#1 Guide To Atari ST

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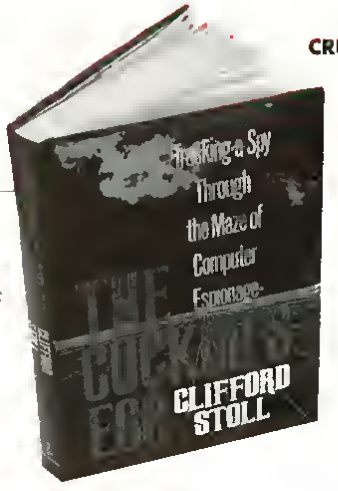

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–Jonathan Sachs, *Micro/Systems Journol*

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START
#1 GUIDE TO THE ATARI ST

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Editorial

It's a new decade, a new year — and time for a new team at START. This is my last issue as Editor. I will be joining several old friends to develop software for, well, how can I say this gracefully — blue computers. It's not a lack of faith in Atari's future that prompts this change, but a combination of a wonderful career opportunity and more time with my family.

Needless to say, I'm sad about leaving all of my friends at Antic Publishing and in the Atari community. But I feel comfortable leaving the reins of START in the hands of Tom Byron, who has served well as Associate Editor of START. Tom has been with the company for more than three years and is ready, willing and able to take over START.

I won't be leaving the Atari world, however. Tom has asked me to take on the position of Graphics Editor for START and I'm happy to accept. So you'll still see me around the pages of START in the future.

Our outstanding Programs Editor, Heidi Brumbaugh, has also left START to pursue her own career opportunities. She will be missed, especially by all of START's program authors who knew Heidi as that determined and knowledgable voice on the phone requesting bug fixes and copyright notices. START was very fortunate to find a superb replacement for Heidi. Amy Johnson is a programmer and journalist who adds a new dimension to the START staff.

We're also saddened to report the death of long-time Atarian John Anderson. His work for Creative Computing, Computer Shopper and the Atari Explorer was beyond excellent. His death occurred during the Loma Prieta earthquake last October 17th. Our sympathy goes out to his family.

Many people have called to ask how we at START weathered the earthquake. Let me reassure you: despite the antique appearance of Antic Publishing's three-story brick building in San Francisco, we suffered not a crack, broken window or crashed hard disk. Although several of our staff lost their homes, everyone came through the quake in fine physical shape.

One last loss to report: the powers that be at LFP Publishing, who published Analog and ST-Log, have decided to pull the plug on their combined all-Atari magazine. We're sorry to see another Atari magazine leave the field, especially one with the history of Analog. All our best to Lee Pappas, Clay Walnum and the gang.

As to the health of START, no worries! Everything looks good from here. Ad pages are up (the lifeblood of any magazine), circulation is up, subscriptions are up — everything's set for a great new decade. You don't have to worry about START!

Thanks to Publisher Jim Capparell, Associate Publisher John Taggart and all of the staff at START for their support over the last two years.

Ciao!

ANDREW REESE
START Editor

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Keyboard Detachment

Is it possible to upgrade my 1040ST to the Mega standard? I love the detached keyboard of the Mega and think it's more functional that the all-in-one-box 1040.

Charles Burrell
Logan, OH

While we've heard of successful hardware hacks to add a detached keyboard to an ST, there is no such commercial product available in the United States. If you'd like to pursue such modifications, check on CompuServe, GEnie or BIX for specific suggestions. As with all hardware modifications, if you open your ST's case within the warranty period, it will definitely void the warranty. — START Editor

ST Writer Bug

I'm having problems with ST Writer Elite 3.0 (START, April 1989). On at least three occasions — and after about 30 minutes of typing — I've been unable to save a file. As soon as I press [Esc], the cursor is gone and the keyboard locks.

Has anyone else experienced this frustration?

Paul R. Hochstetler
South Bend, Indiana

A number of readers — and several members of the START staff — have experienced this bug. The problem is that the cursor gets "stuck" at the top of the screen. To return to the main menu, simply jiggle the mouse a little and the problem's solved. ST Writer guru Bruce Noonan is aware of the bug and has fixed it in the latest version (3.4) which will run in the April 1990 issue of START. — START Editor

Heidi Format a Hit

I hope everyone at START came through the earthquake without being harmed.

The Heidi format is a good idea. I personally do not have a double-sided drive and almost didn't buy the November issue because the accompanying disk was double-sided. But after glancing through the magazine, I realized there would be programs on Side 1 that even my drive would read.

I am having one problem, however. Final Approach Controller won't run on my ST. Everything else is fine. How do I get this program to run?

Michael L. Myers
Marysville, California

The building that START is in weathered the quake without a crack, though some Antic Publishing employees did lose their homes. Our thanks to you and everyone else who expressed their concern following this disaster. Also, thank you for your praise of START's new double-sided format — it's turned out to be well worth the effort.

As for Final Approach Controller — we goofed! It appears that the program will not run on a 520ST (see the Alert Box in this issue). Our apologies for the inconvenience. — START Editor.

Found: One Accelerator Board

Your recent review of accelerators in the December 1989 issue came at a good time. I have been thinking about getting an accelerator board or even a blitter chip, and well, I just didn't know what to buy. After reading your article though, all that has changed. I now know what it is that I need and I didn't even have to waste $100 or more on something that will just sit idle. Thanks for the very helpful information and keep up the good work.

One other thing: I would like to know how to go about reviewing software that becomes available for the ST.

Michael F. Irwin, Jr.
Las Vegas, Nevada

Dave Small put a lot of work into his piece on accelerators for the ST and we think he did a great job. We're glad you think so, too.

To review products for START, just write to Author Guidelines, START Magazine, 544 Second Street, San Francisco, CA 94107. These guidelines will give you an excellent idea of what we're looking for. — START Editor.

Desperately Seeking...

There were a number of items listed in your Softguide (October 1989) that I am very interested in, especially from B.E.S.T. Software & Equal Plus Software. However, you gave no addresses that I could locate for the companies listed.

Ken Sullivan
Waco, TX

The purpose of Softguide was to give an "at-a-glance" overview of products in a particular category. To do further research, your public library is an excellent source. One phone call to the reference desk will produce the following: Equal Plus Software, P.O. Box 160626, Austin, TX 78716; B.E.S.T. Software, 11525 S.W. Durham Rd., Tigard, OR 97224. Both these addresses are available from "The Software Directory," published by R.R. Bowker. —START Editor ▶

Alert Box

Fleet Street Publisher Mix-Up

In the September 1989 issue, START published a review of Fleet Street Publisher 3.0. The article was based on a preview of the program offered to us by George Miller of MichTron. The program was running as we described at the April 1989 "World of Atari" show in Anaheim, California. The article was intended to coincide with actual release of the program. After the issue went to press, Michtron made substantial changes to FSP 3.0. In a recent phone conversation with George Miller, we were told that the final version of FSP 3.0 will rival Calamus or Calamus Plus. When START obtains a distribution copy of the program, we'll let you know more.

CaverUps nat Caverup

The P.S. Computer CoverUps described in Products Update (START, October 1989) have no connection to Computer Coverup, Inc. of Chicago. P.S. Computer CoverUps is located in Metamora, Michigan.

Final Appraach Faux-Pas

In the article that accompanied Kevin Mason's Final Approach Controller (START, November 1989), we failed to mention that the game requires one megabyte of memory. Our apologies for this oversight.

SUBMISSION INFORMATION

START welcomes submissions. Please include both hard copy printouts of articles and program listings as well as disk files on ST compatible disks. Media will be returned if self-addressed, stamped mailer is supplied. START assumes no responsibility for unsolicited editorial materials.

Do you have questions about using your ST? Is there something you're not clear about? Every issue, START's editors listen to your comments and answer your questions in Dialog Box. Let us hear from you! Our address is:

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News, Notes & Quotes

by Stephen Mortimer • START Contributing Editor

Atari Update

• Michael Morand has been named president of Atari Computers (U.S.). He comes to Atari Corp. from AST Research, a PC-clone manufacturer. Bill Crouch is the new Vice President of Sales, replacing Mike Dendo in that position. Crouch headed sales at Commodore during the C-64 boom.

Michael Morand

• A multimillion dollar advertising campaign was launched by Atari in October to promote the Portfolio. Initial response has been overwhelming according to Sig Hartmann, who retired from Atari at the end of 1989. Jim Fischer, Vice President of Marketing, stated that print ads for Portfolio could be found in magazines such as *Newsweek*, *Smithsonian*, *Popular Science*, *Fortune*, *Scientific American* and all the airline in-flight magazines. The ads reportedly build on the theme that Atari has "computers for everyone," establishing Atari's name as a computer company rather than a video-game maker. To a lesser extent, there will be ads for STACY, the ST and MIDI, and the new line of PC-compatibles. The Atari PC4 and ABC286-30 (with a 30MB hard disk) received FCC certification in the fourth quarter and should be shipping as you read this.

• DeskSet II was shown at the Washington Area Atari Computer Fest in October of last year. The completed package carries a $495 list price and has been optimized with several features added since it was originally shown. DeskSet II now has landscape printing and the ability to wrap text around and inside irregular objects. Also, an interface has been developed to connect a Mega to a Compugraphics high-resolution output device. A production model of STACY with 4MB of memory and a 40MB Conner hard disk was also shown by Atari at the WAACE show. As of press time, the STACY had not yet received FCC certification, although Atari was hoping to ship it by Fall COMDEX in November.

• Despite memory limitations, the Portfolio has some interesting capabilities that will let it run advanced software. Executable ROM cards with up to 1MB capacity can serve as the area for a program to reside. Other programs can be loaded into the Portfolio's own RAM. One program using two executable ROM cards requires users to swap cards in order to use the 2MB-size program. Also, transfer software is under development for the ST in addition to the previously announced PC software.

68030 Upgrade Under Development

Fast Technology, maker of the T-16 accelerator board for the ST, is reportedly developing a 68030 board for the Mega. The board is expected to connect to the Mega's internal 68000 bus connector and will automatically patch the operating system, since TOS 1.4 is not completely compatible with Motorola's 68030 processor. A bootup ROM on the board will load TOS 1.4 or 1.6 into RAM and then patch it. (As a point of reference, the 16-MHz 68000 with 32K cache on the T-16 board almost halves the time required to perform many tasks. With a full 32-bit 68030 processor, this performance mark could be far surpassed.)

The 68030 processor has a built-in protected Memory Management Unit that allows for multitasking applications. A number of special features are planned, according to Jim Allen of Fast Technology, with additional memory being a high priority. (It is uncertain whether the memory will be usable for the video.) Monochrome and/or color high-resolution display capability may be included on the board. Other possibilities include a math coprocessor chip and additional means of expansion.

The Fast unit was being prototyped at press time and may be shown at Fall COMDEX. Pricing of the 68030 expansion board will be determined once Atari announces pricing for the TT. ▶

News, Notes & Quotes

PKS Write Improves Calamus

ISD Marketing has just released a new text editor for its popular desktop publishing program, Calamus. Dubbed PKS Write, it can reside as a desk accessory, a stand-alone program, or as a module in the upcoming Calamus version 1.1. Pop-up menus control the text editor/word processor that can handle up to seven open documents.

Many word processor functions exist in PKS Write. Footnotes and indexes can be created in separate windows, similar to Microsoft Write. An index can be alphabetized using a powerful sort function. Calamus-specific functions include the importation of Calamus macros. Rulers can be defined and edited. Unlike Calamus, both text and styles can be searched for and replaced at the same time. Searches can be conducted for layout reference codes. Font and layout codes can be hidden to various degrees. Finally, markers allow easy access to specific parts of a document.

PKS Write lets users create definable keystrokes and the combination of several functions using Emacs-like bindings. This in turn lets users customize PKS Write so that it can mimic other word processors' keystrokes.

Fat Bits

• PageStream version 1.8 is now available. The new upgrade to SoftLogik's desktop publishing package fixes most known bugs and adds several features. Arcs are now created with respect to the center point and a "font manager" facilitates easier and quicker access to fonts. Speedier operation and a new PostScript printer driver round out the new features. Call SoftLogik at (314) 894-8608 for upgrade policy.

• OmniMon, the multiresolution monitor from Wuztek, has been redesigned to allow software control for setting screen resolution, a procedure previously accomplished through a switch box. The new software switch has hooks that will let commercial programs change resolutions inside the actual program.

• CMI offered a Christmas special on their ST-PA accelerator. A single accelerator was available at the low price of $180 or $150 each if three or more were purchased. This move was seen by many as CMI's abandonment of the ST market because of fierce competition. Although CMI denied this rumor, it did acknowledge that sales were slower than expected. ■

Stephen Mortimer is a contributing editor for START. He lives in Binghamton, New York.

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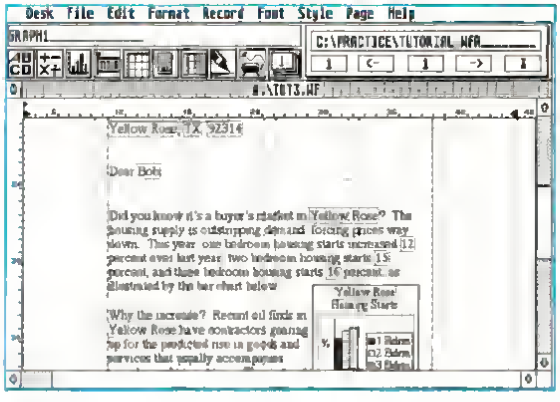

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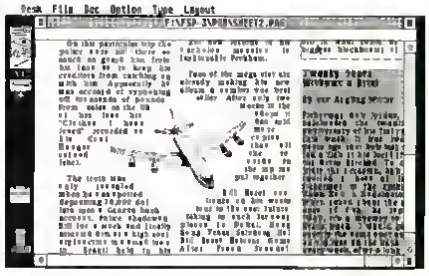

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Products Update

Compiled by Marta Deike

New Games for the ST

LucasFilm's comedy-thriller adventure, **Maniac Mansion**, is now available on the ST. A demented scientist named Dr. Fred has kidnapped Sandy, the ever-popular cheerleader, and is holding her in his psychopathically populated mansion, preparing her for brain surgery. As student Dave, you and your two cohorts must save the damsel in distress. Your cohorts can be any two out of seven eccentric characters, each with distinctive talents. There are 450 objects to discover, over 50 bizarrely detailed rooms and five different ways to win. Maniac Mansion, $49.95. **Lucasfilm Games, P.O. Box 10307, San Rafael, CA 94912, (800) 782-7927.**

Birds of twisted feathers not only flock together in Lucasfilm's Maniac Mansion, but kidnap pretty young cheerleaders for bizzare brain experiments. It'll take a certain kind of mind to maneuver through this psycho chamber and rescue Sandy.

Now you can play a role in British history with Broderbund's latest strategy adventure, **Joan of Arc: Siege & Sword**. As Charles VII, your goal is to drive out the English and unite your country. You have 20 regal acts to choose from such as raising armies, sending out spies and ordering executions. The fate of Joan depends on your choices (unfortunately, history repeats itself even on your ST and in 1432, Joan burns anyway). But more than an adventure game, Joan of Arc is an interactive history lesson, taking you through 73 locales and five richly developed action sequences all the way to 1456. Joan of Arc, $44.95. **Broderbund, 17 Paul Drive, San Rafael, CA 94903-2101, (415) 492-3200.**

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You've been wrongfully convicted and exiled to a dead planet in Prison, Actionware's new strategy game Your only chance for survival is in the one escape pod that remains intact but is lost somewhere in the wreckage of a pleasure craft Unfortunately, criminal gangs are seeking it, too. Prison, $39 95 **Actionware, 38 W. 255 Deerpath Road, Batavia, IL 60510, (312) 879-8998**

MicroProse has released **Pirates**, a dramatic role-playing/fantasy adventure. Aboard a 17th century sailing ship, you'll cruise the Caribbean and relive the yo-ho-ho days of ship battles, land conquests, plundering, fencing, rescuing and romancing There are more than 70 different scenes all of which promise historical and geographic accuracy Pirates, $39.95. **MicroProse, 120 Lakefront Drive, Hunt Valley, MD 21030, (301) 771-1151**

Plotting a Critical Path

Project-management software is finally available for the ST and Mega! Whether you're building bookshelves or publishing a book, a plan of action is crucial, but now you can shred those cryptic hand-written lists and charts. **Critical Path**, by Schwane Software, is a scheduling tool that guides you through large projects one step at a time. Simply describe your project. Critical Path then outlines and prioritizes your steps and plots the speediest possible route — the "critical path" — toward accomplishment. Critical Path, $59.95. **Schwane Software, 1615 S. Magnolia Avenue, Broken Arrow, OK 74012, (918) 252-3003**

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Personal Database Applications announces the release of its **Personal Music Librarian**, a comprehensive music-collection management system for the ST. This professional-quality program will help you organize your recorded- and sheet-music collection and increase your enjoyment of both. The Personal Music Librarian will handle all types of music and data retrieval is fast and flexible. The number of records you can store is limited only to the amount of disk space. Personal Music Librarian, $55. **Personal Database Applications, 2634 Meadow Bend Ct., Duluth, GA 30136-6037, (404) 242-0887** ■

If you have a new product for the ST, we'd like to hear from you. Please send press releases and product photos to ***Products Update*** *START Magazine. 544 Second Street, San Francisco, CA 94107.*

Y DAVID SMALL START CONTRIBUTING EDITOR

A SMALL TOUR OF

UNIX

PART 3

REDIRECTION AND PIPES

In the last two issues, we presented the first installments of Dave Small's UNIX tour. Part I covered the basics of UNIX file structure and several important UNIX concepts. Part II covered the concept of the Root and some oddly-named UNIX commands. In this issue, Dave looks at the concept of pipes in UNIX and its wonderful ability to easily redirect output.

One of the nicest and most powerful features of UNIX is *redirection* or *piping* — where you take the output of a command, such as a directory listing from ls, and feed it someplace other ▶

Batch Files can be incredibly complex and do darn near anything.

than your terminal.

