 if created%=0 then er$="Must C)rea
te or L)oad first!":goto 40
560 clearw 2:gotoxy 1,8:? "----------
--------------------------"
570 ? "Enter /F to skip to next Functi
on set, /B to backup."
580 ? "Enter /C to Clear current word.
"
590 ? "Press [RETURN] only to keep wor
d and continue."
600 ? "Enter /N for Next function key.
"
610 ? "Enter /Gnn, where nn is a # 1-1
0, to goto key."
620 ? "Enter /P for Previous function
key."
630 ? "Enter /U to move Up to previous
 Word."
640 ? "Enter /D to move Down to next W
ord (wraparound)."
650 ? "Enter /E to Exit edit mode to M
enu.";
660 fn%=1:ky%=1:' Function set #, key
descr #
670 gotoxy 2,0:? ttl$:' Show name of f
unction helper in edit mode
680 gotoxy 5,1:? "Editing: ";
690 on fn% goto 700,710,720,730
700 ? "          ";:goto 740
710 ? "    shift";:goto 740
720 ? "  control";:goto 740
730 ? "alternate";
740 ? "-Function Key # ";
750 gosub 2670
760 gotoxy 40,1:? ky%;"    "
770 gotoxy 3,2:? "# : word"
780 for w%=1 to 5
790 gotoxy 2,w%+2:? w%;":";:a%=0
800 if wF$(ky%,w%)<>"\" then ? wF$(ky%
,w%);:a%=len(wF$(ky%,w%))
810 ? space$(12-a%);"|";space$(14);"|"
820 next w%
830 w%=1:' Now Editing, W% = word coun
t
840 gosub 2870:gotoxy 17,2+w%
850 input a$:a%=0:if len(a$)>1 then a%
=asc(mid$(a$,2,1)):c$=left$(a$,1)
860 if a%>96 then a%=a%-32:' Lower Cas
e Fix
870 if len(a$)<>0 then 950:' Return on
ly handler
880 w%=w%+1:gosub 2870:' Next Word
890 if w%<6 then 840
900 ky%=ky%+1:' Next Function key
910 if ky%<11 then 760
920 ky%=1:gosub 2540:fn%=fn%+1
930 if fn%<5 then 680
940 er$="Completed Edit":goto 40
950 if c$<>"/" then 1280
960 if a%<>70 then 980:' F)oreward = n
ext set
970 goto 920
980 if a%<>71 then 1050:' G)oto functi
on key
990 if len(a$)<3 then ky%=1:goto 760
1000 b%=asc(mid$(a$,3,1))-48
1010 if (b%>0 and b%<10 and len(a$)=3)
 then ky%=b%:goto 760
1020 if b%<1 then ky%=1:goto 760
1030 if b%>9 then ky%=10:goto 760
1040 if len(a$)>3 then ky%=10:goto 760
1050 if a%<>67 then 1070:' C)lear Word
1060 wF$(ky%,w%)="\":goto 840
1070 if a%<>66 then 1110:' B)ackup = l
ast set
1080 gosub 2540
1090 fn%=fn%-1:if fn%<0 then fn%=4
1100 ky%=1:goto 680
1110 if a%<>78 then 1150:' N)ext Key
1120 ky%=ky%+1
1130 if ky%<11 then 760
1140 goto 920
1150 if a%<>80 then 1190:' P)revous ke
y
1160 ky%=ky%-1
1170 if ky%>0 then 760
1180 ky%=10:goto 760
1190 if a%<>85 then 1220:' U)p a word
1200 w%=w%-1:if w%<1 then w%=5
```

```
1210 goto 840
1220 if a%<>68 then 1250:' D)own one w
ord
1230 w%=w%+1:if w%<6 then 840
1240 w%=1:goto 840
1250 if a%<>69 then ? chr$(7):goto 760
:' E)xit to menu
1260 gosub 2540
1270 er$="Exit Edit Mode":goto 40
1280 if len(a$)>11 then ? chr$(7):a$=l
eft$(a$,11)
1290 wF$(ky%,w%)=a$:goto 880
1300 if a%<>83 then 1640:' Save Templa
te
1310 if created%=0 then er$="No File t
o Save!":goto 40
1320 ? "Save template. Press [RETURN]
to continue,"
1330 ? "or input 'A' to abort save fun
ction ?";input a$
1340 if a$="A" or a$="a" then er$="No
Save":goto 40
1350 if len(ttl$)=0 then 1380
1360 ? "Current template title is:":?
ttl$
1370 ? "Press [RETURN] only to keep sa
me name."
1380 ? "Input new title:":input a$:if
len(a$)=0 then 1400
1390 ttl$=a$
1400 if len(ttl$)=0 then ? "Must have
a title";chr$(7):goto 1320
1410 if len(file$)=0  then 1440
1420 ? "Current disk filename is: ";fi
le$
1430 ? "Press [RETURN] only to keep sa
me name."
1440 ? "Input template filename: ";:in
put a$:if len(a$)=0 then 1460
1450 file$=a$
1460 if len(file$)=0 then ? "Must have
 filename!";chr$(7):goto 1440
1470 on error goto 1490
1480 open "0",#1,file$:goto 1500
1490 er$="Disk Error During Save!":got
o 40
1500 ? #1,ttl$
1510 f%=1
1520 for i%=1 to 10
1530 for j%=1 to 5
1540 on f% goto 1550,1560,1570,1580
1550 ? #1, F$(i%,j%);:goto 1590
1560 ? #1,sF$(i%,j%);:goto 1590
1570 ? #1,cF$(i%,j%);:goto 1590
1580 ? #1,aF$(i%,j%);
1590 if j%<5 then ? #1,","; else ?#1
1600 next j%:next i%
1610 f%=f%+1:if f%<5 then 1520
1620 close #1
1630 er$="Function Help Template Saved
":goto 40
1640 if a%<>80 then er$="Invalid Key C
ommand":goto 40
1650 if created% then clearw 2:gotoxy
4,0:goto 1670
1660 er$="Must C)reate & E)dit or L)oa
d first!":goto 40
1670 ? "** Print Template ";ttl$;" **"
:?:? "Press [RETURN] to continue,"
1680 ? "or [A] and [RETURN] to abort "
;:input a$
1690 if len(a$)<>0 then er$="No Print!
":goto 40
1700 empty%=0:' Don't print empty func
tion definitions
1710 small%=0:' Use large compressed p
rint, not small superscript
1720 cop%=1:' # of copies
1730 dbl%=0:' Double Strike for large.
 Default off
1740 input "# of copies (default=1) ",
a$
1750 if len(a$)=0 then 1770
1760 on error goto 1740:cop%=val(a$):i
f cop%<1 or cop%>99 then 1740
1770 ? "Print empty function fields (Y
/N, default N) ?"
1780 input "(i.e. all 10 keys for a fu
nction are not defined) ";a$
1790 if len(a$)=0 or a$="N" or a$="n"
then 1820
1800 if a$="y" or a$="Y" then empty%=1
:goto 1820
1810 ? "What?";chr$(7):goto 1770
1820 ? "(S)mall print (1/4 page max he
ight) or"
1830 input "(L)arge print (1/2 page ma
x, default) ",a$
1840 if len(a$)=0 then 1860
1850 if a$="s" or a$="S" then small%=1
1860 if small%=1 then dbl%=0:goto 1910
:' Small always double strike
1870 input "Double strike for large pr
int (Y/N, default N) ",a$
1880 if len(a$)=0 or a$="n" or a$="N"
then 1910
1890 if a$="Y" or a$="y" then dbl%=1:g
oto 1910
1900 ? "What?";chr$(7):goto 1870
1910 ? "Be sure printer is ready and O
N LINE!"
1920 ? "Then press [RETURN] to continu
e,"
1930 ? "or enter [A] to abort if you h
ave changed your mind ";
1940 input a$
1950 if len(a$)=0 then 1980
1960 if a$="a" or a$="A" then er$="No
Print":goto 40
1970 ? "What?";chr$(7):goto 1910
1980 for q%=1 to cop%
1990 lprint chr$(12);chr$(27);"@":' se
t top of form and
2000 ' reset all old printer setups. O
nly 1 template per page
2010 lprint chr$(15):' Always compress
ed print
2020 lprint chr$(27);"U";chr$(1):' Set
 unidirectional for vert allignment
2030 if small%=0 then 2070
2040 lprint chr$(27);"S";chr$(0):' Set
 Superscript mode for SMALL
2050 lprint chr$(27);"A";chr$(5):' 5/7
2 line spacing for SMALL
2060 goto 2090
2070 lprint chr$(27);"0":' Set 1/8" li
ne spacing for LARGE print
2080 if dbl%=1 then lprint chr$(27);"G
":' double strike
2090 for i%=1 to 12
2100 lprint "0123456789";:' For refere
nce
2110 next i%
2120 lprint:lprint:lprint
2130 a%=len(ttl$)
2140 b%=int((120.0-a%)/2.0)-2
2150 gosub 2820
2160 lprint space$(b%);"**";ttl$;"**"
2170 gosub 2780:' Horizontal BAR
2180 fn%=1:' First function key set
2190 gosub 2670:' Diagnose function se
t empty, setup wF$
2200 on fn% goto 2210,2220,2230,2240
2210 fc$=" F":goto 2250
```

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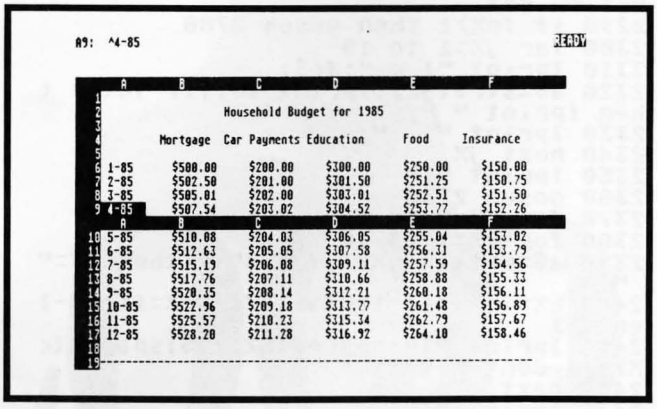


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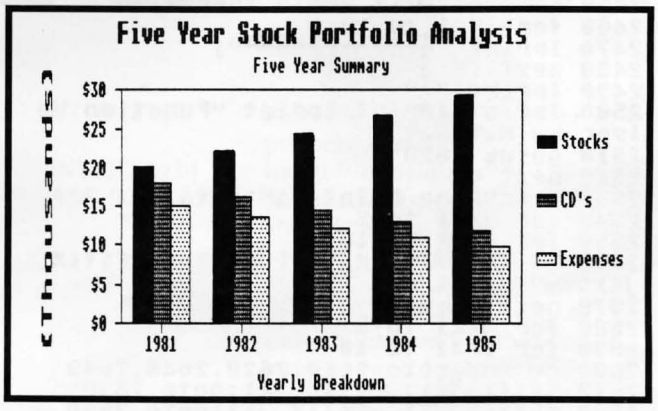


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# Function Key Helper *continued*