Say you're doing a BASIC compile for GFA BASIC on the TT (of course, this is all future tense) and you want error messages to go to a file instead of to the screen where you'd just have to write them down.

You'd do: GFACOMPILE > gfaoutput and GFACOMPILE would prompt you for the file name to be compiled, since it doesn't know Instead of the listing going to your screen, it's written to the file "gfaoutput", which is created on the spot

But still better, we can direct input, too GFACOMPILE < MYPROGRAM > gfaoutput takes MYPROGRAM as the "standard input" and writes the output to gfaoutput.

If you get lost on the < and >, remember that they point in the direction of data flow Easy enough? In the above example, it flows out of MYPROGRAM into GFACOMPILE and out of GFACOMPILE into gfaoutput.

(Admittedly, it would be more clear if it looked like this: MYPROGRAM > GFACOMPILE > gfaoutput, but UNIX needs the command name first, so we're stuck with it this way.)

Okay, let's RUN your program, say it's a word counter for your word-processor files. You need to give it an input file and tell it where you'd like the output displayed. Furthermore, let's say your program encounters a Major Error and needs to generate an error message (such as, say, you try to run a word count on a nonexistent or a binary file).

Ordinarily, you would just tell WORDCOUNT the name of your file and it would display the word count, like this:

```
#WORDCOUNT < mytext
2333 words. (generated by the program)
#
```

But since we can redirect standard input, standard output and error output, we can do this, too:

WORDCOUNT < inputfile > outputfile2 > errorfile will READ from inputfile, write the total number of words to "outputfile" and send any error messages (the "2 >") to "errorfile."

Now, let's say you have a file on which you want to perform several

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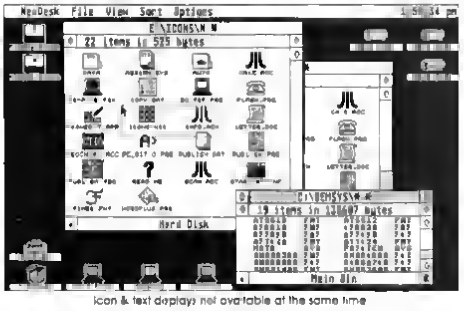

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operations. As an example, we want to take the file, use STRIPWS to strip out any "high parity" characters that WordStar might have put into it, feed it into SUPERWRITE, take the PostScript output from that and laser print it using MajorScript (these are all future-tense programs, of course)

We could do things one step at a time:

```
#STRIPWS < myfile.txt > myfile.stripped
#SUPERWRITE < myfile.stripped > myfile.postscript
#MAJORSCRIPT < myfile.postscript > laserfile lp
< laserfile (print the laser file)
```

Or, we could just "pipe" them together. We pipe with the "|" character (not a colon!), that character on your ST keyboard that you've been wondering about. This automatically takes the output from one thing and feeds it into another. So it becomes:

```
#STRIPWS < myfile.tst | SUPERWRITE |
MAJORSCRIPT | lp
```

This does it all in one step. Hence, when you're running UNIX, you have incredible power over redirecting where *everything* goes. You can hook together many, many different operations to get your particular job finished.

UNIX Philosophy

This leads us to what has become the *UNIX Philosophy*, the way things are done on UNIX — and the way you'll pretty much have to do them, because that's the way the tools you'll be using are laid out.

There aren't any 500-function programs in UNIX. Forget the drop-down menus and whatnot.

There *are* lots and lots of tiny little programs that are really good and efficient at doing one thing. It's up to you to redirect, pipe, script, and otherwise "glue" them together to get what you want done.

This has mixed results. On the one hand, it's really powerful. You can dream up mixtures of commands to do nearly anything, particularly to text, since UNIX is so text-oriented. (Hopefully, graphics utilities for UNIX will start to catch up soon.)

For example, I can take a list of my files, prune out the ones that don't matter, mail the list to Amy so that she sees them next time she's on, go through the list, spellcheck and print each one out for final hand-editing, and so on — *all in one command*.

Remember how ls gave us only a pathetic list of file names, with nothing else? That's because ls is *designed* to feed other programs with just that list — and other programs don't want that extraneous junk like lengths, file type and so forth in the listing they receive. Just the names, ma'am.

On the down side of this, you have a million little utilities to learn. ▶

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All of them have options you must learn, too. The ls utility, for example, lists files in a current subdirectory; mv moves files; cp copies a file; cpio moves a whole bunch of files, subdirectories included and so forth.

It's with some regret that I have to tell you that you're never going to get away from the manuals for these commands. There are simply too many for any human to learn all of them — and all their options. UNIX programmers themselves got so sick of leafing through books that they added the *man* command (manual lookup); this prints out the official AT&T documentation page for a given command onscreen, right there at your terminal. For example, if you've forgotten how to make ls list out file lengths, do

```
#man ls
```

and you'll soon learn. And, of course, you can take that output, save it, maybe send a copy to the printer.

Now, of course, I'm assuming that Atari will make a real UNIX system and put MAN and the manuals on the disk. The UNIX PC I'm using didn't do that; the designers figured they didn't have room. (They figured right, back in the era when 10MB hard disks were expensive instead of being doorstops, like now.)

Even with 40MBs, there's barely room to manuever and I don't even have the manual in there even yet, a year later — and do I have some tattered manuals by now!

Which brings me to something you've felt creeping up on you. Hundreds of commands and subdirectories, huh?

Just How Much Space Does All This Need?

At this point, I'll tell you: 40MBs *at least* — and believe me, as a 40MB UNIX box owner, you'll want more. Apple ships their A/UX on an 80MB hard disk! 100MBs is at least fairly okay and might work well enough on a system with just a few users; it's comfortable for me as the only user. I'm not kidding! Sure is a good thing hard-drive prices have nosedived, isn't it? Only recently has the kind of size required by UNIX to work well become affordable.

It takes around 20MBs to store a reasonable UNIX system and some of the many UNIX utilities. Add another ten for extensions you want. X-windows (which we'll get to next issue) takes up megabytes of space, particularly the source code. And then add the space you want for *your* programs, over and above the operating system — you can see why I say 40 is a minimum.

As of this point, Atari has not revealed what they think is a minimum, nor what drive options will be supported. In terms of main memory, you want all you can get. UNIX gets more efficient when it can keep things in memory, instead of "swapping" them to disk from time to time. Probably 2MBs of RAM is an absolute minimum. I have an 8MB UNIX machine that uses up four megs just idling and another 3MBs when I bring up X-windows! 7MBs gone — and I haven't even started up an application!

Atari lists the TT as beginning with 2MBs, but is expandable. Let's hope so! ■

Contributing Editor Dave Small is one of a small circle of ST gurus who have helped to make the ST as popular as it is. Dave has been a pioneer in developing Macintosh emulation on the ST, culminating with the release of his latest triumph, Spectre GCR.

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The Adventures of a Curious Insomniac with a Machine-Language Monitor

BY DONALD MAPLES

Atari's new 68030-based TT is the big brother of the familiar STs and Megas and, like its forerunners, uses TOS as its operating system. But TOS for the TT differs substantially from the TOS we've all come to love — and hate. Donald Maples, a Dusseldorf-based programmer and writer, recently spent some time poking around in the TT's new TOS 030. Whether you're a programmer or user, you'll enjoy this exclusive first look at Atari's latest — and best yet — version of TOS.

Well, I just couldn't resist the p-p-pun. Even if it's not that good, TT TOS *is*!

The TT was unveiled at the Third Atari Show here in Dusseldorf, West Germany in August 1989 and shown again at London's PCW Show the following month. I attended both shows and was able to spend some time with a TT — and a machine-language monitor. What I found shows that Atari has put a lot of man-hours into upgrading and fixing TOS. And they've left room for upgrades, a positive step for the future. ▶

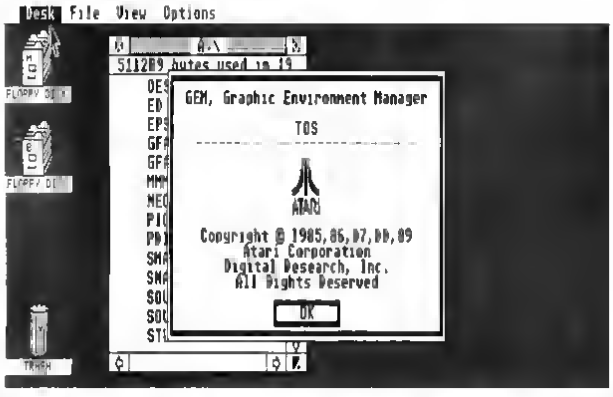

Figure 1. The new TT TOS 030 copyright screen. Like Rainbow TOS, Atori has odded o nice color-cycled Fuji logo. Unfortunotely, it's impossible to shaw color cycling in a mogozine!

Figure 2. Motorola's 68030 processor hos o 256-byte instruction coche built into the chip. While it speeds up processing, it con couse o problem with certain types of progroms. Atori has added an option to turn it off to ovoid problems.

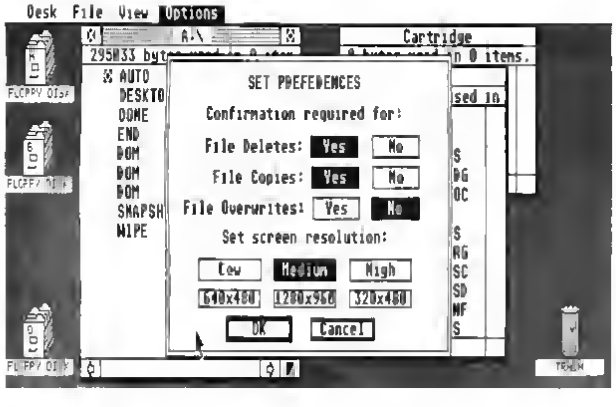

Figure 3. The TT hos three new display modes in oddition to the three stondord ST modes. The Set Preferences diolog box hos been updoted to reflect these new resolutions.

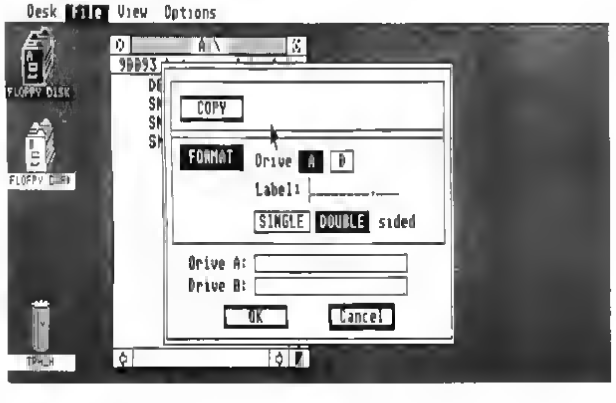

Figure 4. This diolog box oppeors whenever you select either formot or copy. You con now formot a disk and then do o disk copy from the same diolog box.

TT Specifications

Let's begin with a review of the TT's specs. (Editor's Note: *Many of the TT's specifications were detailed in the December 1989 issue of START.*) The heart of the new TT is a Motorola 68030 running at 16 MHz. This means that nominally a TT is twice as fast as your plain-vanilla ST. But in real life, it's actually a bit faster, due both to the fact that the 68030 is itself more efficient than the 68000 (it has two 256-byte caches within the processor itself) and to the TT's new operating system, TOS 030. Also, the TT has a socket for a math coprocessor, which can be either a 68881 or 68882.

The machine comes with two megabytes of RAM standard, but can be expanded to four or eight megabytes internally with one-megabit DRAMs. If four-megabit DRAMs are used, the total internal memory can go up to an amazing *26 megabytes*!

In terms of sound, the TT has the same Yamaha sound chip found in the ST, but also contains custom sound circuitry to generate 8-bit PCM (pulse code modulated) stereo. Because of this, there are two new stereo phono jacks on the back panel. The sound system also contains hardware filters to prevent aliasing and other digital distortions. The TT monitors probably will not have speakers, but there is a built-in speaker in the TT case itself.

Other new ports on the TT are an extra serial port, a regular SCSI port for storage peripherals and a new network connector. The industry standard SCSI port is a welcome addition because it enables connection of inexpensive hard drives now available for PCs. Owners of Atari drives can still use the DMA port that's existed since the first ST.

The new TOS 030 has grown to 256KB — and *moves*! The new TOS ROMs now live at $E00000, rather

than at $FC0000. The 256KB image is then "ghosted" (appears again) at $E40000. This implies an easy extension (from the hardware point of view) to the 512KB operating system, as all it needs is the decoding of the extra address line. Furthermore, there are no registers in the way as was previously the case

More Displays

In addition to the regular ST low, medium and high resolutions there are now three new video-display modes. Atari insists on calling them 640x480, 1280x960 and 320x480. But in real terms, they should be called TT medium, TT high and TT low, respectively.

The TT low-resolution mode has a 320x480 pixel screen with 256 colors on screen from a palette of 4,096 colors. The TT medium-resolution mode has a 640x480 pixel screen but this time with "only" 16 colors from 4,096. And the TT high-resolution mode (analogous to the ST high) has a monochrome screen but with a resolution of 1280x860 pixels.

All of the resolutions (with the exception of the TT high resolution) can be displayed on Atari's new color monitor. To view the new high resolution monochrome mode, a separate monitor will be required. This has not been demonstrated publicly as of this writing.

One thing that may have sounded a bit odd in the last paragraph is that the old ST high resolution can now be seen in color! Yes, it's true — because of the new hardware, the old ST high resolution can now be displayed on the TT color monitor! This means that the TT's high-resolution colors aren't limited to black and white, but can be *any* two colors from the new TT palette. So anyone wanting a green- or amber-on-black monitor can do so and still have the ST's high resolution! ▶

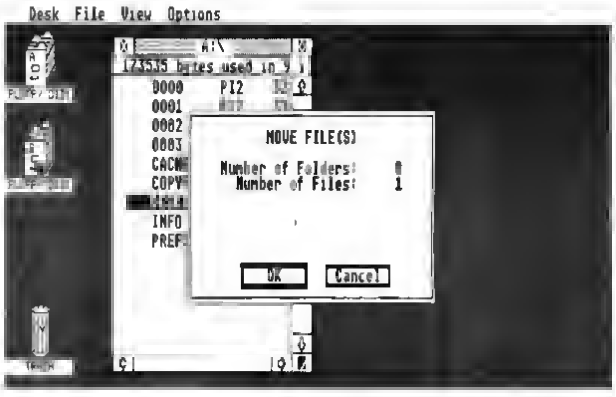

Figure 5. The move-file confirmation dialog box. You can now move files by holding down the [Control] key while dragging files.

Figure 6. Another nice new feature of TOS 030 is that you can rename folders — not just files — and change file attributes by clicking on buttons. This is the new Rename Folder dialog box.

Figure 7. You can now autorun one GEM program at boot-up. To do so, you use this dialog box. You can still install other applications in the same way that you can with the ST.

Figure 8. While Atari's new file-selector box is better than the old, it's still not up to the standard of the START Selector, the Little Green File Selector or Universal Item Selector II.

This not only gives hardware scrolling, but also means that the screen address no longer needs to be on a $100-hyte houndary.

The resolution register now contains more than just the resolution information and it has also moved·

$FF8262 — W, resolution ond screen mode registers

The first hyte-sized register at the above address contains the resolution in the three low hits (as opposed to two on the ST) to enable encoding of new screen modes, which are as follows:

Register Contents	Screen Resolution	Color Planes	Colors
0	ST low (320x200)	4	16
1	ST med (640x200)	2	4
2	ST high (640x400)	1	2
4	TT med (640x480)	4	16
6	TT high (1280x96)	1	2
7	TT low (320x480)	8	256

Color-Handling Chonges

Speaking of colors, there are quite a few changes in the way the colors are handled on the TT. First of all, the color palette has been relocated and has grown to accommodate all of the new colors.

$FF8400 — 256 W, color polette

The RGB (red, green and blue) color components now range from 0-15, since each can now be set to one of 16 intensities for a total of 16x16x16 colors, or 4,096 But that's not all, the colors bits have also been "scramhled."

On the ST the three low bits of each RGB component specified one of the eight possible intensities. It would therefore seem logical to have the next bit to the left extend this to 16. But for some reason, this is not the case The three low bits have been shifted left and the new bit inserted in position 0, making the hardware and software color numbers different, which in turn means that color numbers must now be converted! Why Atari did it this way I haven't a clue.

Software color number: R3-R2-R1-R0 G3-G2-G1-G0 B3-B2-B1-B0 converts into Hardware color number: R2-R1-R0-R3 G2-G1-G0-G3 B2-B1-B0-B3

Compatability ond Look ond Feel

On the software side, TOS 030 is similar to TOS 1.4 (Rainbow TOS), now available as a ROM upgrade. A scaled-down version of TOS 030 will also power the new STE computer, but there it's called TOS 1.6.

Atari claims upward software compatibility, but I have had some strange experiences A well behaved GEM program I've just finished writing had problems with LineA line drawing. On the other hand, a machine language monitor which does all sorts of rude things (i.e.,

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bypasses legal calls) runs fine. I have also seen at least one other major program with problems. To be fair, it's likely that this is not the final version of the TT operating system. Browsing through code I have come across some, shall we say, *unusual* segments. I expect that by the time the TT hits the streets, which is rumored to be in the first quarter of 1990, all of that will be sorted out.

The TOS did grow to 256KB, but more than 32KB at the top of this memory is unused. The address range from $E262DC to $E3FFFF is still virgin ROM territory, i.e., all locations contain $FFFFs and are thus ready for expansion. One nice thing would be to have GDOS in the ROMs. I personally am no great lover of GEM, but I must admit it's very handy when used in moderation. However, one thing worse that GEM is half-a-GEM — and that's exactly what we have now. So, Atari, if you're listening, please add GDOS to the ROMs!

From the user's point of view, there are a few changes to the overall operation of the Desktop. First is a cosmetic change in the Desktop Info under Desk, as shown in *Figure 1*. Like Rainbow TOS, it now contains the Atari symbol with cycling rainbow colors (which we couldn't show on paper!).