```
2220 fc$="sF":goto 2250
2230 fc$="cF":goto 2250
2240 fc$="aF"
2250 if empty%=1 then 2290
2260 if tempty%=0 then 2290
2270 fn%=fn%+1:if fn%<5 then 2190
2280 goto 2460:' Done printing this fu
nction set
2290 if fn%>1 then gosub 2780
2300 for j%=1 to 10
2310 lprint "|   ";fc$;
2320 a$=str$(j%):lprint a$;:if j%<10 t
hen lprint " ";
2330 lprint "   ";
2340 next j%
2350 lprint "|"
2360 gosub 2780
2370 for j%=1 to 5
2380 for i%=1 to 10
2390 a$=wF$(i%,j%):if a$="\" then a$="
 "
2400 b%=int((11-len(a$))/2):c%=11-b%-l
en(a$)
2410 lprint "|";space$(b%);a$;space$(c
%);:' Center text
2420 next i%
2430 lprint "|"
2440 next j%
2450 fn%=fn%+1:if fn%<5 then 2190
2460 for i%=1 to 10
2470 lprint "------------";
2480 next i%
2490 lprint "-"
2500 lprint:lprint:lprint "Function He
lper by Mat*Rat"
2510 gosub 2820
2520 next q%
2530 er$="Done Printing":goto 40
2540 for j%=1 to 5
2550 for i%=1 to 10
2560 if len(wF$(i%,j%))=0 then wF$(i%,
j%)="\"
2570 next i%:next j%
2580 for j%=1 to 5
2590 for i%=1 to 10
2600 on fn% goto 2610,2620,2630,2640
2610 F$(i%,j%)=wF$(i%,j%):goto 2650
2620 sF$(i%,j%)=wF$(i%,j%):goto 2650
2630 cF$(i%,j%)=wF$(i%,j%):goto 2650
2640 aF$(i%,j%)=wF$(i%,j%)
2650 next i%:next j%
2660 return
2670 tempty%=1
2680 for j%=1 to 5
2690 for i%=1 to 10
2700 on fn% goto 2710,2720,2730,2740
2710 wF$(i%,j%)= F$(i%,j%):goto 2750
2720 wF$(i%,j%)=sF$(i%,j%):goto 2750
2730 wF$(i%,j%)=cF$(i%,j%):goto 2750
2740 wF$(i%,j%)=aF$(i%,j%)
2750 if wF$(i%,j%)<>"\" then tempty%=0
2760 next i%:next j%
2770 return
2780 for temp%=1 to 10
2790 lprint "|-----------";
2800 next temp%
2810 lprint "|":return
2820 for tmp%=1 to 10
2830 lprint "------------";:' Horizont
al Stripe
2840 next tmp%:' for cutting on the 'd
otted' line
2850 lprint "-"
2860 return
2870 for tmp%=1 to 5:' Update Edit Win
dow
2880 gotoxy 2,tmp%+2:? tmp%;":";:c%=0
2890 if wF$(ky%,tmp%)="\" then 2910
2900 ? wf$(ky%,tmp%);:c%=len(wf$(ky%,t
mp%))
2910 ? space$(12-c%);"|";space$(14);"|
     "
2920 next tmp%
2930 return
```

●

ST-CHECKSUM DATA.

*(see page 77ST)*

```
 10 data  598, 557, 793, 687, 5, 66, 6
22, 522, 51, 25, 3926
 110 data  541, 600, 53, 398, 45, 265,
 390, 698, 703, 619, 4312
 210 data  307, 239, 934, 489, 955, 51
1, 222, 962, 930, 240, 5789
 310 data  574, 603, 558, 479, 395, 39
6, 66, 967, 535, 223, 4796
 410 data  883, 922, 607, 789, 922, 96
0, 420, 884, 839, 808, 8034
 510 data  385, 390, 645, 835, 64, 764
, 795, 222, 74, 136, 4310
 610 data  849, 955, 582, 233, 956, 45
2, 278, 906, 342, 551, 6104
 710 data  238, 651, 702, 499, 682, 75
, 367, 950, 667, 172, 5003
 810 data  511, 422, 817, 547, 184, 46
, 853, 351, 369, 288, 4388
 910 data  429, 537, 443, 876, 613, 45
5, 432, 255, 203, 887, 5130
 1010 data  465, 759, 905, 325, 330, 3
67, 138, 641, 897, 120, 4947
 1110 data  64, 599, 510, 430, 541, 60
7, 311, 242, 97, 345, 3746
 1210 data  429, 825, 264, 46, 82, 645
, 523, 556, 232, 592, 4194
 1310 data  164, 60, 322, 184, 268, 63
1, 310, 538, 369, 511, 3357
 1410 data  374, 510, 309, 402, 404, 1
48, 731, 559, 351, 462, 4250
 1510 data  874, 0, 911, 641, 93, 247,
 200, 940, 790, 523, 5219
 1610 data  235, 408, 547, 402, 123, 9
05, 51, 801, 962, 93, 4527
 1710 data  730, 872, 358, 585, 959, 9
31, 635, 471, 157, 765, 6463
 1810 data  740, 966, 830, 960, 564, 2
28, 85, 222, 457, 743, 5795
 1910 data  283, 536, 524, 468, 972, 3
60, 739, 391, 440, 920, 5633
 2010 data  964, 429, 849, 365, 521, 5
70, 794, 821, 738, 45, 6096
 2110 data  670, 801, 426, 211, 152, 1
43, 53, 756, 545, 609, 4366
 2210 data  946, 998, 983, 594, 979, 2
01, 690, 2, 369, 735, 6497
 2310 data  18, 623, 293, 680, 210, 16
2, 606, 740, 134, 554, 4020
 2410 data  534, 680, 211, 683, 694, 7
41, 255, 686, 138, 530, 5152
 2510 data  160, 691, 462, 609, 743, 8
47, 69, 613, 747, 657, 5598
 2610 data  303, 832, 801, 254, 70, 87
3, 184, 616, 750, 669, 5352
 2710 data  758, 842, 827, 279, 873, 7
4, 877, 440, 345, 342, 5657
 2810 data  734, 883, 25, 615, 146, 87
9, 522, 374, 953, 319, 5450
 2910 data  961, 223, 879, 2063
```

●

# FRACTIONS USING LOGO

**by F. Neil Simms**

Occasionally you may have run into situations where you wished you could solve mathematical problems using fractions, rather than their floating point equivalents. For example, consider the following equation:

```
7/8 - 3/10 = (7*10-8*3)/(8*10) = 46/80 = 23/40
```

Using your calculator, you would arrive at an answer of 0.575, which is not too obviously equal to 23/40. Of course, you could work out the answer by hand, as above, but for complex fractions and expressions, this can become quite tedious and error prone. What's needed is a set of procedures for performing operations on fractions.

Logo is an ideal language for implementing such a scheme. It allows us to create commands which can be executed either directly or from within other procedures, plus giving the crucial ability to pass parameters.

Our first task is to define a format for representing fractions in list notation. The most obvious answer is to represent $a/b$ by the list [$a$ $b$], where $a$ and $b$ are integers. Next, we must decide what procedures we need to manipulate the fractions. A description of the procedures included here follows. (Note: $a$, $b$, $c$ and $d$ must be integers unless otherwise indicated.)

| | |
|---|---|
| ADDF [a b] [c d] | Add the fractions and reduce. |
| SUBF [a b] [c d] | Subtract the second fraction from the first and reduce. |
| MULF [a b] [c d] | Multiply the two fractions and reduce. |
| DIVF [a b] [c d] | Divide the first fraction by the second and reduce. |
| EXPF [a b] c | Raise the fraction $a/b$ to the $c$ power and reduce. |
| INVERT [a b] | Invert $a/b$ yielding $b/a$. |
| ABS [a b c . . .] | Return the list containing the absolute values of $a$, $b$, $c$, etc. (This is a general purpose routine; you may use it to operate upon lists of reals as well as integers in other contexts. Here, it operates only on integer pairs.) |
| REDUCE [a b] | Return the list comprised of $a$ and $b$, after dividing each by their greatest common divisor. |

The following auxiliary procedures are also required.

| | |
|---|---|
| DIVISOR [a b] | Return an integer which is the greatest common divisor of positive integers $a$ and $b$ (employs a variation of Euclid's algorithm). |
| REDUCE2 [a b] | Perform actual reduction after REDUCE checks for errors and prepares fraction. |
| ADDFRACS [a b] [c d] | Add the fractions yielding [ad + bc bd]. |
| MULFRACS [a b] [c d] | Multiply the fractions yielding [ac bd]. |
| EXPONENTIATE [a b] c | Perform exponentiation after EXPF checks for errors and adjusts for exponent sign. |

Note that DIVISOR could have been written much more elegantly using recursion, but certain input fractions

# // Fractions *continued*

would cause so many recursive calls that an *OUT OF SPACE* error would result. The iterative version presented here uses a fixed amount of space while executing and is also considerably faster than its recursive equivalent.

To appreciate the power of these procedures, type in the following example:

```
ADDF [7 8] DIVF [-2158 3237] EXPF [3 2] -2
```

which is equivalent to:

```
(7/8) + (-2158/3237) / ((3/2)^-2)
```

You should get back [-5 8] for an answer. Throw in some even nastier fractions, and it will become apparent that what's nearly impossible to solve by hand is a trivial problem using the computer.

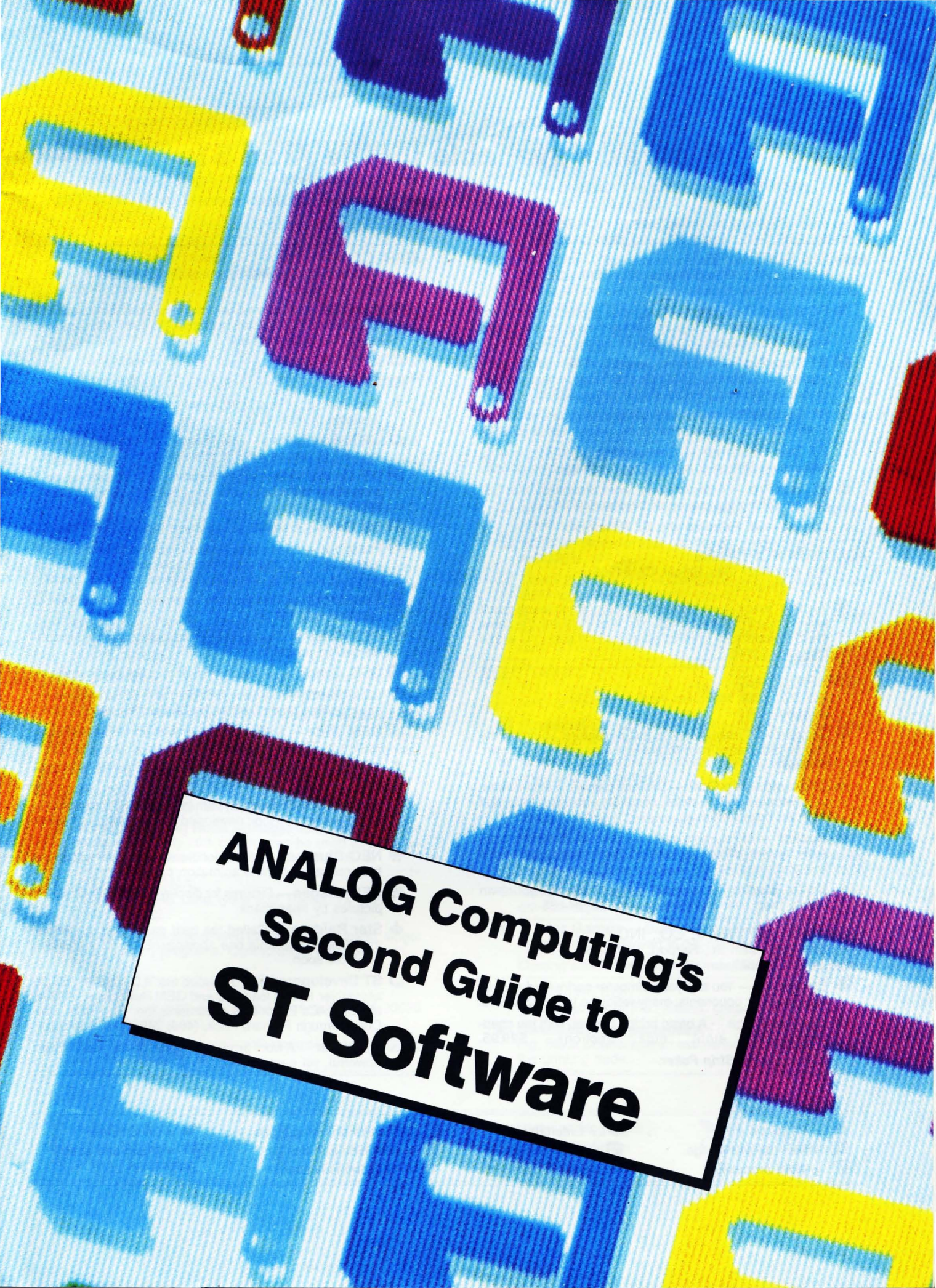
---

*F. Neil Simms has his M.S. degree in Computer Science and is a software designer for a research firm in Raleigh, North Carolina.*

> ***Attention:*** **In this listing, the exclamation points at the end of program lines shouldn't be typed in. They are there to indicate that the statement wraps around to the next line.**

Listing 1.
Logo listing.

```
TO POWER :X :N
IF (:N = 0) [OP 1] [OP PRODUCT :X PO!
WER :X :N - 1]
END

TO ADDF :X :Y
OP REDUCE ADDFRACS :X :Y
END

TO SUBF :X :Y
OP ADDF :X LIST (PRODUCT -1 FIRST :Y!
) LAST :Y
END

TO MULF :X :Y
OP REDUCE MULFRACS :X :Y
END

TO DIVF :X :Y
OP MULF :X INVERT :Y
END

TO EXPF :Y :EXP
IF NOT (((ROUND :EXP) - :EXP) = 0) [!
PR [Exponent must be an integer] STO!
P]
IF :EXP = 0 [OP [1 1] STOP]
IF :EXP < 0 [MAKE "Y INVERT :Y OP RE!
DUCE EXPONENTIATE :Y (PRODUCT -1 :EX!
P)] [OP REDUCE EXPONENTIATE :Y :EXP]
END

TO INVERT :X
IF ABS (FIRST :X) = 0 [PR [Error: De!
nominator will = 0] THROW "TOPLEVEL]
OP LIST LAST :X FIRST :X
END

TO ABSL :X
OP IF EMPTYP :X [:X] [IF (FIRST :X) !
< 0 [FPUT (PRODUCT -1 FIRST :X) ABSL!
 BF :X] [FPUT FIRST :X ABSL BF :X]]
END