Another cosmetic — but more useful — change is that color 0, i.e., the screen around the desktop is not white but black! This is also the case for any programs run from the AUTO folder. They will now default to inverse video with white characters on a black background. Furthermore, this occurs in all programs run from the AUTO folder, regardless of the resolution. In the past, if an AUTO program changed the resolution, for example from low to medium, the character color could be yellow-on-white, making the whole thing unreadable. Now, TOS will automatically swap the necessary color registers to maintain white characters on a black background, regardless of the resolution. An added bonus is that "white on black" is easier on both the monitor (less burn-in) and the eyes (less fatigue). The only other difference in the appearance is the addition of the CACHE item under the Option menu, as shown in *Figure 2*. This has to do with the 68030 processor. To maintain compatibility with older programs, the cache can be turned off, primarily because the cache keeps up to 256 bytes of instructions within the processor itself. This speeds up program execution (no need for the relatively slow main-memory access), but can cause problems in some self-modifying programs. ▶

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The new Set Preferences dialog box, shown in *Figure 3*, has been extended to handle the new screen resolutions. Three new buttons have been added below the Low, Medium and High buttons to select the three new video modes.

Still More That's New

The screen updates and window drawings are faster overall, not only because of the raw speed of the 68030 but also because of the new TOS. This now includes a software disk cache which reduces disk access from older TOS versions.

One addition available only to TT high resolution users is a new font. There are now a total of four default fonts with the new one using a 16x32 matrix for character definition. Alas, this can only be seen on a high-resolution monochrome monitor.

Although there are still two items in the File menu for Copy and Format, they both invoke the same dialog box shown in *Figure 4*. You can now click on Format, format a disk and then without exiting this dialog box, you can perform a disk copy.

Disks formatted under TOS 030 are fully read/write compatible with MS-DOS.

The actual copy process, whether file copy or disk copy, is much improved. Not only is it faster, but it reduces the number of disk swaps, a very irritating aspect of the old TOS. In addition to Copy File, you can now *move* a file, as shown in *Figure 5*. This can only be done from the Desktop by holding down [Control] while dragging the file(s) with the mouse.

Another very useful feature is the ability to rename folders, as shown in *Figure 6*. The same dialog box is used to change a file name, but with the attribute changes disabled.

The last of the small but positive changes is in the Install Disk Drive item. In the past this defaulted to Cancel, which caused a lot of irritation. Now the default is Install, which makes much more sense.

Finally, the Install Application item now looks a bit different, as shown in *Figure 7*. The dialog box contains two new buttons, Normal and Auto. The Normal button works as before — it lets you install applications as before. For example, if you installed STWRITER.PRG with a filename extender of .TXT, whenever you double-clicked on a .TXT file, the word processor would run and load the selected file automatically.

The AUTO option is much more interesting. One significant complaint about TOS from the start was its inability to run GEM programs from the AUTO folder. Now you can — with some limitations. The way

continued on page 33

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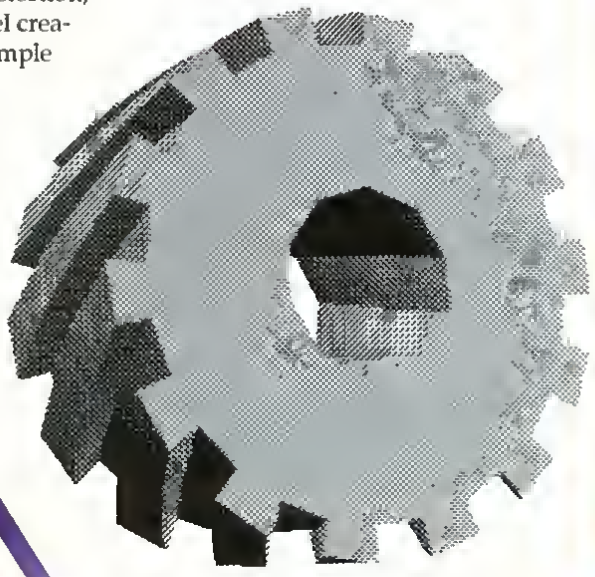

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continued from page 28

this works is by saving the information about the GEM program in the DESKTOP.INF file with the new Z line with the following layout: Z 01 [path][program]. The next time you turn on the computer, GEM will look at the DESKTOP.INF file and, if the above line is found, it will run that program automatically. Note: only one program can be run in this manner and that any document specification will be ignored.

The additional parameter immediately after the Z indicates whether the program requires GEM libraries.

Z 00 — run a non-GEM program automatically (TOS or TTP) Z 01 — run a GEM program automatically (PRG or APP)

The file-selector box has been improved also and it now contains drive buttons, as shown in *Figure 8*. Each drive connected to the machine at boot-up appears as a separate button, including hard-disk partitions and RAM disks. The file templates can now be specified on the template line below the directory line. This template line will accept * and ? wildcard characters in templates and then show only the requested files.

Another handy feature is the ability to perform a warm reboot by pressing the [Control][Alternate][Delete] keys simultaneously. This is equivalent to pressing the reset button (unlike ReSTART from the Summer 1988 issue of START, which performs a cold boot with the same key combination). Pressing the reset button has now been made much more difficult to do accidentally; it's now recessed.

Snooping into the ROMs

So much for the look and feel. As to the actual ROM routines, the main changes have to do with the new screen modes. The whole operating system appears much neater. All of the tables and a major portion of the data and constants are now at the end of the OS. Even the GEM portion, still written in C, looks much better. However, the C compiler is still the same. If you do not like C syntax and find it difficult to follow (C is the world's first write-only language), the resulting object code is even worse. But for us opinionated assembler programmers, anything not in assembler is sloppy and inefficient.

So in true hacker fashion, let's turn to a few things discovered while snooping around with a machine-language monitor. (And just for the record, a true hacker is a programmer who writes neat code and believes in sharing the knowledge, not a criminal who writes damaging viruses and destroys other people's work.)

The BIOS routines largely remain the same, but the XBIOS has been extended. There are now 96 XBIOS routines, rather than the former 39. However, there are only 11 truly new routines. The remaining routines are dummies and are there for future expansion only. The 11 new routines are as follows:

XBIOS 41: get/set drive seek rate.
New: S2(A7) — W, new seek rate (where $FFFF just gets old rate)
S0(A7) — W, drive number (0 = A, B = 1)
Old: 00 — W, old drive seek rate (always returned)

Using this routine, the disk seek-rate can be interrogated and changed. This is a very useful routine painfully missing from the earlier TOS versions.

XBIOS 64: get/set blitter configuration.
New: S0(A7) — W, flag:
$FFFF = get current blitter configuration
$0001 = set blitter to hardware
$0000 = set blitter to software
Old: 00 — W, old blitter configuration (always returned)

This routine was already present in the Mega TOS and is well documented.

XBIOS 66: DMA/SCSI communication.
New: SA(A7) — W, DMA/SCSI device number
S6(A7) — L, buffer address
S4(A7) — W, unknown
S0(A7) — L, unknown

The details on this routine are not available but it appears that it enables access to the DMA without having to resort to custom-written routines as required in the past

XBIOS 80: set screen mode/resolution and reinitialize screen (LINE-A, variables, fonts, etc.)
New: S0(A7) — W, new screen mode (including resolution)
Old: 00 — W, old screen mode

This function enables the complete change of resolution. Unlike the current resolution change routine, this routine will also initialize all of the relevant GEM variables to enable the use of GEM in this new resolution without having to reboot the system.

XBIOS 81: get current screen mode and resolution.
Old: 00 — W, current screen mode and resolution

The new resolution modes on the TT require the use of the new registers at $FF8262. This location contains two byte-sized registers. The first contains the resolution in the low three bits plus some extra information in bits 4 and 7. This byte is followed by an additional register. The routine here returns both values.

XBIOS 82: get/set screen mode only (keep current resolution).
New: S0(A7) — W, new screen mode in low nybble ▸

Old: 00 — W, old screen mode (low nybble of screen mode word)

This routine enables interrogation and changing of the second byte mentioned above.

XBIOS 83: get/set color in color register.
New. $2(A7) — W, new color value (where $FFFF just gets old color
$0(A7) — W, color register number
Old: 00 — W, old color value for given register

This routine enables the changing and interrogating of individual colors in the new color registers at $FF8400.

XBIOS 84: set range of colors from palette.
New. $4(A7) — L, palette address (table of consecutive colors)
$2(A7) — W, number of registers to change
$0(A7) — W, number of color register to start with

This routine enables the changing of a number of color registers. The range can be as little as one or as many as all 256 colors. The only restriction is that the colors must be in sequence. If the range goes beyond the end of the registers, the routine will automatically stop when the end is reached.

XBIOS 85: get range of colors into palette.
New. $4(A7) — L, palette address (colors are returned here)
$2(A7) — W, number of consecutive colors to return
$0(A7) — W, number of color register to start with

This routine is the exact opposite of the previous call. It loads the palette in memory with color values found in a range of color registers.

XBIOS 86: get/set bit 4 of resolution register.
New. $0(A7) — W, flag
negative — return current value of bit 4
zero — clear bit 4
positive — set bit 4
Old: 00 — W, flag:
0 — bit 4 was clear
1 — bit 4 was set

And what does this bit 4 mean? I'm not sure yet.

XBIOS 87: get/set bit 7 of resolution register.
New. $0(A7) — W, flag:
negative = return current value of bit 7
zero = clear bit 7
positive = set bit 7
Old: 00 — W, flag:
0 — bit 7 was clear
1 — bit 7 was set

As for the meaning of bit 7, please refer to the previous routine.

In terms of GEMDOS, I observed only one difference, namely the function $4B, chain program has an additional mode 6, but as of now it's still not clear what the function of this new mode is. It does seem similar to mode 5 which is "create base page.

Documented Low-Memory Variables

Finally, the documented variables in low memory have been expanded. These are the variables whose address will not change in the future. Here is a selection of some interesting new additions:

The XBIOS input/output routines are now accessed using four jump tables starting at $51E. Each jump table is eight entries long, but only six are actually used. The remaining two are for future expansion. The device assignments remain the same:

0 — PRT: centronics interface
1 — AUX: RS-232 interface
2 — CON: keyboard and screen
3 — MIDI interface
4 — IKBD, keyboard processor interface
5 — screen output, ignoring control codes

The jump tables are in the following order:

$051E — 8L, BCONSTAT vectors, get device input status
$053E — 8L, CONIN vectors, input character from device
$055E — 8L, BCOSTAT vectors, get device output status
$057E — 8L, CONOUT vectors, output character to device

The new monitors are not planned to have a built-in speaker and because of this the keyboard click/bell sound currently available may not be heard. However, the address of the bell-sound routine can be found at $5AC. This lets the user wedge in a new sound routine. In theory, you could have each key click send a command down the MIDI ports to your favorite synthesizer and cause serious sonic disturbances ...

Finally, location $59E contains the 68030 processor flag.

$59E — W, when 0, 68000 processor
when not 0, 68030 processor

Conclusion

And that concludes my initial snooping in and around Atari's new TT and its new operating system, TOS 030. For a programmer, both are welcome additions to the Atari line. In turn, that means that programmers will produce better programs which benefits everyone around. But the TT is not limited to existing software. In addition to TOS and GEM, the new TT will also run UNIX System V with X-Windows. This actually appears to be the main thrust of the new computer, it was conceived as an inexpensive UNIX station with downward ST compatibility.

I hope this article has shed some light on this new exciting computer. If you have any additional comments or suggestions, please feel free to contact me in care of START Magazine. ■

Donald Maples is a programmer and writer who lives in West Germany. This is his first article for START.

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FINDEX V

IBM Command-Line Database in ST Clothing

BY KAREN GORDON

Findex V, published by E. Arthur Brown Company, is an anomaly among today's popular ST databases.

Billed as a "data/text storage and retrieval system," Findex is unlike other database programs that require you to create a limited storage location, or "field" where you put specific information like "NAME" or 'ADDRESS." Instead, Findex is a free-form program that lets you store anything from names to whole pages of text. In conventional databases, to find your data you must tell the program exactly where to go and what to look for within the fields you've created. With Findex, you retrieve your data by searching for words or parts of words contained within your file.

E. Arthur Brown's Findex V is a free-form database that lets you retrieve your data by searching for words or parts of words contained within your file. Unlike conventional ST databases, Findex is not GEM-based.

Command-Line Parentage

The author of Findex, Thomas B. Woods, created the program originally for the Sinclair, then released versions for the IBM PC and the ST. Its command-line heritage shows up the instant you load Findex — the ST version doesn't use GEM. All commands are located within one of Findex's three menus, the Main Menu, the Display Options Menu and the Add/Edit Menu. You can access nearly all of the commands no matter which menu you're in, even if they're not visible. If you don't remember which one you need, look around for it in one of the menus. Many commands are confusing, non-mnemonic acronyms like "SDAT" and "SETC" (SDAT sets the date, and SETC sets foreground color.)

While you're trying to learn the basics of Findex, the documentation will save you — somewhat. The manual steps you through several tutorials, illustrated with screen shots, and makes the confusing menus more understandable. Although the screens are overloaded with the confusing commands (see the illustration), the first tutorial shows you that setting up a simple data file is fairly easy — if you're willing to do everything through the keyboard.

Search Facilities

As with most databases, Findex lets you search for very specific data by using Multi-word Search commands. There are five of these commands: AND, OR, NOT, WITH and WITHOUT. AND is essentially "find anything where both *x* and *y* exist," whereas OR means "find anything where either *x* or *y* exists." NOT is used to modify AND and OR by ruling out certain data. ("Smith OR Jones NOT Kentucky" might find you all of the Smiths and Jones who don't live in Kentucky, for example.) WITH and WITHOUT refer to locations of data. "Franklin WITH 2=Ben" will locate every record with "Franklin" in it, but only if "Ben" is on line 2.

Group Functions

In addition to the Multi-word Search commands, Findex has six Group Functions that are displayed on the Main Menu. When used in combination with the Multi-word Search commands, you have a very powerful (and potentially dangerous) tool.

The Group Functions let you do something to all records in your file ▸

that meet your specified criteria. For example, "California/P" will print every record that contains "California." "California/D" will delete every record that contains "California." For simple commands like that, /D is pretty safe. If, however, you want to get into something more complex, be careful. Multi-word Search commands and Group Functions work in a logical progression. If you're not sure your search command is going to pick out exactly what you want, test it first before you perform Group Functions like /D on it. Backing up a copy of your database often is also a good idea, so you don't end up staring at an empty file where you've mistakenly deleted everything.

Mail-Merge Problems

So far, Findex is an unusual, but usable alternative to other ST database programs. But now we step onto shaky ground. To most database users, one of the most important features of any database is its ability to mail-merge — to take database records and merge them into the appropriate areas in a letter or other piece of text. Findex boasts the ability to do this from within the program alone or by porting over an ASCII text file from another word processor. I decided to use Findex alone to do this, which is how most databases are used.

Unfortunately, I never got the mail-merge to work — after an hour of frustration, I gave up. At this point, the documentation also fails to help; it literally devotes one sentence to this subject, i.e., "To use Findex to write your form letter, use the ADD command to write the letter, define the document's name using the ASCI [sic] command, set or create a DEFO, then write the document to disk using either the Group Write function or the 'W' from the Display Options." Say that five times fast, and then try to get it to work.

In Short

Findex is an interesting concept that didn't quite translate from DOS to the ST world. It's fine for address files and recipe files, but its complicated commands make it difficult to use — and for business purposes, where you need *definite structures* for your data, Findex may be more trouble than it's worth. ■

Karen Gordon is a human-resources representative for Oracle Corporation in Belmont, California. This is her first article for START.

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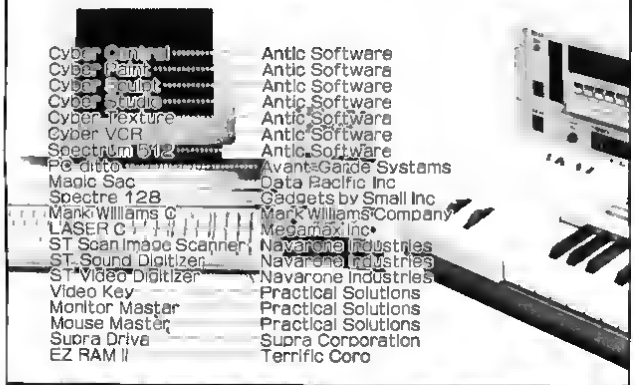
Findex V, $49.95. E. Arthur Brown Company, 3404 Pawnee Drive, Alexandria, MN 56308, (800) 322-4450



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Cyber Corner

ON DISK

The Return of Pixel -Pro!

BY JON A. BELL

Pixel-Pro plus Cyber Paint equals great graphics! File PIXELPRO.ARC an Side 2 af yaur START disk.

(Editor's Note *Pixel-Pro, written by former Consulting Editor Matt Loveless, was first published in the Fall 1987 issue of START. Pixel-Pro performs image manipulations on DEGAS or NEOchrome pictures, which you can then load into Cyber Paint for fascinating effects This issue, we'll show you how to use one of Pixel-Pro's features with Cyber Paint You'll find the original Pixel-Pro program, an "Inside Pixel-Pro" text file and several other files in the archived file PIXELPRO.ARC on your START disk.*)

When Matt Loveless first wrote Pixel-Pro, he had no idea that it could still be useful to ST graphics mavens three years later. But it is. Pixel-Pro contains some nifty image-twiddling features that even Cyber Paint 2.0's Pixel F/X menu doesn't have You can use Pixel-Pro as a powerful tool to enhance still frames from a Cyber Paint animation and then reload them into Cyber Paint to play them in sequence.

In this installment of Cyber Corner, we're going to use Pixel-Pro's unusual "Grainy" feature to distort a DEGAS picture — actually, an image of a CAD-3D object If you want to exploit the program's other features, you'll find a text file on the START disk called PIXELPRO TXT explaining them in detail.