TO REDUCE :X
IF ABS (LAST :X) = 0 [PR [Error: Den!
ominator = 0] OP "STOP]
IF ABS (FIRST :X) = 0 [OP [0 0] STOP!
]
IF (LAST :X) < 0 [OP REDUCE2 LIST (P!
RODUCT -1 FIRST :X) (PRODUCT -1 LAST!
 :X) STOP]
OP REDUCE2 :X
END

TO DIVISOR :X
MAKE "F FIRST :X
MAKE "L LAST :X
IF :F = 0 [OP :L STOP]
REPEAT 9999 [REPEAT 9999 [IF :F = :L!
 [OP :F STOP] [IF :F > :L [MAKE "F :!
F - :L] [MAKE "L :L - :F]]]]
END

TO REDUCE2 :X
OP LIST (FIRST :X) / (DIVISOR ABSL :!
X) (LAST :X) / (DIVISOR ABSL :X)
END

TO ADDFRACS :X :Y
OP LIST (SUM (PRODUCT FIRST :X LAST !
:Y) (PRODUCT LAST :X FIRST :Y)) (PRO!
DUCT LAST :X LAST :Y)
END

TO MULFRACS :X :Y
OP LIST (PRODUCT FIRST :X FIRST :Y) !
(PRODUCT LAST :X LAST :Y)
END

TO EXPONENTIATE :X :EXP
OP IF :EXP = 1 [:X] [EXPONENTIATE (M!
ULF :X :Y) (:EXP - 1)]
END
```



# ANALOG Computing's Second Guide to ST Software

# Programs available for the Atari STs

## ABACUS SOFTWARE

P.O. Box 7211, Grand Rapids, MI 49510
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- **PC Board Designer** — Automates printed circuit board design, allowing you to fully edit any board, then print the image to an Epson or compatible printer. $395.00.
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- **ST Forth/MT** — Multi-tasking implementation, with complete TOS and Line-A commands, many utilities. $39.95.
- **ST Text Designer** — Creates page layouts from word processing files to output to Epson compatibles. $39.95.
- **ST TextPro** — A professional word processor with full-screen editing via mouse or keyboard. $39.95.

*Coming—**ST PaintPro** and **ST AssemPro**.*

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## ACTIVISION, INC.

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## ARTWORX SOFTWARE CO., INC.

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- **Bridge 4.0** — You and your computer partner bid against two computer opponents; many welcome features. $29.95.
- **Compubridge** — A basic bridge tutorial, with ten chapters and eight quiz sections. $29.95.

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## ATARI CORP.

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- **Atari Planetarium** — An advanced astronomy package with a wealth of information on planets, stars, galaxies and deep-sky objects. $49.95.
- **Atari ST BASIC** — Free with ST purchase.
- **Atari ST LOGO** — Included with the ST.
- **Centipede** — This arcade look-alike is scheduled to be available in mid- to late summer.
- **CP/M Emulator** — This program by Softronics allows your ST to run as a CP/M system.
- **DB Master** — Written by Stoneware, this is based on a bestselling database, with two levels of filing systems. $49.00.
- **DB One** — A simplistic database included with the ST.
- **Fastcom** — Feature-packed communications software to access all major information database systems, via a wide range of modems; specially designed for GEM. $69.00.
- **First Word** — This recently updated word processor is included with the ST.
- **GEM Draw** — Digital Research's object-oriented graphics design program.
- **GEM Graph** — A graphics projector for businesses.
- **GEM Paint** — A painting program with GEM features for any graphics mode; written by Digital Research. $49.95.
- **GEM Write** — A word processor with enhanced features; written by Digital Research. $99.95.
- **Joust** — Just like the popular arcade game, available soon.
- **Music** — A MIDI music system to turn the ST into a professional musician's tool; developed in cooperation with Rising Star.
- **NEO-Chrome** — A full-color drawing program with many features, among them animation capability.
- **NEO Images** — Pictures for display using **NEO-Chrome**; pictures by Imagabank.
- **Star Raiders** — Called the best game ever written for the 400/800 line, this one showcases the ST's abilities, available soon.
- **ST Developers Kit** — Included are: a C compiler, 68000 assembler, linking loader, C and GEM library files, utilities, MicroEMACs Editor and documentation. Only from Atari Corp. through Richard Frick, (408) 745-4926. $300.00.
- **ST Writer** — A word processor based on the **AtariWriter**; powerful, yet easy to use.

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**3-D Interiors** — An interior decorating package, complete with pictures for use with **NEO-Chrome**.

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**DEGAS** — A drawing/design program packed with features, capable of working in any of the ST's three resolution modes. $39.95.

**HomePak** — The ST version of the popular 400/800 program; Russ Wetmore's all-in-one database, word processor and terminal program. $69.95.

**The Isgur Portfolio System** — Designed by Lee S. Isgur of Paine Webber, Inc., this portfolio management system can track stocks, bonds, and more. About $249.95.

**PaperClip Elite** — The popular word processor comes to the ST, with many more features.

BAY VIEW SOFTWARE
177 Webster St., Suite A-295
Monterey, CA 93940
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**Word For Word** — A Scrabble-like game; you design the shape, size and layout of the board, with up to three other players (or the computer) as opponents. $39.95.

BECKEMEYER DEVELOPMENT TOOLS
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**Micro Make** — Automatically builds programs, creates batch files and executes compiler/linker directly. $34.95.

**Micro C-Shell** — A Unix-style C shell with aliases, batch files and I/O redirection. $49.95.

**Micro C Tools** — A collection of Unix-style software tools for text editing and debugging. $24.95.

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**Bitmap Coloring Book** — Images from design and style books of the early 20th century can be used as a "coloring book," or for editing or manipulation. $18.95.

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**FORTH Accelerator** — An optimizer compiler for **4xFORTH**. $75.00.

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# C-MANSHIP

by Clayton Walnum

This month, as I promised, we'll get busy designing our own input routines. We're no longer going to suffer with the limitations of such library routines as scanf(). And, to add a little spice to the proceedings, how about learning a little about disk file handling?

First, though, I've got a letter I thought was worth passing on. James Hague writes:

> ...you mentioned that braces are not necessary if a single statement follows an if...else, while, or for. It's worth noting in your column that the single statement may be an entire if...else, for, or while construct. For example:

```
while (!y)
   if (x==4)
      for (i=0; i<10; ++i);
```

Jim is absolutely correct. Even though the above seems to be many statements, it's considered only one. We could have even added a brace to the for statement and followed it with as many substatements as we wished—and it would still be a single while statement. Thanks, Jim.

### Moving along.

Listing 1 is this month's sample program. Type it in and compile it. If you need help, see the sidebar at the end of this article. The program is an embarrassingly simple text editor. When you run it, you'll be asked for a filename. If the filename you enter already exists on the disk, you'll be asked if you wish to delete it. If you answer *Y*, the file will be deleted and a new one created. Any other response will let you select a different name.

The text is entered one line at a time. When you reach the right margin (medium resolution), press RETURN for the next line. If you try to type beyond the right margin, the program will automatically terminate the line. You'd be wise to avoid this, since the last character you typed will be lost. You should also check each line for typos before pressing RETURN. There are no editing features.

Press CTRL-Z (that's the CONTROL key and the *Z* simultaneously) to close the file. You may then print or view the text from the GEM desktop, by double-clicking the file you created.

### The innards.

There's nothing fancy going on in this program—a couple of new functions to learn and, most importantly, a new method for accepting input. No more scanf() or gets(). From now on, every key will be under our control.

First take a look at the #define statements at the top of the program. MAX is the length limit for each line. RETURN, BACKSP, and CTRL-Z are the ASCII values for some of the keys we'll be checking for in our input routine. Don't pay any attention to NOFILE right now; we'll get to that later. Notice, also, that here we're declaring an integer variable, code. Since it's defined outside of any function, it's a global variable—one we may access from anywhere in the program.

If you look at the function main(), you'll see that we've declared two character arrays, filename[] and text[]. The first will hold the name of the disk file we'll be working with; the second will store each line of text as it's typed.

The body of main() consists of only three statements. These represent the activities we must complete to create

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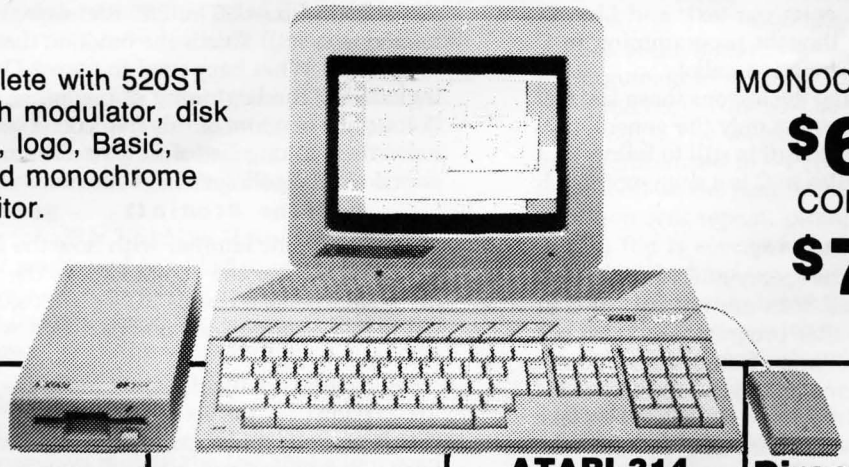

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our text file. The function call at Line 13 will open our file; Line 14 will allow us to enter our text; and Line 15 will close the file. And you thought programming in C would be tough. Only three function calls!

Well, if you've been following the lessons these last few months, you're aware that main() is only the general outline of the program; the trickier stuff is still to follow. But don't get panicky. Handling files in C is a snap, not much tougher than in BASIC.

### Doing it our way.

In the past, we've been at the mercy of C's built-in I/O functions. Actually, these functions are not part of C at all. They're small routines other programmers have put together, then gathered into a library for our convenience. It's nice to have these functions lying around in case we need them, but there's always a price to pay when you take a shortcut. The price is a loss of flexibility.

If we use library functions like scanf() and gets(), we have to follow the rules somebody else made up. Frequently, these rules will be at odds with what we wish to accomplish. The solution? Write our own input routines, using our own set of rules.

This might sound a bit scary, but, depending on how fancy you want to get, there's really nothing to it. For our simple text editor, we don't need to convert strings to decimal values, or perform any of the other tricks a complete input routine must be capable of. All we have to do is let the user type in one character after another, terminating his line with a RETURN.

In Listing 1, down near the bottom, you'll see a function called get_str(). This is our input routine. The body of the function is only sixteen lines long—a veritable piece of cake. As you can see by the function declaration, get_str() receives one argument from the calling function: the address of the character array where we wish the string stored.

We start off at Line 55 by initializing p, our array index, to *0*. Then, in order to slip neatly into the while loop at Line 56, we get our first character from the console, utilizing one of the GEMDOS functions, conin (console in).

### Huh?

What's all this GEMDOS stuff? The ST's operating system (OS) is called TOS, right? It even says so right there on my old boot disk. *T-O-S*.

Well, TOS is an incredibly complex animal, made up of two main parts: the BIOS (Basic Input/Output System) and GEMDOS (actually, there's also the XBIOS, but that's just an extension of the BIOS). The BIOS is the lowest level in the OS, and handles all the ST's primary input/output functions.

You can think of the BIOS as the software that runs the hardware, the meat in the sandwich between GEMDOS and all those data buses and microchips. GEMDOS provides the programmer with convenient access to the BIOS.

GEMDOS supplies over fifty functions, of which conin is function number one. In upcoming installments of **C-manship**, we'll be exploring GEMDOS in more depth. For now, we're only concerned with conin.

### Back to the proceedings.

Notice in Lines 56 and 66 that we're calling a function named Cconin(). This is the function that will get us those keystrokes. What happened to conin? One of the files we included at the beginning of our program was osbind.h. If you get a printout of this file, you'll see that it's nothing more than a long list of #define statements. About halfway down, you'll see this statement:

```
#define Cconin()    gemdos(0x1)
```

You should be familiar with how the #define statement works. Wherever the compiler sees the word Cconin() in our source code, it'll substitute gemdos(0x1). The word conin is just a name someone came up with for GEMDOS function 1.

To access this function we must use the call gemdos (0x1). (Don't let the *0x* in front of the function number throw you off. It just means the number should be interpreted as hexidecimal, rather than decimal.) Using names like Cconin() for GEMDOS functions reminds us of what the function does. We could have put the call gemdos(0x1) directly into our source code and not bothered with including osbind.h.

### The secret life of conin.

In order to use conin effectively, we have to know exactly what it does. If you look at Line 56, you see that the function call appears to be the same as any other we've used. The value returned by Cconin() is placed into the integer variable code, right? Well...sort of.

Conin() actually returns a long word, 32 bits of information we must sort out. The ASCII code of the key pressed is stored in the low byte of the low word, and the scan code of the key pressed is stored in the low byte of the high word.

Hmmm. . .I think I feel a diagram coming on. Yep. Figure 1 illustrates what we get from Cconin() if we press the *A* key. The ASCII for *A* is *65* (41 hex), or, in binary, *01000001*. See it in the rightmost byte?

The scan code for the *A* key is *29* (1D hex). In binary, this would be *00011101*. There it is in the high word. The scan code indicates only what key has been pressed. You'll get the same scan code whether or not you're typing an upper- or lowercase letter.

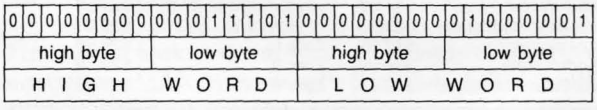


**Figure 1.**

For the moment, we won't be doing anything with the scan codes. These are necessary for keys that don't have an ASCII value, like the function keys. Since code in Line 56 is an integer, all we get is the low word of Cconin()'s RETURN, or the ASCII value of the key pressed.

### A bit of construction.

We now have all the information we need to build our own string input routine. The function get_str() begins on Line 51. All this function does is get characters one by one and place them in successive bytes of the character array. There's a small complication, however. Several

keys have special functions. RETURN ends a line; CTRL-Z closes the file; and the BACKSPACE key allows the user to correct mistakes. We'll have to check for these keys as the user types.

At Line 55, we initialize the array index p. We then get our first character, and slip into the while loop that follows. The loop conditionally checks for a RETURN or a CTRL-Z, and makes sure we haven't gone past the end of our array.

Line 58 checks for a BACKSPACE. If we didn't get one, the character that was typed is added to our array text[]. Line 59 accomplishes this, as well as incrementing the index p (notice that p is being post-incremented; that is, the array is first indexed by p, then p is incremented). Program execution then drops down to Line 66, where we get our next keystroke.

If a BACKSPACE is entered and we have at least one character in the array, we replace the last character typed with a null (Line 62). We also have to adjust the screen display. This is done in Lines 63 and 64. Since the cursor was moved on top of the last character in the line when the BACKSPACE was typed, all we have to do is print a space (Line 63), then place the cursor back in its proper position by printing a BACKSPACE to the screen (Line 64).

Sooner or later, the user will type a RETURN to end a line, or a CTRL-Z to close the file, at which point we exit get_str().

### Disk files.

Fortunately for us struggling programmers, the makers of the C compiler have supplied many functions for handling disk files. Four of these functions concern us at the moment. They are: open(), creat(), write() and close().

The function open() opens a file already in existence. It requires two arguments: the address of the filename and the type of access required. The latter may be one of three values: *0* (read only), *1* (write only), or *2* (read and write).

The open() function also returns a value. If it encounters an error and fails to open the file (the file didn't exist), it'll return a *-1*. Now you know why I defined NOFILE at the top of the program equal to this value. If the file is opened successfully, the function will return a file descriptor. We'll use this number whenever we wish to access the file.

The function creat() starts a new file and also requires two arguments: the address of the filename and a dummy value. If, when you call this function, the file you wish to start already exists on the disk, the file's pointer will be moved to the beginning of the file, effectively deleting it. Just like open(), a *-1* is returned in the case of an error, or a file descriptor if successful.

The function write() saves data to a file. It requires three arguments: the file descriptor, the buffer starting address (where the data is stored) and the number of bytes to write. A successful write will return a value equal to the number of bytes actually written. Otherwise, a *-1*, indicating an error, will be returned.

The function close() closes a file and requires the file descriptor as its argument. If the file is closed successfully, a *0* will be returned. An unsuccessful close, meaning you used an unknown file descriptor, will yield a *-1*.

### Starting our file.

Look at the function start_file() in Listing 1. It receives one argument from main(), the address of the character array filename[]. This will be the first argument for open() and creat(). The variable file will hold our file descriptor and is initialized to *-1* (Line 21), so we can get into the while loop on the next line. As long as file is equal to *-1*, this loop will repeat, prompting the user for a filename until a file is successfully created.

Within the loop, we print a prompt, then call get_str() to allow the user to input the filename. At Line 25, if the file descriptor we receive from open() equals *-1*, then we know the file doesn't already exist, so we go ahead and create it (Line 26).

If we get a value other than *-1*, it means there's already a file by that name on the disk, and the program continues at Line 27. Here we reinitialize the file to *-1*, then ask the user if he wants to delete the file. If he answers yes, the old file becomes the new file (Line 31), otherwise the loop repeats, asking for another filename.

### Writing our file.

Now, let's study the function get_text() in Listing 1. You should have little difficulty figuring it out.

First we prompt the user to input his text, then we initialize code (the global variable that'll contain the ASCII value of each keystroke) to *0*. We then call get_str(), to get the first line of text. This function will return the number of characters typed.

In Lines 46 and 47, a carriage return and a null are added to the string (otherwise, when we try to print the file, the lines will be concatenated). Finally, in Line 48, we write the text to disk.

We repeat the while loop until code equals *26* (a CTRL-Z), at which point the function terminates, and the file is closed at Line 15.

### Simple, but cute.

So there you have it. There's not much to this program, but it can be useful for creating small README.DOC files for your disks. It's certainly easier than loading up a full-fledged word processor when all you want to do is type in a couple of lines. Maybe you could use it to type a short note to the struggling author of **C-manship**.

**Listing 1.**
**C listing.**

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

#define RETURN 13
#define BACKSP 8
#define MAX 78
#define NOFILE -1
#define CTRL_Z 26

int code;

main()
{
   char filename[15], text[MAX];
   int file;
```

```
    file = start_file(filename);
    get_text(file, text);
    close(file);
}

start_file(filename)
char filename[];
{
    int file, ch;

    file = NOFILE;
    while (file == NOFILE) {
        printf("\nFilename: ");
        get_str(filename, 14);
        if ( ( file = open(filename,2) ) == NOFILE )
            file = creat(filename, 0);
        else {
            file = NOFILE;
            printf("File already exists!  Delete it? ");
            if ( (ch = getchar() ) == 'Y' || ch == 'y' )
                file = creat(filename, 0);
        }
    }
    printf("\n");
    return(file);
}

get_text(file, text)
int file;
char text[];
{
    int p;

    printf("Type your message:\n\n");
    code = 0;
    while (code != CTRL_Z) {
        p = get_str(text);
        text[p++] = '\n';
        text[p] = '\0';
        write(file, text, p);
    }
}

get_str(text)
char text[];
{
    int p;

    p = 0;
    code = Cconin();
    while (code != RETURN && code != CTRL_Z && p <= MAX) {
        if (code != BACKSP) {
            text[p++] = code;
        }
        else if (p > 0) {
            text[--p] = '\0';
            putchar(' ');
            putchar(BACKSP);
        }
        code = Cconin();
    }
    printf("\n");
    return(p);
}
```