Getting Started

To run Pixel-Pro, boot this month's START disk; the START Menu program runs automatically. If you have a double-sided floppy disk drive, at the main screen, click on Prepare, then select "Pixel-Pro." (If your only floppy disk drive is single-sided, you'll need to borrow a friend's double-sided drive to access the second side of the START disk.) The file will un-ARC directly onto the destination disk you specify. In a short time, you'll have the following files.

- PIXELPRO PRG is the runnable program itself. (The source code, written in Megamax C, has been omitted from the disk because of length. You can purchase it on the original Fall 1987 START disk from Antic Publishing's Disk Desk by calling (800) 234-7001.)

- PIXELPRO RSC is the Resouce file for PIXELPRO.PRG It must be in the same directory as the program

- PIXELPRO.TXT is a text file in ASCII format — an edited version of Matt's original Pixel-Pro article If you want to play with all of Pixel-Pro's features, print out a copy of this file and study it It'll provide you with all the help you need to exploit this program's features

- ATAKSHIP.PI1 is the sample DEGAS picture that we'll be loading into Pixel-Pro to manipulate for our animation sequence. It's a spaceship I designed with CAD-3D, using Antic Software's Future Design disk As an added bonus, I've included the actual CAD-3D object on the START disk as ATAKSHIP 3D2 for you to play with.

continued on page 41

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ALPHA SYSTEMS

Pixel-Pro operates on a pixel matrix, the set of pixels surrounding each individual pixel. Use this picture file, Atakship, to practice your Pixel special effects.

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The Program

Pixel-Pro has no drawing features of its own, nor does it create pictures. Instead, it works with any low-resolution NEOchrome .NEO or DEGAS .PI1 pictures (it works particularly well with digitized color pictures). It won't work with Spectrum 512 or any other "super-color" paint program, nor with compressed .PC1 files.

The Grainy Feature

Pixel-Pro runs only on a color monitor. Double-click on PIXELPRO.PRG in medium resolution, when the program loads, click anywhere in the dialog box to begin.

Since we don't have the space to cover the use of all of Pixel-Pro's features with Cyber Paint, we'll just cover the Grainy feature from the Effects menu this issue. For the moment, ignore the other features you see in the other menus — you can explore them later in more detail, following the instructions in the Pixel-Pro text file.

Grainy, like most of the features in Pixel-Pro's Effects menu, is based on a pixel matrix, or pixel neighborhood. To understand this, think of every pixel as being surrounded by a matrix of adjacent pixels — like a tic-tac-toe board. The pixel matrix will be either 3x3 or 5x5, in Grainy's case, it's always 3x3. Grainy takes a 3x3 pixel matrix and rotates it onto itself.

Doing It

Let's get started. To load a picture, just click on Load NEO or Load DEGAS from the File menu and then load ATAKSHIP.PI1. Once it's loaded, you can view it by clicking on View from the File menu. The picture will be displayed for as long as you hold down the mouse button. Preview lets you try an effect without permanently changing the image. Like all items on the Modes menu, you can toggle it on or off by clicking on it.

When you choose Grainy, the ATAKSHIP picture will appear, with a set of mouse-controlled crosshairs on the screen. The crosshairs enable you to select an area of the picture to

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work on — a rectangle within which the selected operation will occur.

First, go up to the Modes menu, and make sure Preview is toggled on (a checkmark will appear to the left of it). Position the crosshair in the upper left-hand corner of the screen, then press and hold the left mouse button down. When you move the mouse, you can drag a box down and to the right on the screen around the area you want to affect. You can abort the box at any time by clicking the right mouse button. You can also leave your picture and return to the GEM screen any time the crosshairs are active: simply click the right mouse button.

See the effect? Grainy adds a scratchy, distorted texture to your image — almost as if you're looking at it through a shower door. If you use Grainy on the same area nine times, it will rotate back to the original image.

That's what we're going to do. Toggle Preview *off*, and go back to your picture. Click on Grainy, then drag a box around the entire spaceship. Now, go up to the File menu and click on either Save NEO or Save DEGAS. It doesn't matter which type of file the original picture was; you can save it as either. Call the picture either 2.NEO or 2.PI1, and save it to a blank, formatted disk. You'll want to number your modified images to make it less confusing later when you're loading them into Cyber Paint.

Now, go back to your picture and repeat the Grainy procedure. Save this picture to disk as 3.NEO or 3.PI1. Repeat this procedure — Grainy, Save, Grainy — until you've cycled back to your original image. When you've successfully created eight pictures, numbered from 2 to 9, leave Pixel-Pro. Click on Quit from the File menu, but be careful: the program will exit immediately without an alert box and you'll lose any picture that's still in memory.

Enter Cyber Paint

Okay, now load either version 1.0 or 2.0+ of Cyber Paint. Create nine blank frames, then go to frame one. Go to Menu, click on Load/Save, click on Load, then click on .PI1. Load ATAKSHIP.PI1 on the first frame. Advance to frame two, then load 2.NEO or 2.PI1 from disk. Continue advancing through the frames and loading the pictures sequentially. When you've finished loading all the frames, play the animation.

Interesting, isn't it? The pixel matrix rotates clockwise to create a swimming, spiky effect to your original image. If you want, go to the Load/Save menu, click on .SEQ and save this short sequence to disk as ATAKSWIM.SEQ.

There are many uses for this Pixel-Pro effect. For instance, if you create a densely-textured DEGAS background using Airbrush, with, say, various shades of blue on a black background, then put your image through its Pixel-Pro paces, you can create a swirling underwater effect — like plankton or diatoms spinning around. Loop this several times, then Overlay an animation such as a swimming fish and you have a fascinating, multitextured sequence impossible to create with any of Cyber Paint's other Pixel F/X features.

Conclusion

As with most graphics programs, the key to getting the most out of Pixel-Pro and its uses with Cyber Paint is experimentation. Collect copies of your favorite low-resolution pictures, load them up and start twiddling those bits. ■

Former START Editor Jon A. Bell is now Managing Editor of ORACLE, The SQL Database Journal, in Belmont, CA. Matthew G. Loveless is a software documentation writer and programmer with Berkeley Softworks, Berkeley, CA.

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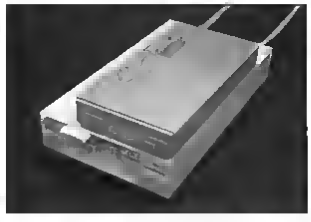

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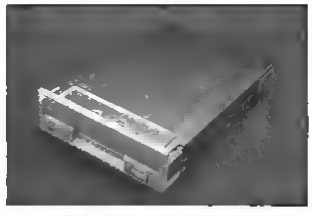

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Clipboard

by Heidi Brumbaugh

Overcrowded AUTO Folder?

If your AUTO folder is stuffed to the brink with every terminate-and-stay-resident (TSR) program ever written for the ST, here are a couple of tips to make your life easier.

You can disable a program from running at boot time simply by changing the extension from .PRG to .PR_; change it back to .PRG to reinstall it. This will save memory in your computer as well as preventing finicky TSR's from getting in each other's way.

There are times, however, when you want to run a TSR for a single session without installing it permanently. Some programs, such as the Universal Item Selector II and HotWire, don't need to be in the AUTO folder to run — you can install them from the Desktop by double-clicking on them. A convenient way to make all the programs in your AUTO folder executable is to edit the DESKTOP.INF file to make your disabled programs runnable. Find the lines in DESKTOP.INF that define executable programs:

```
#G 03 FF  *.APP@ @#G 03 FF  *.PRG@ @
```

And insert the line:

```
#G 03 FF  *.PR_@ @
```

Now you can install HotWire, for example, simply by double-clicking on HOTWIRE.PR_.

In some cases the applications you use require completely different sets of AUTO programs. For instance, you may need GDOS to run a desktop publishing package and find that all your other TSR's must be disabled due to memory requirements.

A fast way to handle this situation is to set up different AUTO-folder configurations on different drives. In this case, create an AUTO folder containing only GDOS on drive D. Run your hard disk utilities program and select Set Hard Disk Autoboot. Follow this procedure to set the autoboot back to C when you're done.

Mouse Troining

Here's a tip from START contributor Phil Comeau:

Many paint programs provide an "eraser" tool that rubs out part of a painting. It's hard to keep the mouse steady when erasing in a straight line. I position the eraser where I want to start, then hold down the [Alternate] and [Insert] keys while I press the arrow keys in the direction I'd like the mouse to travel. The result is erasure in a perfectly horizontal or vertical line.

Note that this will work with any paint drawing tool. In fact, you can use the [Alternate]-[Insert]-arrow-keys combination to simulate moving the mouse with the left button held down in just about any ST application.

And the Winner is...

In the June 1989 issue of START, the Clipboard ran a contest challenging readers to write an assembly routine to flip a pixel as quickly as possible. The submitted routine had to be able to replace the FLIPPIXM.S routine in that issue's "Programming in Pascal" column.

The winner of the contest is Bob Vixie of Colorado Springs, Colorado. Bob's entry took only 112 clock cycles, which was 20 cycles faster than the next fastest entry and more than four times as fast as Bruce Wiehe's original FLIPPIXM.S. We were hard-pressed to think of a way to improve on Bruce's algorithm.

Most of the entries used a multiplication table to look up the Y position of the pixel on the screen. Since the contest announcement made no specification as to the size of the code, this was allowed.

I'd like to thank all the people who participated in the contest; the response showed that there are a lot of people who take their assembly language speed programming seriously. Thanks also to Jim Kent, who helped judge the contest and to my former instructors Bob and Gail McDowell, whose assignment to speed up an assembly language code section inspired this contest.

Heidi Brumbaugh is the former Programs Editor for START magazine.

Flippix contest-winner Bob Vixie's solution:

```
   COMMENT PASCAL
   XDEF        FLIPPIX
   SECTION     TEXT
FLIPPIX
   move.l      (sp)+,a1        *12 pop return address off stack
   move.l      (sp)+,d0        *12 pop y off stack
   move.l      (sp)+,d1        *12 pop x off stack
   move.l      (sp)+,a0        *12 pop screen address off stack
   move.w      d1,d2           *4 save a copy of x for later use ▶
```

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Winning Entry, continued

```
        lsr w     #3,d2          *12 divide x by 8 to get a byte number
        add w     d0,d0          *4 multiply y by 2 for index into table
        odd w     Y80(pc,d0 w),d2 *14 add y *80 from table to x / 8
        not w     d1             *4 negate x for proper bit numbering
        bchg      d1,0(a0,d2 w)  *18 flip the bit on the screen (mp
                  (a1)           *8 return to calling routine
Y80
        dc w      0,    80,   160,   240,   320,   400,   480,   560
        dc w      640,  720,  800,   880,   960,   1040,  1120,  1200
        dc w      1280, 1360, 1440,  1520,  1600,  1680,  1760,  1840
        dc w      1920, 2000, 2080,  2160,  2240,  2320,  2400,  2480
        dc w      2560, 2640, 2720,  2800,  2880,  2960,  3040,  3120
        dc w      3200, 3280, 3360,  3440,  3520,  3600,  3680,  3760
        dc w      3840, 3920, 4000,  4080,  4160,  4240,  4320,  4400
        dc.w      4480, 4560, 4640,  4720,  4800,  4880,  4960,  5040
        dc w      5120, 5200, 5280,  5360,  5440,  5520,  5600,  5680
        dc w      5760, 5840, 5920,  6000,  6080,  6160,  6240,  6320
        dc w      6400, 6480, 6560,  6640,  6720,  6800,  6880,  6960
        dc w      7040, 7120, 7200,  7280,  7360,  7440,  7520,  7600
        dc.w      7680, 7760, 7840,  7920,  8000,  8080,  8160,  8240
        dc w      8320, 8400, 8480,  8560,  8640,  8720,  8800,  8880
        dc w      8960, 9040, 9120,  9200,  9280,  9360,  9440,  9520
        dc w      9600, 9680, 9760,  9840,  9920,  10000, 10080, 10160
        dc w      10240,10320,10400, 10480, 10560, 10640, 10720, 10800
        dc w      10880,10960,11040, 11120, 11200, 11280, 11360, 11440
        dc w      11520,11600,11680, 11760, 11840, 11920, 12000, 12080
        dc w      12160,12240,12320, 12400, 12480, 12560, 12640, 12720
        dc w      12800,12880,12960, 13040, 13120, 13200, 13280, 13360
        dc w      13440,13520,13600, 13680, 13760, 13840, 13920, 14000
        dc w      14080,14160,14240, 14320, 14400, 14480, 14560, 14640
        dc w      14720,14800,14880, 14960, 15040, 15120, 15200, 15280
        dc w      15360,15440,15520, 15600, 15680, 15760, 15840, 15920
        dc w      16000,16080,16160, 16240, 16320, 16400, 16480, 16560
        dc.w      16640,16720,16800, 16880, 16960, 17040, 17120, 17200
        dc w      17280,17360,17440, 17520, 17600, 17680, 17760, 17840
        dc w      17920,18000,18080, 18160, 18240, 18320, 18400, 18480
        dc w      18560,18640,18720, 18800, 18880, 18960, 19040, 19120
        dc w      19200,19280,19360, 19440, 19520, 19600, 19680, 19760
        dc w      19840,19920,20000, 20080, 20160, 20240, 20320, 20400
        dc.w      20480,20560,20640, 20720, 20800, 20880, 20960, 21040
        dc w      21120,21200,21280, 21360, 21440, 21520, 21600, 21680
        dc w      21760,21840,21920, 22000, 22080, 22160, 22240, 22320
        dc w      22400,22480,22560, 22640, 22720, 22800, 22880, 22960
        dc w      23040,23120,23200, 23280, 23360, 23440, 23520, 23600
        dc w      23680,23760,23840, 23920, 24000, 24080, 24160, 24240
        dc.w      24320,24400,24480, 24560, 24640, 24720, 24800, 24880
        dc w      24960,25040,25120, 25200, 25280, 25360, 25440, 25520
        dc w      25600,25680,25760, 25840, 25920, 26000, 26080, 26160
        dc w      26240,26320,26400, 26480, 26560, 26640, 26720, 26800
        dc.w      26880,26960,27040, 27120, 27200, 27280, 27360, 27440
        dc w      27520,27600,27680, 27760, 27840, 27920, 28000, 28080
        dc w      28160,28240,28320, 28400, 28480, 28560, 28640, 28720
        dc w      28800,28880,28960, 29040, 29120, 29200, 29280, 29360
        dc w      29440,29520,29600, 29680, 29760, 29840, 29920, 30000
        dc w      30080,30160,30240, 30320, 30400, 30480, 30560, 30640
        dc w      30720,30800,30880, 30960, 31040, 31120, 31200, 31280
        dc w      31360,31440,31520, 31600, 31680, 31760, 31840, 31920
```

Got an ST trick or tip to share? We're interested in tips for the rank beginner or expert programmer, for exploring the Desktop or for getting the most out of any popular ST program. Send your tips to the Clipboard, START Magazine, 544 Second Street, San Francisco, CA 94107.

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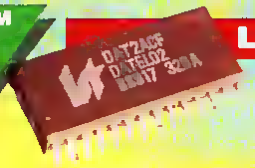

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CHAOS ON YOUR ST

Under All, There is Order

BY STEPHEN CLARK

"Here was one coin with two sides.
Here was order, with randomness emerging,
and then one step further away was
randomness with its own
underlying order."
— Doyne J. Farmer

Appearances con be deceiving. Find out why in the file CHAOS.ARC on Side 1 af your START disk.

In a fascinating article, Stephen Clark presents the obscure concept of chaos in clear and elegant terms. The accompanying program on your START disk was written in Mark Williams C and runs in all three resolutions.

ON DISK

Chaotic is the term used to describe phenomena in nature that appear to be complicated and unpredictable, but have underlying causes that are simple and easily understood. Familiar examples of chaos include a whirlpool in river rapids, smoke rising from a cigarette and the shapes of clouds. These events generally have two related properties: *underlying order* and *self-similarity*.

Consider the Whirlpool

Order is the result of the manifestation of well-known physical laws that govern a particular event. Consider the whirlpool, for example. Its shape is determined solely by the shape of the river bottom and the rate and direction of the water flow. However, since the water flow is always changing, the shape of the whirlpool also changes. It is dynamic, *chaotic*.

Furthermore, it exhibits self-similarity. A close examination reveals adjacent areas of calm that are perturbed periodically by small eddies that spin off the main whirlpool. Next to these eddies are areas of calm that can be disturbed by even smaller eddies spinning away. This self-similarity at different scales exemplifies the unimportance of the region that is examined — any part looks quite like the whole.

Another example is the Mandelbrot set, which gives rise to beautiful swirling and arching patterns. Magnification of the swirls reveals tiny Mandelbrot patterns, with their own swirls and arches. Although the Mandelbrot set is incredibly complicated and unpredictable, it is obvious that it is not random.

Despite the simple and frequently small number of physical forces that affect chaotic events, they are unpredictable because these forces are interdependent and influence each other. The state of X depends on the state of Y, and vice versa. Thus, the flow of the river affects the shape of the whirlpool, and the shape of the whirlpool affects the flow of the river. Moreover, a small change in X can lead to a large change in Y. To calculate what Y will be some time in the future, we must know the exact value of both X and Y at the present. A small error in either value will soon lead to a large error in the prediction of future values.

So what appears to be random is really a result of our inability to precisely measure some set of current conditions. (The reason that weather prediction can never be accurate is because it depends on dozens, if not hundreds, of variables, none of which can be determined exactly.)

Understanding Chaos

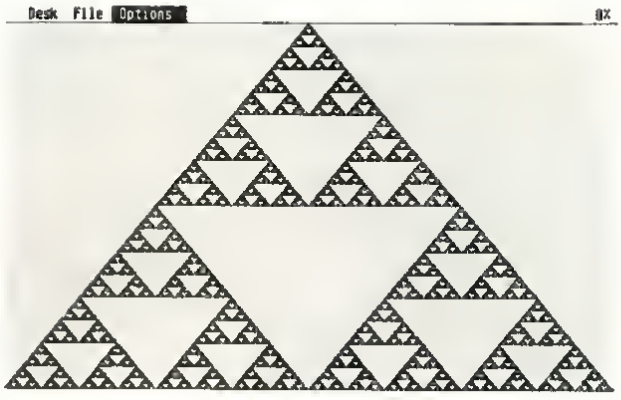
Chaos was written as a simple but powerful illustration of the other side of the coin, the order and self-similarity that can arise from a truly ▶

random event.