### C-manship Compiler Tutorial.

All the program listings in **C-manship** were written using the ST Developers Kit from Atari. Many of you who've recently received this package may be a little confused as to how to compile and run the programs (I know I was). For those nodding their heads in agreement, I've put together this quickie tutorial.

The first thing you must do is create the proper batch files for both the compiler and linker. LOAD your text editor and type the following exactly as it appears here:

```
cp68 %1.c %1.i
c068 %1.i %1.1 %1.2 %1.3 -f
rm %1.i
c168 %1.1 %1.2 %1.s
rm %1.1
rm %1.2
as68 -f -l -u %1.s
rm %1.s
wait.prg
```

When you're sure you've typed it correctly, SAVE it to your compiler disk under the name CC.BAT.

Now clear the previous text from memory and type in this batch file:

```
link68 [u] %1.68k=gemstart,%1,gemlib,libf,osbind
relmod %1 %1.tos
rm %1.68K
wait
```

Check your typing well, then SAVE it to your linker disk under the name LINK.BAT.

Now you're ready to compile any of the listings from **C-manship**. We'll use Listing 1 from this installment as an example.

#### Single-drive compilation.

(1) Use your text editor to type in Listing 1, then SAVE a copy of this—under the name INPUT.C—to both your compiler disk and a backup disk.

(2) Place the compiler disk in your drive and double click the drive A icon.

(3) Double click the BATCH.TTP program, and enter *CC INPUT* into the parameter window, concluding the entry by pressing RETURN.

(4) After the compiler has finished, there should be a file named INPUT.0 on your compiler disk. Copy this file to your linker disk.

(5) Place the linker disk in your drive and double click the drive A icon.

(6) Double click the file BATCH.TTP, and enter *LINK INPUT* into the parameter window.

(7) When the linker has finished, the file INPUT.TOS should be on the disk. This is the executable version of the program. To RUN it, simply give it a double click.

#### Two-drive compilation.

(1) Use your text editor to type in Listing 1, then SAVE it to disk under the name INPUT.C.

(2) Place your compiler disk in drive A and your source disk (the one you saved the program to) in drive B.

(3) Double click the drive A icon.

(4) Double click the BATCH.TTP program, and enter *CC B:INPUT* into the parameter window, concluding the entry by pressing RETURN.

(5) When the compiler has finished, replace the disk in drive A with your linker disk.

(6) Double click the drive A icon.

(7) Double click the BATCH.TTP program and enter *LINK B:INPUT* into the parameter window.

(8) When the linking is complete, your source disk will contain the file INPUT.TOS. This is the executable version of the program. RUN it by giving it a double click.

The above instructions will work with all the C program listings presented thus far in **C-manship**. Only the filenames you use must be changed.

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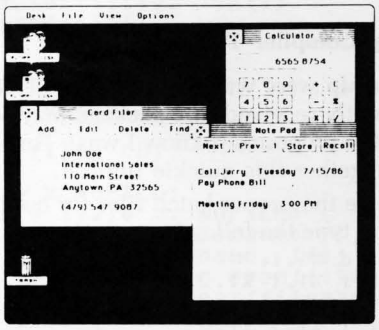


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Pascal and Modula-2 source code are nearly identical. Modula-2 should be thought of as an enhancement to Pascal (they were both designed by Professor Niklaus Wirth).

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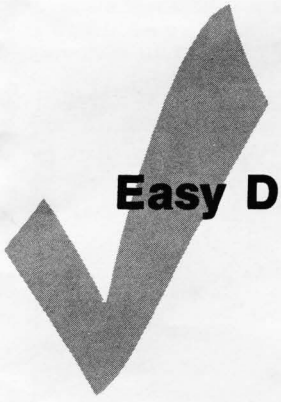

# Easy Draw

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**by Arthur Leyenberger**

Digital Research's Graphics Environment Manager (otherwise known as GEM) is unquestionably an easy-to-use interface. From the time Atari first announced the ST and GEM, in January 1985, users looked forward to having GEM-based software for the computer. Unfortunately, the majority of ST software has—so far— failed to live up to its promise.

From a user's point of view, there are two levels of GEM software. What I call GEM software are programs that take advantage of the icons, drop-down menus and mousing capabilities of the computer. Output is typically self-contained within the application program, and the programmer has complete freedom to do what he or she likes.

"True-GEM" software describes programs using the *entire* Digital Research GEM system. This includes relinquishing output control to GEM, using all the built-in overhead of GEM, and resembling the version of the system designed for the IBM PC and compatibles.

MichTron's **Mi-Term**, Haba's **Habawriter** and Atari's **1st Word** are all GEM programs. **Easy Draw** from Migraph is the first true-GEM program for the Atari ST. That's reason to both rejoice and curse, as you'll see.

**Easy Draw** is a new, professional drawing program for the ST. It's billed as a professional program because it provides the user with much more power than conventional painting programs like **DEGAS** and **NEO-Chrome**.

In those pixel-oriented programs, you actually control the pixels on-screen. Each thing you paint obliterates everything it covers, because an individual pixel can only be on or off.

In a drawing program, you create figures or elements, each with its own "layer." Thus, elements can be stacked on top of one another, much as you would stack sheets of paper. So, even though one element covers another, it merely blocks the previous occupant.

Because they're separate entities, the elements can be made transparent. In this way, the "hidden" elements can show through. They may be grouped together with other elements to form new pieces, or they may be moved, copied and ungrouped.

Another distinction between painting and drawing programs is in their structure. **Easy Draw** presents a drawing surface very much like a drafting table with graph paper as an integral part of it. The size of the graph's squares can easily be changed as needed, for finer or coarser measurements.

This grid does more than just show relative position. As a central part of the structure, its markings govern the movement, sizing and control of the elements.

Still another difference between the two types of programs is the size of the files they'll create. A program like **DEGAS** in its high-resolution mode requires 32-thousand-plus bytes to store the screen image. Regardless of whether a **DEGAS** picture is simple (even a single dot) or complex, the same size file is required to store it.

A drawing program like **Easy Draw** doesn't require a fixed-length file. The file's size depends on the number of elements in the drawing. The more complex the drawing, the more elements it has, and the larger its file.

The amount of available RAM also has an impact on the size of the drawings. Using a 520ST with TOS on ROM, approximately two thousand separate elements can be created. A 1-megabyte ST, either a 1040 or an upgraded 520, can contain about twelve thousand elements.

**Easy Draw** provides a variety of drawing tools, to create geometric shapes (squares, rectangles, circles, wedges, ellipses, arcs, straight lines and free-hand lines). The program also has a text feature, to add titles, labels, notes and legends to your drawings. In addition, thirty-nine predefined patterns plus a make-pattern option are available.

Using **Easy Draw** to create a computerized drawing is as simple as following a few steps, then repeating the process. Once the program is run, you're given a drawing screen with ten drop-down menu labels on the top line. To the left of the drawing screen are two icons: a clipboard for copying figures and a trash can for deleting.

Pressing the right mouse button displays a pop-up menu, from which you choose one of twelve drawing tools. A figure is drawn with the left mouse button, positioned with the mouse, then pasted down by pressing the right button. After drawing, you can add or change the color and pattern, or alter the line width and style to suit your purpose. That's all there is to it.

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screen, you can manipulate one, several or all of them. Whenever figures are selected, a highlight box appears around them, to indicate that whatever manipulations you do will be performed on them.

**Easy Draw** uses the standard GEM window, which can be sized or scrolled vertically and horizontally. In addition, a second window can be opened. From this, you can cut and paste figures, or compare an original drawing with a modified version.

While drawing, you can select the "zoom" function to expand a part of the drawing to fill the whole window. Other such functions include: full page, which shows how the drawing will look on the page; normal, to return to the standard view; and last, which lets you go back to the previous view—before you zoomed in on an area.

Figures can be rotated 90 degrees at a time, shadowed to add a three-dimensional look, placed in front or in back of another figure, or grouped together. A number of alignment options allow figures or text to be left- or right-justified and centered vertically or horizontally within another figure.

Text can be entered in four heights (10, 14, 18 and 36 points) and can be displayed as bold, light, italic, outlined, or underlined. It's as easy to modify existing text as it is to initially place it on the drawing.

For several months, I've been a heavy user of GEM Draw on an IBM-compatible computer. It's proven a workhorse for me, but there *are* times when I wish it had a few more features. **Easy Draw** has a number of features that GEM Draw doesn't.

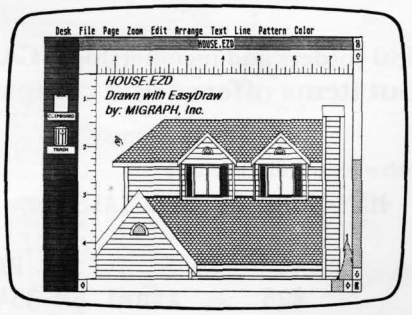
GEM Draw provides only one command to change both the size and shape of a figure. Often, when I want to proportionally enlarge or reduce a whole figure, I accidentally stretch it—and lose the original shape. One of the greatest improvements **Easy Draw** has over GEM Draw is the provision of two commands for sizing and stretching. There's no way to ruin the shape of an element while trying to size it.

**Easy Draw** has a number of other advantages over GEM Draw, including: figure rotation, the ability to let a user define a pattern, a user-changeable arc angle and the ability to merge two drawings. Further, the program always tells you the number of figures available. You *know* how much room you have left.

**Easy Draw** is not copy-protected, so you can make backups and not have to worry about trashing your only copy of the master disk. Please don't abuse this by giving or receiving copies of the program. You'd be helping to jeopardize the entire ST software market.

Although **Easy Draw** isn't protected, it's difficult (if not impossible) to use the program on a hard disk. All the files can be transferred to a hard disk, but the program always looks to drive A for the various GEM files needed to begin. So running it on a hard disk won't speed things up.

Further, the program is so large that, on a stock 520ST with TOS in ROM, you can't have any desktop accessories except the control panel (a 1040ST would make use of **Easy Draw** much easier). This makes it




**Easy Draw.**

a hassle—you must eliminate any accessories from the hard disk before you run the program.

Another negative aspect is a result of the full use of GEM. Two copies of each drawing are stored on disk, because GEM expects files for output to be in a certain format. Those with a *.GEM* extension are output files, whereas *.EZD* files are editable. You can't edit *.GEM* files or print *.EZD* files. *(However, see the addendum, below.)*

GEM Draw uses *.GEM* files. On the PC, only one file is needed; it can be edited or printed. Unfortunately, GEM Draw's files can't be manipulated by **Easy Draw**.

A problem **Easy Draw** shares with GEM Draw is the inability to abort printing once started. Both programs use the GEM output routines created by Digital Research.

Overall, **Easy Draw** is an easy, fun-to-use, versatile drawing program, allowing you to create drawings primarily with geometric shapes. But it is by no means limited to squares and circles.

With some creative thinking, you can make outlines, sample forms, vugraphs and flowcharts. Of course, you can use it to produce organizational charts, office furniture arrangements, architectural elevations and floor plans.

**Easy Draw** is truly a professional program, limited only by your own imagination. Once you have it, you'll continue to find uses for it. If you need this kind of capability, it may be worth buying an ST just to be able to use **Easy Draw**.

---

*Here's some updated information I recently received from Kevin Mitchell, President of Migraph. If you use **Easy Draw** now, or are thinking about getting it, I believe you'll be as excited as I am.*

As described above, **Easy Draw** has been using a dual file format (extensions *EZD* and *GEM*) for drawing and print files. As of July 1, version 1.1 of **Easy Draw** will no longer use this dual file format. That means you'll be able to fit more drawings on each disk, because files aren't duplicated; and—get this—there will be compatibility with GEM Draw files, produced on an IBM PC or compatible.

The compatibility will go both ways. A file you create with **Easy Draw** on an Atari ST can be transferred to an MS-DOS computer, and will load correctly into GEM Draw on that machine. Now I'll be able to create drawings with Easy Draw and transfer the files to my PC at work.

Another item Kevin mentioned was that **Easy Draw** now supports the Gemini 10X printer. The obvious question at this point is: how do I get the new program if I already own **Easy Draw**?

The answer's simple: Migraph will be making a conversion program available. It will modify the existing version of **Easy Draw**, allowing it to use the Gemini printer. This will be freely available on CompuServe and BBSs, and through user groups across the country.

This goes for the conversion program *only*, not **Easy Draw** itself. Selling, giving or receiving a copy of **Easy Draw** is illegal, immoral and could jeopardize the ST's software market.

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| PCA - The Graphic Artist | 310 |
| - The Graphic Artist Lang. | 169 |
| Prospero - Pro Fortran 77 | 87 |
| Quikview - Zoomracks | 44 |
| TDI - Modula 2 | 46 |
| - UCSD Pascal | 40 |
| Unison - Printmaster | 21 |
| - Art Gallery | 16 |
| VIP - Professional | 102 |
| VersaSoft - dB Man | 59 |

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| Atari SM 314 DS Disk Drive | 200 |
| Casio CZ-101 MIDI syn. with cab. | 270 |
| SLC - Logikhron Clock Card | 29 |
| Supra - 20 Meg Hard Disk Drive | 780 |
| Blank Disks (3.5") - | |
| Maxell/10 Box SS DD | $16 |
| Fuji/10 Box SS DD | 17 |
| SKC/10 Box SS DD | 15 |
| BASF/25 Bulk DS DD | 54 |
| Hippo ST Sound Digitizer | $99 |
| Hippo EPROM burner | 99 |
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Hardware S/H are included in price.

## ST Hardware

(Please add shipping and handling charges found in brackets.)