Now, follow in your mind (or on paper) the process that Chaos repeats over and over. Start with three points, A, B and C, which are the vertices of an equilateral triangle. Randomly choose any vertex, say B, and then a second one, say C. Now place a point halfway between B and C, and call it D. Choose a third vertex at random — perhaps B again. Place another point, E, half way between D and B. Continue in this fashion, placing a new point halfway between the most recent point and a randomly chosen vertex.

After a while, a pattern emerges, but not just a random smear with a vague triangular outline. To see this pattern filled in with 10,000 points, run the program Chaos without changing any of the initial values. A little reflection reveals that this pattern has to be generated. How, for example, would a dot ever fall in the central area of the figure? Is this a special case, requiring that there be three vertices in the form of an equilateral triangle? What happens if one starts with four points in the form of a square, or even more points? Or what if the vertices are not evenly spaced, perhaps some of them even being coincident? And what happens if a new point is placed somewhere other than exactly halfway between a vertex and the last point? Do patterns emerge, or is the result randomness? Chaos will help you investigate.

Triangles of triangles generated by the file DEFAULT.KS.



Getting Started

To run Chaos, boot this month's START disk; the START menu program runs automatically. At the main screen, click on Prepare, then select "Chaos on Your ST." The program will un-ARC directly onto the destination drive you specify.

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Plus we'll have MIDI and CAD news and reviews... and more!

Look for the March issue of START Magazine, on sale February 1st!

After the program un-ARCs, click on CHAOS.PRG at the Desktop.

Chaos runs in all three resolutions. In medium resolution, each pixel changes from white to grey to black as more points fall on it. The patterns can be printed on any Epson-compatible printer and the parameters for generating the patterns can be saved and recalled from disk files. I wrote Chaos in Mark Williams C, version 3.0.6.

The program also includes a few data files as examples of the various patterns that can be created in Chaos. The files DEFAULT.KSx are the intial patterns that are first produced when the program is loaded, but these files are not required for the program to run. For fun, see if you can figure out how the other patterns were generated. (Hint: the vertices don't have to be on the periphery of the figure, nor do they have to be evenly spaced.)

THE CHAOS MENU BAR

Desktop

About Chaos...: Click here to get program information and to see the simple animation I've included.

Files

Save: Saves the parameters used to generate the pattern, but not the pattern itself, in a small ASCII file. The file extension is automatically assigned as .KS1 for low resolution, .KS2 for medium and .KS3 for high.

Load: Replaces the current setting of the parameters with those contained in a previously saved file, except for the number of iterations, which is discussed below. The file DEFAULT.KSx contains the parameters for the conditions when the program is first loaded, so the initial pattern can always be regenerated without having to restart the program.

Print: Starts a screen dump of the screen to a 9-pin Epson-compatible printer. A dialog box will present you with two choices: Fast and Accurate. The latter gives a finer dot pattern and reproduces the colors more accurately as 19 shades of grey, but is somewhat slower. The Fast option has only nine shades of grey. The printing can be aborted at any time by pressing any key.

Quit: Exits Chaos and returns you to the Desktop.

Options

Clear Screen: Clears the screen of any images and lets you start over.

No. of Vertices: Calls up a dialog box that lets you specify how many vertices your pattern will have. Click on the arrow above the digit to ▶

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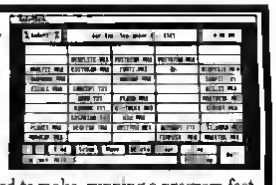

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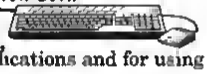

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increase it, click on the arrow below the digit to decrease it. The maximum number of vertices is 25, the minimum is three.

Vertex Positions: Produces a grid on the screen to help you align the vertices, which are specified by moving the mouse pointer to the desired position and clicking the left button. A small star remains on the screen to indicate the vertex position. If an even number of vertices are placed at exactly the same spot, the mark will not be visible. A pair of numbers at the right of the menu bar shows how many vertices have been positioned and how many there are in total.

Distance: Lets you change the position where the next point will be placed between the last point and the random vertex. The program starts at 50 percent (halfway between the two), but you can select any value from one percent to 99 percent. Values within 10 to 15 percent of 50 percent usually give the best results, however.

No. of Iterations: Specifies the number of points to be used to produce the pattern. The default value is 10,000, which takes 21 seconds to draw in monochrome (about 500 points per second). The program takes 50 percent longer in either color resolution, extra time being required to determine the current color of a pixel and convert it to the next darker shade of grey.

Coloured Points: Lets you substitute your own palette for the default Chaos grey shades, via the GEM Control Panel. This option has no effect in monochrome.

Start: Gets the program rolling. Press any key to interrupt the plotting. The proportion of points that have been plotted is shown at the right end of the menu bar.

Acknowledgments

I would like to acknowledge an episode of the PBS science series "Nova" as the inspiration for me to write Chaos. That episode discussed the phenomenon of chaos in clear and simple terms. I would also like to acknowledge the people at PBS in general and at WGBH-Boston in particular, for producing interesting and informative television shows that are well worth watching. ■

Stephen Clark has his Ph.D. in molecular biology and is Computer Resources Manager at the Mt. Sinai Hospital Research Institute in Toronto. He plays underwater hockey to relax. This is his first program for START.

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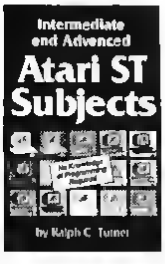

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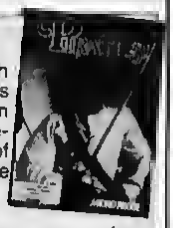

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INDIANA JONES AND THE LAST CRUSADE – THE ACTION GAME

REVIEWED BY TOM BYRON
START ASSOCIATE EDITOR

Whoever designed Indiana Jones and the Last Crusade, the Action Game, had to be, well, a sadist. I was hours and hours into gameplay and still hadn't made it through the first level. It would take another two weeks of sleepless nights before I'd finish the game. What were they trying to do to me?

Lucasfilm's latest game, based on last summer's hit movie, is being marketed concurrently with the role-playing adventure (called "The Adventure Game"). It has a lot going for it: name recognition, slick graphics and serviceable gameplay. Yet as I struggled through each level, died innumerable deaths and alternately cursed and praised the programmers, I started thinking about the nature of computer games. I realized that I wasn't just playfully addicted to Indy, I was *obsessed*. Only two other computer games have had this effect on me: Star Raiders and Tower Toppler.

***Indiana Jones and the Last Crusade, the Action Game,* starts you off as young Indy. It is here that you must fight a band of grave *robbers* for the fabled Cross of Coronada. Three more challenging levels await you in Lucasfilms' latest offering.**

Indy Gameplay

In Indy, you're Indiana Jones and must pass a number of obstacles and innumerable bad guys over four levels to collect relics as a part of your quest for the Holy Grail. In some ways, it's a typical ladder game, not unlike Zorro or Impossible Mission 2.

The game does an admirable job at following the basic plotline of the movie. In the first level, you're young Indy and your goal is to wrest the Cross of Coronado from a band of grave robbers. If you've seen the movie, you can guess what the next levels are like; if you haven't seen the movie, then I'll let the game surprise you. Each level gives you five lives, measured by a bar at the bottom of the screen. Unlike the movie, however, Indy's father Henry does not make an appearance in the game (except for his hearbeat).

Overall, gameplay is a bit difficult and oddly enough, Level 1 is *extremely* difficult and very long, as well. It's a baptism by fire, because the following levels are cakewalks compared to it.

Game control is through the

Continued on page 62

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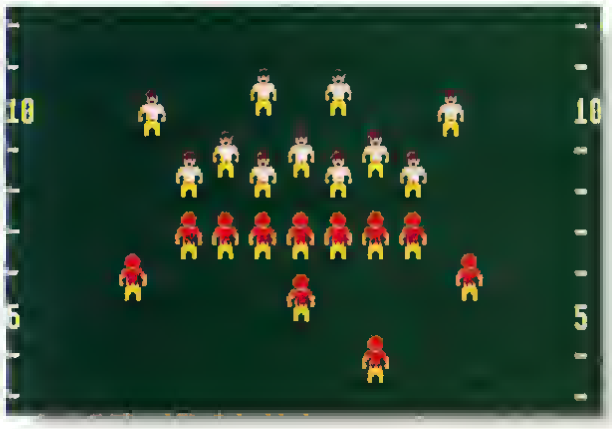
GRIDIRON EXCITEMENT YEAR 'ROUND

The football season is officially over and the Superbowl is still a few weeks away — what's an arm-chair quarterback to do? With your ST, you can fill those waiting hours with challenging fun and excitement. START's Crunch Time Football lets you make exciting runs, spectacular passes, bone-crushing tackles and game-winning touchdowns any time of the year — and there's even a halftime show! The program was written in GFA BASIC 3.0 and runs in low resolution only.



Crunch Time Football is just like the real thing. At the play screen you can run, pass, punt, ga for a field goal — anything it takes to win the game. Who knows? — maybe this is the year you make it to the Super Bowl!

You make the calls in the file FOOTBALL.ARC on Side 1 of Your START disk.

CRUNCHTIME FOOTBALL

BY POPPY AND JESSE KOCHER

Crunch Time Football is a one-player arcade football game — it's just you against the computer. On offense, you call the plays: you can run, pass, lateral, punt or try field goals. On defense, you choose the defensive formation then try to tackle the runner and keep the other team from advancing the ball.

Getting Started

To run Crunch Time Football, boot this month's START disk, the START Menu runs automatically. At the main screen, click on Prepare, then select "Crunch Time Football." The program will un-ARC directly onto the destination disk you specify. Plug in your joystick and double-click on GFABASRO.PRG (the GFA BASIC 3.0 Run Only program) and then select FOOTBALL.GFA in the file-selector box. Make sure that the data files FB2.DAT, FB3.DAT and FB4.DAT are in the same directory.

Crunch Time's title screen will appear while the program loads the graphics data. When it finishes loading, you're given a series of screens to choose your team colors, enter your team name and select the level of difficulty: High School, College, Pro or Super Bowl. College is the default setting, but you may want to try High School until you get the hang of it. A word of warning: Super Bowl level is tough — you better know your football before you tackle it. Now, press the fire button to begin the game. The computer's team kicks off, and you control the receiving player with the joystick.

Offense and Defense

On offense, choose your play from the play-selection screen. Move the joystick to highlight the play you want. Press the fire button and the teams will line up. Press the fire button again to start the play. As soon as the players start moving, you can control the quarterback with your joystick. To pass or lateral, simply press the fire button. Joystick control transfers to the player who catches the ball.

Your offensive plays are diagrammed on the selection screen and you should study the diagrams so that you know how each play is designed. Of course, you don't have to run the play precisely as designed. You can run in any direction that you want. You can fake a pass or lateral and keep the ball. Carefully watch how the defense reacts when you drop back to pass. You may want to release the ball quickly or wait for the receiver to get open. But if you wait too long, you may not get the pass off. ▶

Within Crunch Time we've included two secret plays. If something happens that you don't expect, try to figure out how you did it. Both plays are very effective and once you know how to run them, you can use them whenever you want.

On defense, you select your alignment: Basic 4-3, Run Prevent, Pass Prevent, Blitz or Goal Line. You control the defensive player who is flashing just before the play begins. The computer's team has all the same options that you have on offense.

You may quit the current game after any play by pressing [Q]. A dialog box will appear giving you the option of starting another game or exiting the program.

Strategy

Like real football, Crunch Time gameplay takes a combination of skill and luck. As you play the game more and more, you'll improve both on offense and defense. However, some things, like fumbles and interceptions, just happen — even to the best players. In a close game, it's the turnovers that can determine the outcome.

There are numerous variables that determine the difficulty and outcome of each play: the selection of the defense, the speed of the rush, etc. Because of the multiple factors, the game forces you to react to the action. The offensive plays were designed so that they usually, but not always, work best if run as designed, due to the positioning of the defensive players. But they were also designed so that the defense will not always react the same way. On the average, each play is approximately equal, but your skill can affect the outcome significantly.

Just as you need to read the defense when you have the ball, you need to look for keys to the computer offense when you're on defense. It will take lots of practice before you're able to know what to look for. As you get more experience with the different defenses, you should be able to eliminate a lot of the mistakes that you'll make at the beginning. Just remember, you better have a good defense if you want to go to the Super Bowl!

That's all there is to it (except for the crowd scenes and the halftime show, of course). We hope you enjoy playing the game as much as we enjoyed creating it. ■

Jim "Poppy" Kocher is a retired rock'n'roll drummer, a trial attorney and sports fan who programs computer games for relaxation. Jesse Kocher is a 13-year-old artist and middle-school student. They both live in Eugene, Oregon; this is their first program for START.

FOR THE FUN OF IT, continued from page 57

joystick. To make Indy leap, you jerk the joystick to the northeast or northwest. The fire button makes Indy punch or crack the whip at bad guys (or to help you past obstacles).

Some Hopefully Helpful Hints

Perhaps the most important bit of advice I can give you is to have a good joystick. If your joystick has lousy response, you're looking at a whole lot of missed jumps — and even more frustration.

On the first level, I found that the whips were less a help than a liability. A well-timed right to the jaw from a crouched stance worked better for me.

Later on, gameplay is pretty much the same, although in some parts the whip actually comes in handy. In Level 2, don't forget to use your whip when you make it to the castle walls. Seeing the movie helps here.

A word of warning about Level 2: to gain access, you must enter a doorway with three symbols that correspond to a date at the top of the screen. You'll find the correct doorway by referring to a special decoder sheet in the documentation. Take this part of the game seriously: if you use the wrong door, you can play through the entire level, but the icon you need to go on is simply not there. If you go through the wrong door by accident, go ahead and play the sequence out, just to get some practice time in.

Level 3 is graphically interesting, but there's not much more to say about it — in fact, it's the easiest level. In Level 4, the game control changes without warning and you need to press the fire button to make Indy jump. It took about three attempts before I discovered this, because it's not covered in the documentation.

How Not to Make a Computer Game

Despite (or because of) the hours I spent playing Indy, I think Lucasfilm made some basic errors in this game.

First, the on-disk copy protection: it searches for an extra track on the disk and makes your system sound like it's damaged — or is about to be. As many times as I booted and rebooted Indy, I certainly didn't need this strain on my expensive hardware.

Second, the documentation: it's just plain inadequate. The manual touches on the basics and that's it — no in-depth instructions, no hints, no nothin'.

Third, there's no save-game feature, a serious flaw. Indy is long,

involved and frustrating — why add to the player's troubles by making him complete the game in one sitting? By way of consolation, you have unlimited restarts on the upper levels, but once you turn off your computer, it's back to the beginning for you.

Fourth, the first level is just too hard. Whatever happened to idea that the easier the first level is, the more the player is drawn into the game?

Despite the hours lost from my friends and family, I liked Indy.

Conclusion

Despite the hours lost from my friends and family, I liked Indy, the Action Game, a lot. I figure any game that can can keep me so interested for so long has to be good.

If you're wondering how the game compares to the movie, I'll tell you: the movie's better, but that's mainly because it's shorter.

PROJECT NEPTUNE

REVIEWED BY DAVID PLOTKIN
START CONTRIBUTING EDITOR

Once again, a tyrant wants untold wealth and power. But this one has decided to try something different. In the frigid North Sea, the villain, code-named "Yellow Shadow," is building a series of undersea bases to mine uranium to sell to countries who would probably not make peaceful use of it. The bases, therefore, must be destroyed and this dastardly plot stopped. To avoid an international incident in these oil-rich waters, a lone secret agent is sent in to do the job. So begins Project Neptune from Epyx, a game which effectively combines strategy and action to form a very playable contest.

A Man Called Rip

As Agent Rip Steel, you must destroy the undersea bases of the Yellow Shadow. To do this, you are equipped with several weapons. The first is your submarine. You can control the speed and direction of the sub with the mouse or joystick, and the view out the cockpit window is extremely realistic, even down to the distortion you normally see when looking at things in the water.

The sub is how you get from place to place. It is, unfortunately, a research sub and so doesn't carry much air or power for its shields. It does have some short-range torpedoes for blasting obstacles along the sea bottom — they're not much good for anything else. The sub is also equipped to receive signals from overhead satellites, from which a map is constructed of the current situation. The Yellow Shadow's bases and their connecting linkages are shown on this map, as well as your own friendly supply bases. These supply bases can be docked with to provide refills of air, energy and weaponry (more on this later).

Two Ways to Battle

Yellow Shadow's warrior patrols can be battled in two ways. The first is to use the submarine to launch a "concussion device". This is rather involved. You must click on the activating button, set the timer, and launch. This can take a few precious moments, but it is worth it — several patrols can be wiped out with one blow. You can only carry five concussion devices, but you can get limited refills from allied supply bases. While you are busily setting up to launch your concussion device, the patrol is pounding away at the sub. Each hit costs energy and air — run out of either and the game is over.

The second way to battle the warrior patrols is lots more fun and brings up the game's first arcade sequence. By clicking on the launch button for the Propeller Driven Platform (PDP), you're left facing the entire six-vessel patrol. Your view is from above and behind the PDP as it zooms along the sea bottom, and you can control it with mouse or joystick. The patrol ships will attack one at a time while the others hang back. They attack by launching several types of torpedoes and tracking mines, being hit by these robs you of energy and air. You fight back using a laser mounted on your PDP. A single hit on a warrior vessel causes it to explode rather spectacularly, at which point the next one (if there is one) moves into position. Your laser can also obliterate the oncoming torpedoes and mines if you're a good shot.

Project Neptune effectively combines strategy and action.

Choices, Choices

Project Neptune is lots of fun. Its arcade sequences are extremely well done, and yet it is heavy with the need to make strategic choices. For example, as enemy patrols gang up on your supply bases, you must choose between running over and defend them, or letting the enemy ▶

have some of them. Defending your bases takes time, and Yellow Shadow is busily building more bases all the time. The supply bases that are closest to Yellow Shadow's installations are the most vulnerable to attack, but also provide the easiest and fastest source of resupply. Choices, choices.

Project Neptune's graphics are very, very good. The illusion of 3-D in the arcade sequences is excellent and the twisting and turning of enemy vessels is mirrored by their trailing air bubbles.

There are also three levels of difficulty; be warned that level 1 is plenty hard, and Yellow Shadow builds bases so fast on level 3 that I haven't even come close to winning. You can also save a single game, which is handy if you reach a good stopping point. The "manual" is a series of "top secret" sheets of paper which are not bound in any way. While this is supposed to be realistic, it is instead realistically annoying, as the sheets of paper you need to reference fly all over the place in the heat of battle. Fortunately, before too long you won't need the "manual" anymore.

Problems and Recommendations

There are a few minor problems with Project Neptune. You control the sub with either the mouse or joystick, but must switch between the two operating modes (piloting the sub or using the pointer to press switches in the sub's cockpit) by pressing the [Return] button. Often in the heat of battle, you may forget and end up in the wrong mode. Another thing which sometimes occurs is that the program misses your keystroke. There are also a couple of minor bugs. Occasionally, the auto pilot will bring you up adjacent to a supply base, but you won't be able to see it on the viewscreen, and your supplies are not replenished. You can move away and try to come back, but if you're very low on supplies, that could be the end of the game. Also, the concussion device that you drop from the Scuba gear occasionally goes off prematurely, which severly depletes your energy and air if you're caught in the blast.

One final complaint involves the ending. It's disappointing and kind of anticlimactic, but you'll see what I mean when (if?) you get there.

Despite the minor complaints, Project Neptune is a rollicking good time that will appeal to arcaders everywhere. And, if you're looking for a game with a little "depth" (excuse the pun), look no further. This one's a winner.

FALCON — OPERATION: COUNTERSTRIKE

REVIEWED BY WOLF GRIFFEY

The last I had heard was that Falcon, the F-16 jet-fighter simulation from Spectrum HoloByte, was going to get some new areas of operation. I had been looking forward to a playground where I could splash MiGs and toss turf around with bullets and bombs.

But when I was handed a new set of Falcon orders by my old C.O., he said not to worry about packing my bags. He then added, "The area you're headed for has all you'll need."

He finished, throwing over his shoulder the comment, "Don't worry — it's just a new operating area."

I soon discovered that my orders for Falcon — Operation: Counterstrike were another example of my C.O.'s legendary understatements

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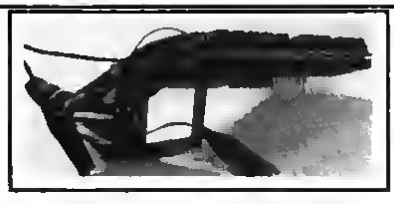

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Dive beneath the surface to combat the evil Yellow Shadow in Project Neptune, the new arcade adventure from Epyx.

Spectrum HoloByte's new mission disk for its popular F-16 jet-fighter simulation is called Falcon — Operation: Counterstrike. Its 12 missions promise no-holds-barred, high-tech dog-fighting at its best.

Twelve Ways to Glory Or ... ?

Twelve missions.

I was used to that, same number as before. But these jobs were linked. According to the operation profile, I could come back sometimes after a tough one, only to find more of those tanks trying to tear up my runway. No more "single-strike-flights-then-count-up-the-honors."

The mission profiles included objectives, recommended ordinance and words of warning about what could happen if I blew it. The whole idea was to stop the other side from being able to fight (destroy their ground assets). One pilot, one friendly base and ground crews. Yet, guess who had to go lone-wolfing it, bombing and shooting up the countryside. This was glory or bust.

Changes for the Better

This bad news aside, I quickly moved on to see if my old ride had changed to give me some kind of edge. First piece of good news was that they were called enchancements. Both aircraft systems and flight controls had been upgraded.

Radar and HUD had been moved up to reflect the current avionics. The AGM-65 Maverick's had gained a corrected zoom image on the COMED screen. The improved flight controls were tuned for easier handling and now included a select and deselect auto-leveler. With the ability to make small degree changes, the hits on target during bomb runs would increase. Also there was an autoview mode to switch my cockpit view to the one that the MIG was in.

A few last items also helped. I could make landings with more damage to the aircraft and I didn't have to be as close to the center line as b efore I would have a little more slack after a tiring flight. I was sure that Sarge and I both thought a lot about that one. Also another big plus about this base: there were friendly SAM's all around. Now I could land in peace and not have some red-star climbing up my tail pipe.

As always, with the good came some bad. Those tanks I talked about were T-80s. It would require either a MK84 or an AGM-65 to stop them and they would only stop appearing after I cut the supply lines. Second trouble spot was the hard fact that the baddies were flying MiG-29A Fulcrums. Head to head we were about even. I would have the edge on speed down low, they would have it at altitude. Word was that as a close-in fighter, armed with either the AA-10 or AA-11, this was a good machine. But the designers still left rear-view mirrors in the cockpit. When the time came for me to test this bird I intended to make some use of that feature.

Active Duty

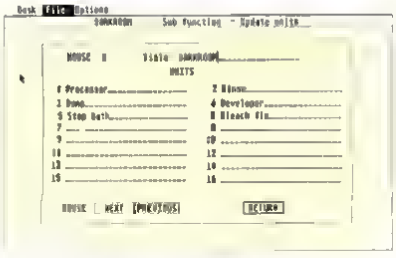
I read the "Strategy" section of the manual. Simple advice — just stay ahead and survive. Get the incoming ground forces, tanks and their landing craft, then take out the bridges and supply units. Finally take out the industrial base. Finished with all that, I went on active duty.

Engine startup, system checks and takeoff were all normal. With a load of six AGMs and a couple of AIM-9s

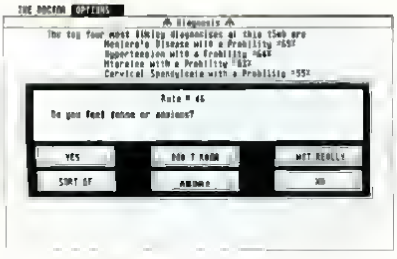
continued on page 70

Disk Contents

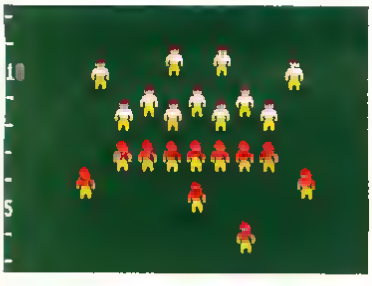
Programs on Side 1 of Your START Disk



X-10 CONTROLLER ..... PAGE 72



A.I. DOCTOR ..... PAGE 78



CRUNCH TIME FOOTBALL ..... PAGE 60

SCIENCE ON YOUR ST

Turn your ST into an industrial-strength workhorse with Howard MacOdrum's **X-10 Controller**. Use this GFA BASIC 3.0 program to control a simple hardware interface connected to the serial port, and let your ST do all the hard work you once did by hand. File X10CTRL.ARC; runs in medium or high resolution.

The Super Bowl is almost upon us, marking the end of gridiron season. But you can play **Crunch Time Football**, by Poppy and Jesse Kocher, all year long. Choose the play when quarterbacking, or your formation on defense, and wait for the snap. This game is so realistic you'll discover grass stains on your joystick! File FOOTBALL.ARC; runs in low resolution.

Chaos on your ST, by Stephen Clark, demonstrates how complex forms arise from simple beginnings. Based on the hottest mathematical theories of the decade, this program generates intricate, sophisticated patterns using your choice of starting points. File CHAOS.ARC, runs in all three resolutions.

Has your child got a cough? Does your car make a mysterious whir-rattle-ping sound? Need a diagnosis? The doctor is in — **A. I. Doctor!**, that is. Ron Schaefer's exercise in artificial intelligence analyzes a problem based on rules stored in a separate knowledge file. Change the knowledge file and change A. I. Doctor!'s area of expertise. File AIDOCTOR.ARC, runs in medium or high resolution.

Wendy Johnson

LOGIC LAB *on Side 2 of your START disk*

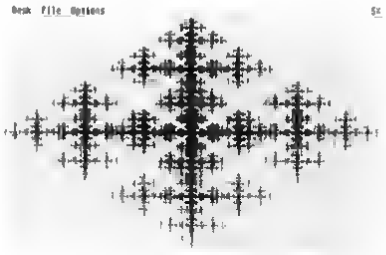
AND THERE'S MORE...

Side Two

Programs on Side 2 of Your START Disk

CHOCK FULL O' SOURCE

We've dubbed Side 2 of this month's START disk "Chock Full O' Source." When we introduced the Heidi format, we promised you a bonus side of special programs, intriguing demos, and, most of all, source to the great programs on Side 1, past and present. So in addition to giving you code to this month's programs, we've dug through past issues and found three worthy sets of source that just couldn't he fit on disk when originally published.



CHAOS ON YOUR ST ..... PAGE 84

We've got something old and something new for this month's bonus programs. We're republishing **Pixel-Pro**, Matt Loveless' image processing program from the Fall 1987 issue. You'll find it in the file PIXELPRO.ARC. And the something new is Joe Reiss' **Logic Lab**, which creates the logic puzzles you sweated over in seventh grade. You remember: five men wear five different color ties, live in five separate houses, have five different pets and eat five different foods. Match each man with his house, pet, food and tie. The program in LOGIC.ARC creates the puzzle.

Headlining our "Chock Full O' Source" disk is the Mark Williams C code to **Chaos**, one of this month's special science programs. Written hy molecular biologist Stephen Clark, it shows the mathematics that creates order out of apparent randomness. You'll find it in the file CHAOSSRC.ARC.

In the file CALC_SRC.ARC is the C source to Alex Leavens' programmable scientific calculator, **START Calc**, published in the Fall 1987 issue. This feature-packed desk accessory handles trig functions and floating point math, and can accept programs of up to 1000 steps.

Spencer the Snake, star of the popular game **Slither**, returns once again to your START disk. The source that creates this apple-chomping reptile is included in file SLITHSRC.ARC. The compiled version of this Personal Pascal 1.1 program ran in the January 1989 issue.

And, bonus! bonus! we re also giving you the code to the **Slither Screen Editor**. Written in Laser C, and published in the September 1989 issue, this is the program that allows you to create your own Slither levels, making them as hard or as easy as you want. You'll find the source in file SSED_SRC.ARC.

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Disk Instructions

Now Using Your START Disk is as easy as 1, 2, 3!

Running the START Menu Program

From a Floppy Disk: Put your START disk in drive A and turn on your computer. The START menu program will come up automatically.

From a Hard Disk: Boot your computer as you normally would. If you're using a color system, set the computer to medium resolution. Put your START disk into either drive A or B, and double-click on the drive's icon. After the disk's directory appears, double-click on START.PRG. Note: *Do not run the menu program from your hard drive!* Each issue's disk has its own START.INF file which must be in the same directory as START.PRG.

When the menu program first runs, it will ask you to describe your floppy disk drive configuration. It is very important that you enter this information correctly, as the program will use the information later to correctly back up and prepare your program disk. Click on Single or Double sided for both drives A and B; if you only have one drive, the Drive B buttons will be greyed out. If you are unsure whether your drives are single- or double-sided, click on Help.

What Then?

This is where accessing your START programs gets easy. Just follow these three steps.

Format Disk

1. Here, you can format a single- or a double-sided disk in either drive A or B. Click on the drive containing the disk to format, select Single or Double sided and then click on Format. Formatting a disk will delete that disk's contents. Do *not* format your START disk.

Backup START Disk

2. We recommend that you make an archive copy of your START disk, which is in the special Heidi format. If you have a single-sided drive you can back up Side 1 of your disk onto one single-sided disk. We also recommend that you borrow a friend's drive to back up Side 2 of the disk onto another single-sided disk. If you have a double-sided drive, you can back up the disk onto one double-sided, Heidi-format disk. The computer will rely on the system configuration information you entered earlier to tell you which disk needs to go in which drive.

Prepare Disk

3. This is the heart of the START menu program. The Prepare a Disk option brings up a window that lists the names of the programs, source files and demos on this issue's disk. The names of the programs will be given in full; you don't have to worry about the specific names of the archive files. If a program has accompanying source code on the back side of the disk, the entry will be listed separately. For example, one entry may be "Avecta I: Ebora" and an entry futher down would be "Source Code for Avecta I: Ebora."

Next, a dialog box will ask for the destination directory, and whether you wish to send the program files to a folder. The destination directory may be a floppy, hard drive or RAM disk. If you wish to put the files in a folder, the program will offer you a default folder name. Press (Return) to use this name or edit the path directly. If the folder does not already exist, the program will create it. If you select drive A or B as your destination drive, the program will ask you if you want to format the destination disk. The menu program will then un-ARC the files directly to the destination drive, and will minimize disk swapping by analyzing the drive configuration you specified earlier.

Bonus Options

Each month, your START disk menu program will include special bonus information ranging from the issue's disk contents and coming attractions to special subscription offers and the latest-breaking Atari news. Click on the various menu buttons and scroll through the main menu window to read this information.

And There You Have It

For more detailed instructions, click on the Help button. Click on Exit to return to the Desktop. And that's all there is to it — un-ARCing START programs was never easier!

Your START disk format and interface was developed by some of the most talented programmers in the ST world. Contributing Editor **David Ramsden** wrote the interface for the menu program and the custom un-ARCing routines that are as much as 40 percent faster than ARCX TTP. Contributing Editor **Dave Small** and **Dan Moore** wrote the Heidi formatter that made the back side of the START disk accessible for the first time. **Charles Johnson** of Codehead Software wrote a custom version of the STARTGEM program that lets the menu program run at boot time even though it's GEM-based. **Keith Gerdes** of Double Click Software wrote DC SQUISH, which lets us compress the START menu program executable and resource files to save valuable space on the front side of the disk.

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continued from page 65

(for morale purposes only) I needed zone-5 afterburner. The tanks wouldn't show on the COMED, so I turned toward the lake in the map and selected the Mavericks from the system discretes. Explosions in the distance told me where the ground attack was. So, at 350 knots and under 3,000 feet, I started eyeballing for a few T-80s. I spotted the first just about half the distance to base and I went for a lock-on. The lock looked a little off, so I unlocked and used the auto-leveler to help my correction inputs, relocked on target and had time to shoot before I overflew. A good hit and I continued toward the water somewhere below 1,500 feet. About ten degrees to the right was one of the landing craft. Selecting guns, I made moves to run a strafing attack. Another good position and the boat was airborne for a few seconds — at least some parts were.

Ground support called up with a MiG report while I was making a climbing turn back to the beach. It was far enough away not to appear when I placed the autoview on active. I continued the turn and caught sight of two more boats in the water. I got an AGM-65 lock on the nearest one and was rewarded with an in-range right as it happened. As soon as that missile came off the rail, I unlocked and relocked on the second boat and shot again. Two locks, two Mavericks in flight, two less landing craft to worry about. Back over the ground war, I spotted my second tank and attacked. Rushed the shot and missed! Turned toward base and there was the third T-80, but it was getting a little too close for comfort. I made a loop over the base, got number three in the sights, rolled upright, pulled out of it, locked on and knocked out my second one. Leveling out a little, I locked my last missile onto the last and fired it off. It was up, hot and true. No more working treads this side of the water.

This climb-and-dive had pushed my speed to 500-plus by the time I had finished. I was now back over the lake. Ground control advised me with a MiG alert and the autoview brought up the left side. It was a little above my ship and overflew, guns firing. I pushed down and turned, deploying the speed brake. This made it overshoot even more. Wings level and brake retracted, I looked right for my first closeup view of a MiG-29A. It was still higher than me and the caution lights informed me that the pass had taken out my oxy and gun systems.

The MiG was close to the west edge of the lake, so it would have to either turn right or climb straight ahead to stay out my SAM sites. The pilot elected to turn, I elected to stay low, turn under him and go for a behind-and-low solution. With that decided, I opted for out-of-cockpit view and AIM-9s. A smooth Low-G Yo Yo to stay inside its turn, speed brake out again to get some separation, so the missile would arm. The shoot diamond was on flashing. Fire and *splash one Fulcrum*! That autoview kept me up to date on this one, without having to search the compass to see where the bad guy was.

Return to base and landing the ship was a breeze. Just like all through the flight, the controls were smooth. With auto-leveler and trim working for me, staying on the ILS only required me to watch my power and AOA. Touchdown and roll out were beautiful.

No Time for Laundry

You know, sometimes, it doesn't pay to unpack your bags. Sometimes, you don't even get to pack them. This action is a case in point — why

have a clean flight suit lying around at a base that has been under attack by tanks ever since you started up the engine. Next, I get to try my luck, pushing max speed, down low with a full load of MK84s and AGM-65s, hanging out in the wind! Then maybe get one or more of those MiG-29s waiting around to pounce me once I clear the local SAM zone. Who has time to think of laundry!

After the mission I told my C.O. a few things. Yes, the countryside is very rich and green. I definitely like the improvements in systems and handling on this version of the Electric Jet. The autoview alone is worth the new price tag. Absolutely, the new terrain and targets are a challenge I wouldn't miss trying out.

Sarge says the ship is ready — time to go back to work. But, you know, with this much action, and as light a touch as this bird is to fly, what's there to worry about?

Right — plenty. ■

Contributing Editor David Plotkin works as a chemical engineer for Chevron U.S.A.
Wolf Griffey is a product manager for Antic Software and a former Marine Corps fighter pilot.

PRODUCTS MENTIONED

Indiana Janes and the Last Crusade: The Action Game $39.95. Lucasfilm Games, P.O. Box 2009, San Rafael, CA 94912, (415) 662-1800.