| | |
|---|---|
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| 520 ST, Monochrome, ½ MEG Drive | $620 (40) |
| 520 ST, Monochrome, 1 MEG Drive | 700 (40) |
| 520 ST, RGB, ½ MEG Drive | 770 (40) |
| 520 ST, RGB, 1 MEG Drive | 850 (40) |
| 1 MEG DRIVE | 198 (15) |
| ½ MEG DRIVE | 160 (15) |
| Keyboard, mouse, ½ MEG Drive | Call |
| Keyboard, mouse, 1 MEG Drive | Call |
| Monitor, RGB | 400 (25) |
| Monitor, Monochrome | 175 (25) |
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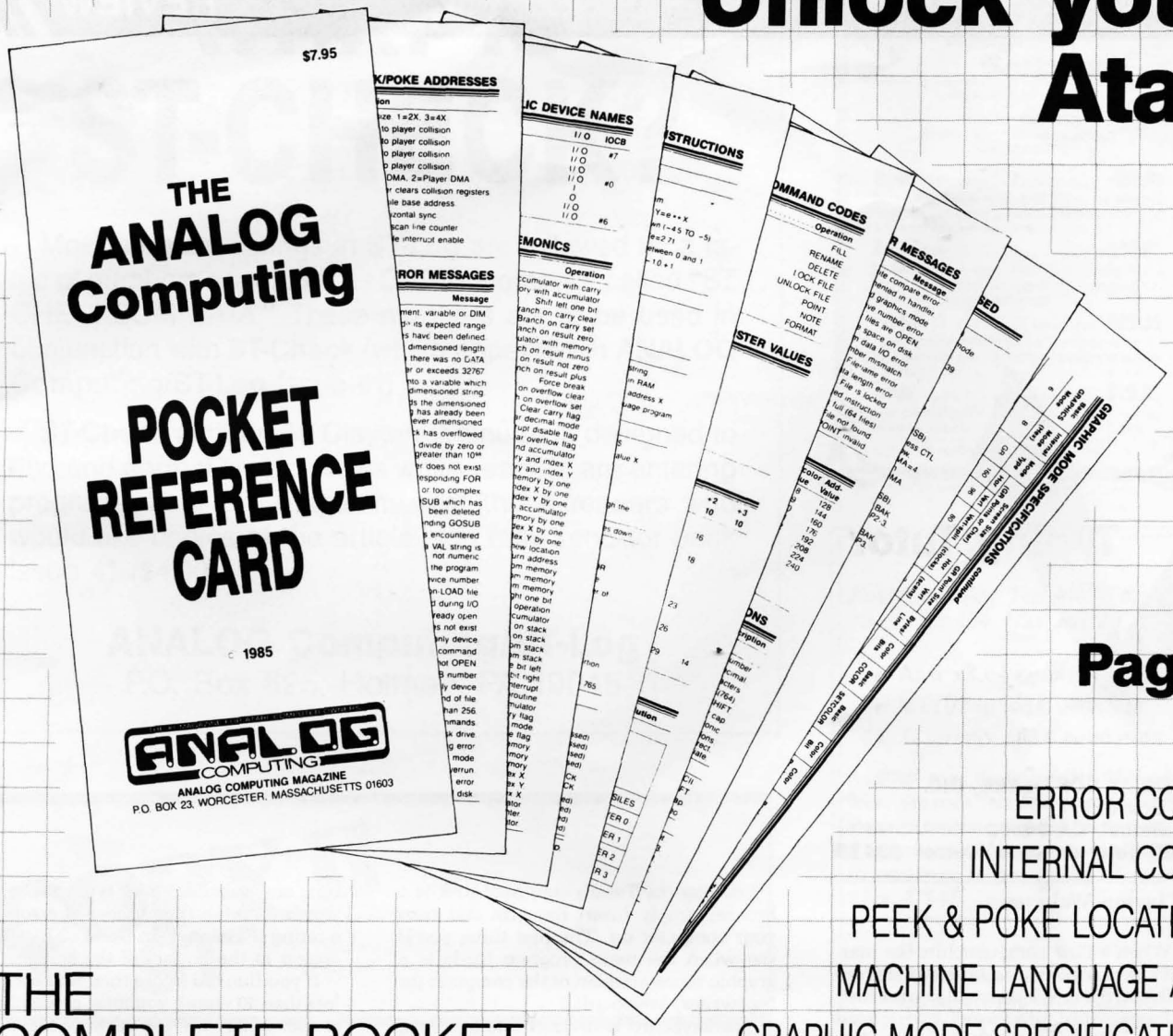


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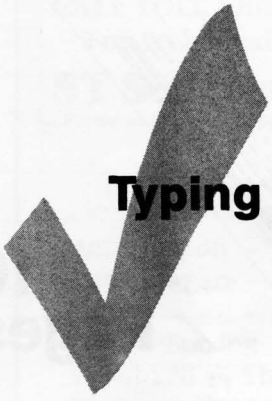


# Typing Tutor

**ACADEMY SOFTWARE, INC.**
**P.O. Box 6277**
**San Rafael, CA 94903**
**520ST, Color or Monochrome $34.95**

**by Clayton Walnum**

When a new computer hits the market, it's always interesting to see what types of software the developers will market first. Databases, word processors and spread sheets inevitably leap to the top of the list, followed closely—especially in the ST's case—by adventure games. Once the public's desire for these classic offerings has been satisfied, many suppliers turn their efforts toward educational software.

Repeat after me: rationalization is a wonderful thing.

What's my point? Well, remember when you purchased your first computer, how you kept telling yourself what a great *educational* tool the machine would be—even while your trembling fingers stretched toward **Star Raiders** and **Pac-Man**? And in that first stack of software, buried somewhere under **Zork** and **Asteroids**, wasn't there a copy of Atari's **Touch Typing**? Rationalization at its classic best.

With the ST, all this has come full circle. There's a brand new market, and never has the user had such a cornucopia of delights to pick from. There are dozens of great excuses to buy an ST. If you find yourself having to balance the purchase of **Sundog** with something to assuage your throbbing conscience, you could do a lot worse than pick Academy Software's **Typing Tutor**.

Loading the **Tutor**'s auto-boot disk is a breeze; simply insert the disk and turn your computer on. The first thing you'll see when the main program loads is a graphic representation of the computer (or typewriter) keyboard.

The keyboard is divided into sections, each a different color, indicating the correct finger usage for each key. Throughout your lessons, hitting the ESCape key will bring you back to this screen, allowing you to check finger positions or change program options.

**Typing Tutor** leads the beginning typist through a series of eight lessons, starting with learning the "home row" keys, right through the typing of full sentences—including upper and lower case letters, punctuation and the dreaded top row (numbers and all those other nasties lurking up there).

Each of the eight levels is divided into nine "pages," the ninth being an exam for that level. The screen displays the current level and page on either side of a small typing window containing three lines of text.

As you type, your input appears beneath the exercise text. If you make an error, the letter you typed will turn red. You'll also hear a short beep. You aren't allowed to correct your errors, but there's nothing in the manual forbidding cursing or the childish (but highly satisfying) striking of innocent, inanimate objects.

When you've finished typing, your efforts are evaluated. Your typing speed (in words/minute), the number of errors and a rating (Passing, Fair, Good or Excellent) appear at the bottom of the screen.

If you flunked (more than four errors or less than 10 wpm), you must repeat the exercise. Otherwise, you advance to the next page. The ninth page is an exam to test your abilities within that level. If you pass it, you go on to bigger and better things. If not, you must review the current level.

Once you've gotten past the second level, you've attained the skills necessary to begin battle against **Word Invaders**. In this bonus game, an alien ship empties its cargo of dictionary dropouts into the sky, perhaps in an attempt to conquer our planet, perhaps just to create litter and be a general nuisance.

In either case, each line of text moves inexorably downward, while you type with a vengeance, deploying your best key-tapping skills to rid the world of this Webster-style threat. You must clear the words from the screen before they reach the bottom (of course, one has to wonder how much damage the word *fork* can do, should it find its way past your barrage and into our cities).

The game has four levels of play (level one covers **Typing Tutor**'s lessons 1 and 2, level two covers lessons 3 and 4, etc.) and includes four speed settings. It's a simple, enjoyable test of your abilities.

**Typing Tutor** comes with a brief (12

# 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).

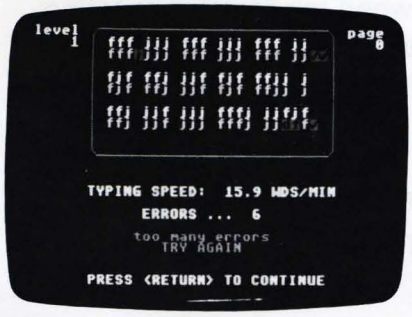
**ST-Check** (written by Clayton Walnum) is designed to find and correct typing errors when readers are entering programs from the magazine. For those readers who would like copies of the article, you may send for back issue 41 ($4.00).

**ANALOG Computing/ST-Log**
P.O. Box 625, Holmes, PA 19045

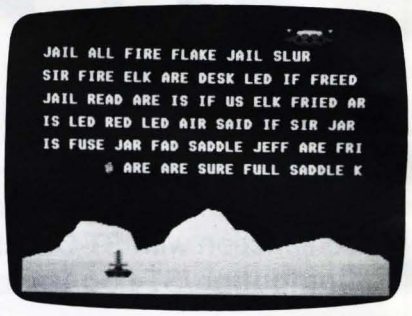
# // Review *continued*

pages, half of which are loading instructions and such) but complete manual. Each level is explained, including the keys covered and the proper finger techniques.

The only real complaint I have with **Typing Tutor** (other than a typo that got past the programmers—a bit ironic considering the subject matter) is that it doesn't allow the user to construct his own lessons. Because of this, the advanced typist will find little here for a challenge, though **Word Invaders** (which can handle up to 80 wpm) offers an addictive method for increasing speed.




**Typing Tutor.**




**Word Invaders.**

Many times, reviewing software can be a tedious and frustrating experience. One may find oneself with a notebook full of quirks and complaints that must be passed on to the potential buyer. In the case of **Typing Tutor**, I find my notepaper virtually bare. This is a fine—though not terrifically original—program, and I can recommend it without reservation.

And how effective is it? Let's see. Eyes forward. Fingers in place. *The quick brown fox on the meadow jumped over the lazy old dogs.* I did it!

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