Falcon — Operation: Counterstrike, $29.95 (Falcon F-16 Jet Fighter Simulation required), Spectrum HoloByte, 2061 Challenger Drive, Alameda, CA 94501, (415) 522-3584.

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ON DISK

X-10 CONTROLLER

Make Your ST a Powerhouse

BY HOWARD MACODRUM

The X-10 Powerhouse Interface is specialized hardware that lets you control any household appliance directly through your ST's serial port.

With GFA BASIC 3.0, Howard MacOdrum takes the X-10 Interface a step further with a customized program to control anything from a photographer's darkroom to an electrician's workbench. His X-10 Controller runs on either color or monochrome systems.

Take total control! X10CTRL.ARC is on Side 1 of your START disk.

I enjoy developing film and printing pictures, but working in a darkroom always requires a lot of tedious handwork. To avoid it, I've built my own special darkroom equipment with solenoid valves to dump the chemicals and rinses into my processor.

My first efforts to control these solenoids were with a crude homemade mechanical timer, since I couldn't find any commercial timers that suited my needs. With this timer, unfortunately, it was difficult to make changes whenever a different film, paper or chemical process was used. Then I learned about the X-10 Powerhouse controllers and purchased an X-10 and the software to run it. To my disappointment, I found that the Stored-Program feature of the X-10 only let me control events with an accuracy of hours and minutes — not fine

enough for my purposes. I decided to write my own program: X-10 Controller.

A Controller with a Difference

The main difference between X-10 Controller and other control software available for the ST is the "Run From File" option. When this option is used with a properly designed file, event accuracy may be controlled from hours to seconds, a substantial improvement.

There are limitations, however. The primary limitation is that since the X-10's Stored-Program feature is not used, your ST must be dedicated to this function during the entire process. Also, because some time is required for the X-10 to send signals and respond to the ST, it's not possible to control the time between steps precisely to the second. The time required for signals to be transmitted varies and is dependent upon the number of units upon which the action is to be performed. However, steps will be maintained in the proper order and completed in turn.

X-10 Controller was written in GFA BASIC version 3.0 and utilizes resource files created with the resource construction set supplied with the language. Hardware requirements consist of an ST or Mega, a monochrome monitor, an X-10 Controller and one module for each device to be controlled, a printer is optional. Complete instructions for the design and set-up of X-10 systems is contained in the X-10 Command Unit documentation.

Getting Started

To run X-10 Controller, boot this month's START disk, the START Menu runs automatically. At the main screen, click on Prepare, then select "X-10 Controller." The program will un-ARC directly onto the destination disk you specify. Double-click on GFABASRO.PRG (the GFA BASIC 3.0 Run Only program) and then select X10CTRL.GFA in the file-selector box.

After loading, you'll see the main menu with the menu headings of Desk, File and Options. The Desk menu will let you access your desk accessories and shows the credits and some information about the resource file.

The File Menu

Load: Loads a previously saved X-10 Controller file with the filename extender .X10.

Update Steps: If you select this option and haven't loaded a file, a dialog box will appear giving you the choice of continuing or returning to the main menu. If you click on Continue, a new file is created and X-10 Controller will go directly to Update Detail (more about this later). If you've loaded a file, the first page (the first 16 steps) of the file will be displayed, as shown in *Figure 1*. If the file is larger than 16 steps, you may click on the Page Down button to display the next 16 steps. The maximum number of steps is 128—dictated by the X-10 controller's memory capacity.

Save: Saves any file created in the Update Steps or Update Units options.

Each *step* is a command for a specific time and for a specific module or modules. You can specify the module(s), the location and the time for the action. To change the contents of any step or create a new step at the end, click on the applicable line. This will bring up the Update Detail display in which you change or create a step. See *Figure 2*.

If you click on Return from the Update Detail display, you will return to the main menu, but if you have created any steps out of time sequence, an alert box will appear to warn you where the error is, so that you may go back and change the time. If you created the out-of-sequence step on purpose, you may use the Sort box to rearrange the file into correct time sequence. In order to exit the Update Detail display, you must either correct the out-of- ▶

With this hardware and the X-10 Controller software, you can automate tedious tasks.

Barry Muniz

sequence step or sort the file.

The Update Detail Display

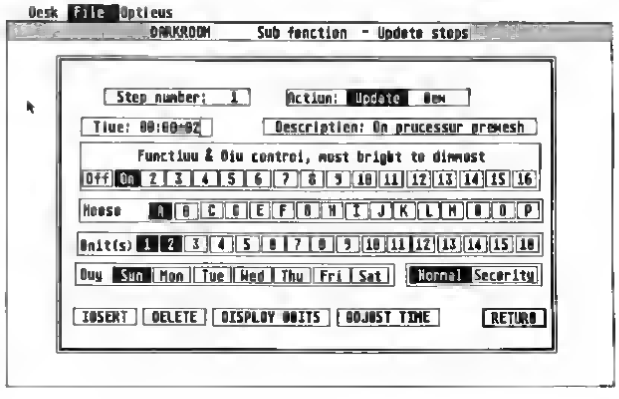
Step Number: Sets the step number on which the given action is to be taken.

Action: The action is shown as new or update.

Time: Time is shown as hours, minutes and seconds. If the file is to be loaded into the X-10 Controller's memory (rather than run from the ST), seconds have no meaning and may be ignored. You must keep in mind how a file will be used when creating it. If a file is to be stored in the X-10 memory, the time to be entered is the *hour and minute until the action*. If a file is to be Run From File, the starting time of the first step is set from a zero starting point, since the real starting time can't be determined at the time the file is created.

Figure 1. The Update Steps menu option will show you the first page of steps of any loaded file or let you create a new file. This is a typical page file display for the control of a darkroom.

Figure 2. The Update Detail screen lets you change each individual action in your sequence as to start and end times, the module you want controlled and its location.



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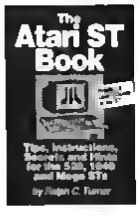

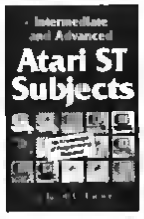

Ralph Turner's new book, *Intermediate & Advanced Atari ST Subjects*, covers hard drive management & optimization, IBM emulators, disk structure and file recovery, connecting a 5 ¼-inch floppy drive, assembling a hard drive system from inexpensive components, SCSI ID numbers and LUN IDs, sector and file editing, binary, hexadecimal and decimal codes, ASCII file problems, escape codes, miscellaneous tips, and much more. His *Atari ST Book* covers RAM disks, the AUTO folder, Desktop tricks, Installing an Application, adjusting the Control Panel's Palette Settings, Public Domain Software, Copying, Printers, Desk Accessories, Telecommunications, the Item Selector, and much more. Neither book requires a knowledge of programming. $16.95 each, plus $2.00 shipping each ($2.50 each to Canada). Check, Money Order, VISA or MasterCard. Index Legalis, Post Office Box 1822-49, Fairfield, IA 52556. Phone: (515) 472-2293

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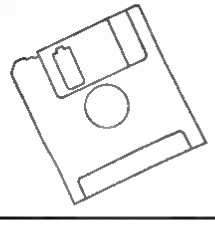

Description: This is optional but will help you remember the purpose of each step when you look at a file later on.

Function: Click on a button to set the level from On (brightest) to 16 (dimmest)

House: Click on the House in which the unit is located.

Units: Click on one or more of the units (modules) that you want to respond to the current step.

Day: Click on one or more days on which you want the module(s) to respond. Day only has meaning if the file is to be stored in the X-10 memory; Day is ignored if the Run From File option is used.

Normal/Security: Normal means that the action will be taken on the day(s) and at the time indicated. Security is used to take advantage of the X-10's Security function; an

You only need a few peripherals to turn your ST into a powerhouse.

action will not be taken precisely at the time indicated (which might indicate a timed operation to burglars), but within a random time of one hour from the time indicated. Normal/Security applies only if the file is stored in the X-10 memory; it has no meaning if the Run From File option is used.

Insert: Lets you insert a new step *prior* to this step; all subsequent steps are shifted down one step number.

Delete: Deletes this step and shifts all subsequent steps up one step number

Display Units: Lets you review and, if desired, change descriptions of unit assignments (more about this later)

Adjust Time: Lets you adjust the time of this and all following steps forward (plus) or back (minus).

Return: Returns you to the page file display.

Print Steps: If a printer is available and on-line, this will give you a hard copy output of the current file ▸

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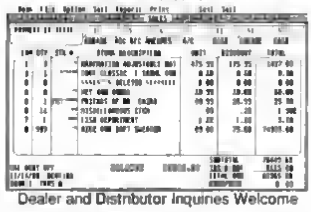

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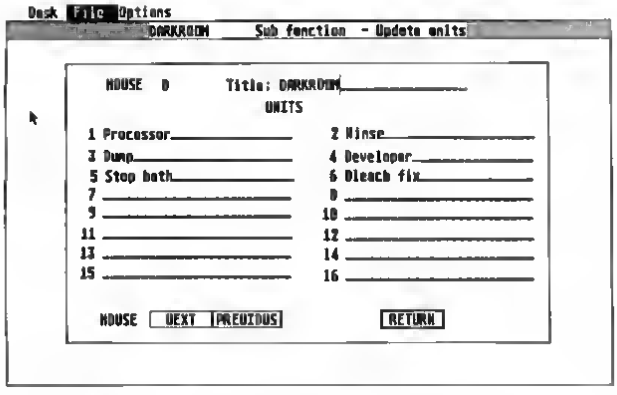

Figure 3. The Update Units menu allows you to assign easy-to-remember mnemonics for up to 256 units. These are the typical names assigned to darkroom units.

Update Units: Lets you assign names to all 256 possible units. These names are for reference only, but names are much easier to remember than unit numbers. See *Figure 3*.

Print Units: If a printer is available and on-line, this will give you a hard-copy output of the current unit assignments for this file. This option will only print Houses and Units with a description.

Analysis: Searches the current file for common errors. You can view or print any errors, up to 50. If you have more than 50, correct the first 50 and then use Analysis again.

Quit: Exits from the program. If you have inadvertantly left any X-10 control modules in an *On* status, an error message will appear listing those units. You should always end the program with this option, rather than just shutting off your ST.

The Options Menu

Run From File: This option is the main reason X-10 Controller was written. You may abort a Run From File by pressing the [A] key. If any units are left on, an alert box will appear and then X-10 Controller will turn all units off. The ST must naturally remain on-line during the entire process. You may rerun a Run From File by simply re-selecting it. Each starting time is calculated from the time you start the Run From File and has no relationship to the time maintained by the ST system clock, a battery-backed ST clock or the X-10's own clock.

File to X-10: This option loads the current file into the X-10 Command

A further development

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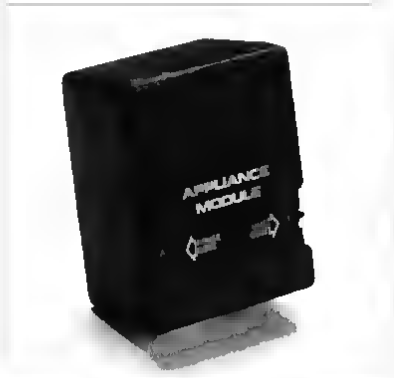


The X-10 Powerhouse unit con control multiple units.

Unit's memory. The X-10 clock will then control the times when actions will occur. When using this option, any file previously stored in the X-10 will be overwritten by the new program. The X-10 clock setting is not changed by this option and will continue to run.

X-10 to Printer: If you have forgotten which file is currently loaded into the X-10 Command Unit or want to check whether a file has loaded properly into the X-10 Command Unit's memory, click on this option. This will not change the X-10 memory contents or the X-10 clock setting. The X-10 lets you perform a self-diagnostic test; if you have done one prior to selecting this option, the X-10 memory will contain the hexidecimal diagnostic data rather than intelligible data that can he displayed onscreen; you'll receive an alert box to this effect.

Base Code: This option lets you change the Base Code of the X-10. Base Code is normally set to A on power-up. The Base Code's only function is to control the rocker switches on the X-10 control module. This option will clear any file stored in the X-10 memory.

X-10 Diagnostics: If you suspect that the X-10 is not working properly, you may use this option to run a self-check of the X-10. This option will also clear any file stored in the X-10 memory.

Set X-10 Clock: This option lets you check and, if necessary, change the X-10's clock and day setting, independent of the ST clock

Direct Commands: Lets you take an action on any of 256 possible combinations. ■

Howard MacOdrum lives in Concord, California. This is his first program for START.

PRODUCTS MENTIONED

X-10 Powerhouse $69.99 **Control Modules** $14.99 and up X10 (USA), Inc., 185A Legrand Avenue, Northvale, NJ 07647, (201) 784-9700

An Expert System Shell for the ST

A.I.

BY RON SCHAEFER, M.D.

If you've ever wanted to experiment with Expert Systems, here's your chance. A.I. Doctor is an Expert System Shell that comes complete with a medical knowledge base to try out. And the best thing is that you don't need a medical degree to use A.I. Doctor! The program was written in GFA BASIC 2.0 and runs in medium or high resolution.

Okay, let's get something straight. A.I. Doctor is a fun and interesting program, but it is *not* a substitute for an examination by a real, live, human doctor. START's Editors almost decided not to publish A.I. Doctor for fear that some readers would diagnose themselves with all manner of serious ailments and then call START or their doctors and demand that various organs be removed. As I say in the disclaimer at the beginning of the program, if you are really sick, see a real doctor — not an artificial one!

What A.I. is All About

Artificial Intelligence (A.I.) is the attempt to mimic the human thought process with a computer. A.I. has become a multimillion dollar industry with the proliferation of specialized languages such as LISP and SMALL TALK, as well as numerous expert systems. An *expert system* can be defined as the embodiment within a computer of a set of rules from an expert skill in such a form that the system can offer expert advice or make an intelligent decision about a processing function. In other words, it's a computer program that gives expert advice in a given field.

Medicine was one of the first areas to explore the use of expert systems. Dr. Shortliffe and his colleagues at Stanford University developed a trailblazing program called MYCIN which diagnosed infectious diseases. This program has subsequently inspired the development of numerous expert systems in fields as diverse as drilling for oil or repairing computers. There is also a class of programs called expert system *shells*. These provide you with a shell or environment, in which you can enter the data or knowledge base and have the program manipulate this data/knowledge in an intelligent — expert — way.

A.I. Doctor: the BASICs

A.I. Doctor is an expert system shell. In it, I've created a knowledge base related to medicine, but if you're ambitious, you could easily write a set of rules for fixing TV's or cars. A.I. Doctor was written in GFA BASIC 2.0. If you don't have the GFA BASIC 2.0 Interpreter, pick up a copy of the January 1989 issue of START with disk; it includes this awesome programming language. For those of you with GFA BASIC 3.0 — sorry, this program won't work without some minor modifications in the way windows are opened.

How to Run A.I. Doctor

To run A I. Doctor, first boot this month's START disk; the START Menu runs automatically. At the main screen, click on Prepare, then select "A.I. Doctor" The program will un-ARC directly onto the destination disk you specify. You should have the following files:

DOCTOR!

ON DISK

Artificial Intelligence on the ST in the file AIDOCTOR.ARC on Side 1 of your START disk.

AIDOCTOR PRG (the main program), RX DAT (the medical knowledge base), AIDOCTOR PI2 and AIDOCTOR.PI3 (title screens for medium and high resolutions).

Now, double-click on the AIDOCTOR PRG icon. Read the disclaimer and then click on OK. If you would like some simple instructions, select the drop down menu item HELP or press the Help key.

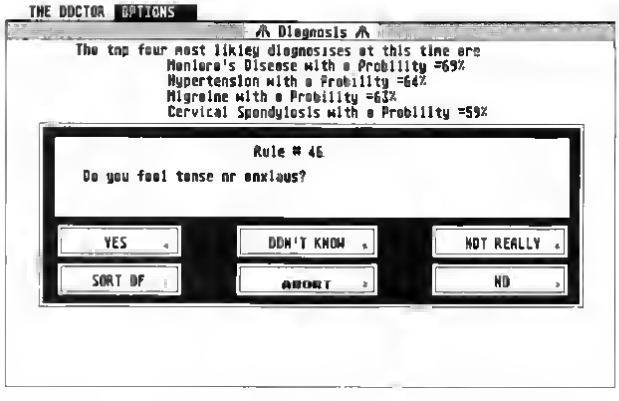
The knowledge base on the START disk, called RX DAT, contains data on 69 symptoms and 89 diseases and conditions. Select Load File from the OPTIONS menu or press [Alternate]-[L] to bring up the file selector, select RX DAT. An alert box will ask you if you want to see the data listed out on the screen as it is read into memory, either by pages or scrolled (FAST). This feature is useful when writing your own knowledge bases; to speed up loading, click on NO.

Now select Diagnosis from the OPTIONS menu or press [Alternate]-[D]. A.I. Doctor will sort through the data, calculate the four most statistically likely diagnoses and the question that will have the most effect on determining the correct diagnosis. By the way, before you answer any questions you'll see four diagnoses, but don't be alarmed. It doesn't mean that you're sick, it just expresses the general prevalence of an illness in the general population. For example, about 14 percent of the U.S. population has hypertension.

At the top of the Diagnosis dialog box is a Question number and below that is the current symptom question. There are two methods to input your answer; you can click on the appropriate answer or use the number keypad. The small numbers following the answers correspond to the appropriate keys. The answers are pretty self-explanatory: Yes, Sort Of, Don't Know, Not Really, No and Abort. If you select Abort, the program calculates the top 20 diagnoses based on what you've answered to that point. Once the probabilities of a given diagnosis exceed about 95 percent, it adds very little to ask more questions — just click on Abort. The questioning will continue until the probability of a disease or condition equals about 98 percent or until all the questions have been asked.

Remember, this knowledge base only considers 89 possible diseases and conditions, not all known diseases or conditions. Even if you try to answer all of the questions accurately, you'll only be able to rely on the resulting diagnosis *within the limits of the knowledge base*. Don't attempt to doctor yourself based on the answers from this program.

A.I. Doctor is on exemple of on expert system. It includes o knowledge bose of 69 symptoms and 89 diseases ond conditions, but you con design your own in ony oreo of knowledge for use with A.I. Doctor.



Write Your Own Expert Knowledge Bose

For those intrepid few of you out there who might be interested in writing your own knowledge bases take a look at the file RX.DAT. The first half of the knowledge base consists of questions or symptoms as in *Figure 1*.

Questions should not exceed 60 characters per line and can be one or two lines long. If the question is only one line long, use a period (.) to indicate a blank line. At the end of the questions section put nine 9's ▶

(999999999 as in *Figure 1*.

The second half of the knowledge base contains the illnesses or answers, their prior probabilities and the effects that yes and no answers will have on their probabilities. For example:

```
Brain Tumor
.0000001,7,.9,.01,41,.9,.01,38,.8,.01,50,.8,.01,38,
.8,.01,999
```

The first line contains the name of the illness. The second line has the following format: the first number is the probability of this illness in the general population. The next number refers to symptom (question) number 7, which is "Do you have a headache?" The next number is the probability of the person answering yes to the question if he has the illness (.9 or 9 times out of 10 a person who has a brain tumor will have a headache). The next number is the probability of the person answering yes to the question if he does not have the illness (0.01 or 1 time out of a hundred a person without a brain tumor will have a headache). The next three items then repeat the format of the previous three. The next symptom is 41 for "Are you vomiting?", followed by the probability of .9 for a yes answer if the condition is true and a probability of .01 for a yes answer if the condition if false. At the end of the line place the end-of-line code 999.

The hard part is coming up with data for a knowledge base that makes sense and is consistent. When creating a new knowledge base, it's best to experiment with it. Pretend to have a disease or other condition and answer the questions appropriately; if the results seem odd, play around with the probabilities until you get the results you think appropriate.

Figure 1

```
1                                              Rule number
Have you had your tonsils removed?             Question
.                                              . = leave line blank
2                                              Rule number
Do you have attacks of your symptoms rather    Question
than them being present all the time?          line two of question
[and so on]
999999999                                      End of questions code
```

How It Works

Fuzzy logic — that's the term used to describe the ability of a program to deal with answers that are not clear-cut, such as Don't Know or Sort of. This is realistic, since many things in the real world are probabalistic in nature. Fuzzy logic is handled through the use of Bayes' Theorem which states

$$P(I:S) = (S:I)P(I) \; P(S:I)P(I)+P(S:\text{not } I)P(\text{not } I)$$

You begin with a given probability for an event or illness, P(I). Next, you ask a question "S" and depending upon how it is answered, the probability of that illness is modified using Bayes' Theorem. The actual code taken from the program is as shown in *Figure 2*.

Figure 2

```
If Pushed>0
    Then P(I%)=P*(1+(II(I%,K%,2)/Pe-1)*Pushed/5)
Endif
If Pushed<=0
    Then P(I%)=P*(1+(II(I%,K%,2)-(1-II(I%,K%,2))*Pe/(1-Pe))*Pushed/5)
Endif
```

P(I%) is the probability of the illness and Pushed is the value of certainty of an answer. Pushed is weighted differently for Yes than Sort Of and is a negative value for No or Not Really. A Don't Know answer has a Pushed value equal to 0 so that it has no effect on the probability.

Before each question is asked, the program goes through all the questions that have not yet been asked, finding the one that has the most effect on changing the probability of the diagnosis.

Further Study

Confused? That's OK, artificial intelligence is a very complex subject. However, for those of you who are really curious, take a look at the source code of A.I. Doctor, which I've commented heavily. You should also take a look at "AI Apprentice" in the Fall 1986 START. And there are public domain versions of LISP and XLISP available for the ST; check with your local users group or on online services, such as CompuServe, GEnie or BIX.

Good luck and may you never get any of the illnesses diagnosed by this program! ■

Ron Schaefer has been programming for 18 years, the last three on his ST. Ron is the president of Schaefer Supergraphics, which markets medical software for the ST, and vice-president of ACE-HI. He wrote the game ATTACK! in the December 1989 issue of START.

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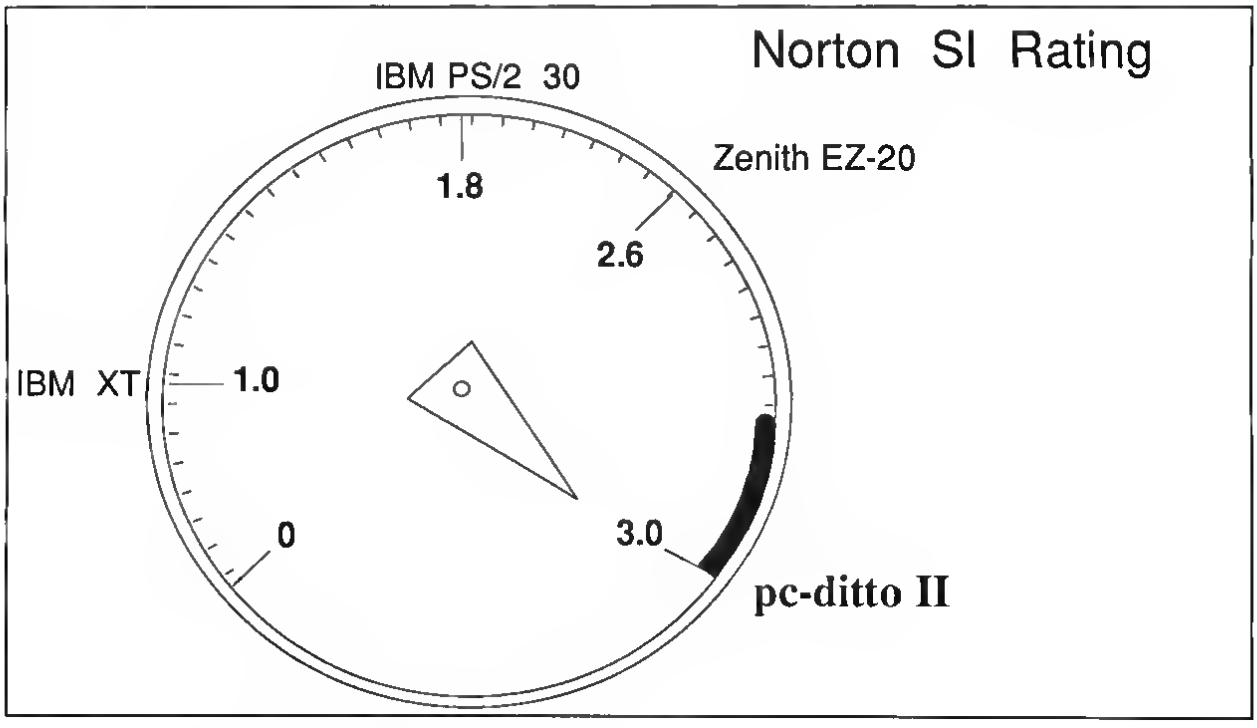

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DOCTOR IS THAT AN ST I SEE?

MARCO TECHNOLOGIES' ST-BASED VISUAL FIELD ANALYZER

BY BRUCE D. NOONAN, M.D.

The ST has proven itself to be an extremely versatile computer. Not only can you find STs in homes, offices and schools, but also on stage in concerts — and even, perhaps, in your ophthalmologist's office! Florida-based Marco Technologies has incorporated an Atari 520ST into a custom commercial system to measure, record and analyze a patient's visual response. In this article, ophthalmologist Dr. Bruce Noonan takes a look at this surprising use of ST power.

Although many of you know me as a programmer, my primary occupation is as an ophthalmologist (eye physician and surgeon). While poring over my usual mountain of professional journals recently, I came across an advertisement from a company called Marco Technologies for a visual field analyzer which made use of a *mouse*, as in computer mouse. On close examination of the picture, I saw that it was an ST mouse! I scanned the ad and read, "The MT-336 is powered by a one megabyte personal computer with a dual density floppy disk. A printer is included along with the mouse and the color monitor."

I then spoke with Mr. Scott Lewis, Vice President of Sales at Marco's home office in Jacksonville, Florida. I discovered that they were indeed using the ST for their perimeter. The software was written in compiled GFA BASIC by Dr. Bill Coan of Massachusetts. Coan has a Ph.D in

biophysics and is an avid Atari enthusiast. He has engineered and built several perimeters.

"OK," you may be saying, "so what the heck is a *perimeter*?" A perimeter is an instrument used by doctors to measure the vision, one eye at a time, for your entire visual field — horizontally, vertically and everywhere in between. Since it would take infinitely long to measure the ability to see an object at every single point, a perimeter takes a sample of points.

Marco's system comes with a "bowl" which serves as the view screen of the patient test equipment, a built-in chin and forehead rest, an automated table to hold the bowl, a 520ST with a double-sided drive and color monitor, a 9-pin Panasonic dot-matrix printer and a table for the computer and printer. Originally, Marco planned to use the 1040ST, but when Atari converted the less-expensive 520ST to a double-sided drive, the 1040ST was dropped.

The Morco Technologies MT-336 Auto-Perimeter is o saphisticoted ophthalmologicol meosuring system built oround on Atari 520ST. The progrom thot runs the system was written in compiled GFA BASIC! You've come o long way, boby!.

Oh Say, Can You See...

Perhaps a bit of explanation is in order here. A person's keenest vision is in the very center of the visual field, representing the vision of the macula in the human retina. More specifically, it's the *fovea*, the center of the *macula*, where the highest resolution occurs. The fovea's resolution is very high, whereas the peripheral retina can detect only large objects.

The concept of resolution can be illustrated by how we view images created by scanners. Scanners can digitize an image, such as a photograph, from resolutions of 2400 dots per inch (very high resolution) down to 150 dpi or less with low-resolution scanners. They create an image by placing a series of dots in the resulting image to represent the most significant information in the scanned photo. The fovea can detect such dots in all but the very highest dot resolutions.

The macula area of the retina is also where color vision is perceived and reading vision (recorded as 20/20 or higher) is achieved. As images are focused further from the center of the visual field, only very bright or large objects can be detected and vision in these areas can be 20/400 or worse.

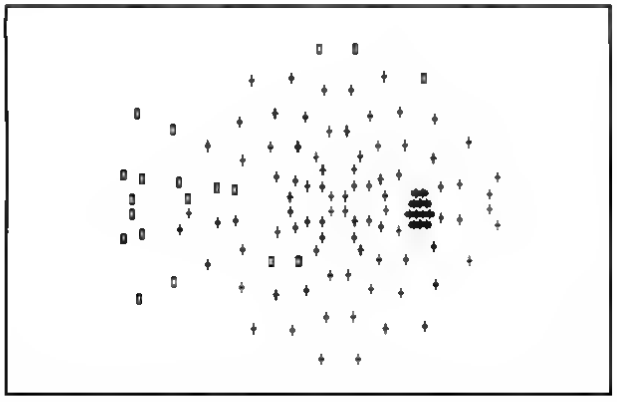
Testing a Visual Field

A basic static perimeter consists of a large illuminated bowl with a central fixation target. The patient must keep his attention focused on the fixation target while spots of light (stimuli) are projected or illuminated at random points in the visual field. When the patient perceives the stimulus, he presses a hand-held button and the intensity, spot size and location are recorded by the examiner or computer. The results can be drawn or printed out on a visual field map and then can be compared with normal fields. In this way, diagnoses of glaucoma or neurologic impairment can be made.

One of the most widely used perimeters is the Goldman perimeter. This perimeter has become the standard, although it requires a full-time operator and is not automated. The intensity of the stimulus and its size can be set by the examiner and then projected at a peripheral location and moved radially, like moving along a wagon wheel spoke toward the hub. When the patient presses the button indicating he has perceived the stimulus, a mark is made on the field map and the process is repeated along another 'spoke' until the full 360 degrees have been examined. This is called kinetic perimetry, since a moving stimulus is used. ▶

Enter Morco Technologies

The Marco perimeter uses static perimetry All of its 336 spots are created by fixed-size LED's in fixed locations, although the hrightness of each spot can he varied The examiner presents a dim target to the patient and gradually increases its illumination until the patient indicates he can see it. The point at which it can he harely perceived is called the threshold level of hrightness. The MT-336 has 25 levels of brightness availahle in 1/2-log unit steps.



Marca Technalagies takes advantage af the ST's GEM system to produce accurate displays and printauts af a patient's visual response.

The MT-336 can also be used for pseudo-kinetic measurements Lights along the "spokes" are set at a specified hrightness and, starting with the LED furthest out, adjacent stimuli are turned on and off in sequence until the patient signals that it was perceived

An examiner can select from any of eleven preset types of field patterns or design a custom field. This would depend on whether the examiner wanted to screen a patient for a defect or examine his visual field for a known type of defect.

The operation of the program was nearly flawless It will occasionally poll the perimeter bowl (connected to the RS-232 port) and the printer to see if they are "on," and notify you if they are not. Although designed for a 9-pin printer, my 24-pin Star NB24-15 worked fine and printed faster than the Star NX-10.

When performing penmetry, always make sure that the patient is looking only at the fixation point. If he or she looks away, the test will not he accurate and the resultant data will be meaningless. But each eye has a physiological blind spot on the retina on which you can't detect any stimulus. The program maps these out initially and then will occasionally display a stimulus in the hlind-spot area. If the patient signals that he perceives it, then it's recorded as a fixation failure. The number of fixation failures is printed out along with the field test results, thus giving the doctor an indication of the reliability of the results.

Marco also uses a unique alignment system to make sure that the eye being tested is exactly centered in the howl This precise alignment is necessary for reproducible results Marco's system involves the detection of color in the fixation point on the howl. It's simple to use and accurate.

Three Flovors of Progroms

Software for the MT-336 comes in three levels of sophistication: Basic, Plus 1 and Plus 2. The Basic program will only print out a hard copy of the data. Plus 1 lets the examiner store data in memory so that fields for both eyes can be printed at the same time It also gives the examiner a greater selection of stimulus intensities for various tests. The Plus 2 program goes further, letting the examiner store field data on a floppy disk. It also provides a much needed utility: the Delta comparison.

The Delta comparison is an exciting concept It lets examiners make comparisons on a point-hy-point basis of threshold changes over a period of time. For example, if point "A" is seen with a threshold intensity of 7 dB during one examination, and has a threshold of 5 dB on a subsequent examination, this might be an indication that the patient is developing a field defect, such as a loss of retinal function, at that point. Remarkably, this sophisticated program allows comparisons of different patterns of fields, and even on fields where the patient did not complete the test! The printout will display graphically where such changes are occurring, alerting the doctor to do a more definitive test of that specific area He or she then may choose to design a custom test concentrating on that area

I had the opportunity to test the program on a number of glaucoma patients with known visual field defects documented on Goldman perimetry Without exception, the program detected the field defects. Unlike other automated perimeters, the printed output is a screen dump in graphics mode which prints out an exact replication of the field as seen in the bowl. This is mostly hecause of GEM's ability to adapt output to any device without shape distortion

There are several things I would like to see improved in the program, most of which the company is aware of and is implementing. The perimeter has a higher density of spots than nearly all of its non-projection competitors Thus, it usually operates

in "half-density" mode, where only half of the LEDs in the area are used. Such fields are equivalent to the competition, but if you want to use full-density fields, you must design a custom field. It would be nice to be able to select full density for the eleven preset field patterns rather than having to design a custom test. Designing a custom test is not all that difficult, however; you simply use the mouse to drag a rubber-band box around the area to be tested.

Although the mouse is used for nearly all program functions, if you wish to recall a previous field from disk, you must remember the name of the file and type in the filename — no file-selector box, an important oversight.

Similarly, a dialog box should be used for entry of the patient's data — name, age and refraction. Also the date and time must be entered every time the program is booted; it would be much better for the program to scan for the date and time and ask if it is correct.

The learning curve for the program is fairly short. I did have trouble switching field types between eyes on one patient because I did not return to an earlier menu. Full-screen menus are used in place of drop-down menus and alert boxes appear in abundance. However, help screens are available at almost every stage of the program. The full-screen menus may be confusing, especially when choices are listed with alphanumeric characters, since it gives one the erroneous impression that you can use the keyboard to make choices.

The system modularity is what makes this perimeter a truly outstanding value. If the printer goes on the blink, you can substitute any Epson-compatible printer and continue working. If the computer goes down, any 520ST will work. For system-specific components, the support is excellent — I had trouble with a defective patient signal button and Marco had a replacement to me in two days. They are anxious to succeed in a very competitive market and I found their service to be excellent.

The system is certainly not inexpensive when compared to other ST programs. The cost of the system varies from $6,500 to more than $9,000, depending upon the software selected. But in comparison to similar automated perimeters — some costing $20,000 or more — the price is very competitive.

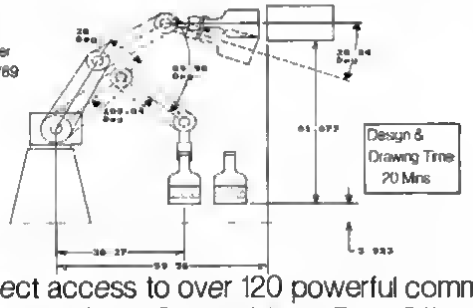
Marco's system supplies the clinician with one more means of tracking disease, and given the history of many high-tech medical advances, may prove to be the standard by which perimetry is measured in the future. I personally was very impressed by the system and would definitely recommend it to health-care professionals looking for an inexpensive perimeter with state-of-the-art computer capabilities.

Oh yes, hy the way, Marco is currently including ST Writer Elite 3.0 free of charge along with the package. It seems they know good software when they see it! ■

Dr. Bruce Noonan is an ophthalmologist who is best known throughout the ST world for his stalwart support of ST Writer. Watch for the latest version of ST Writer Elite on an upcoming START disk.

PRODUCTS MENTIONED

MT-336 Auto-Perimeter
$6,500-$9,000 Marco Technologies, 11825 Central Parkway, Jacksonville, Florida 32216, (800) 874-5274 Nationwide, (800) 227-0084 in Florida



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Mac and PC On The ST

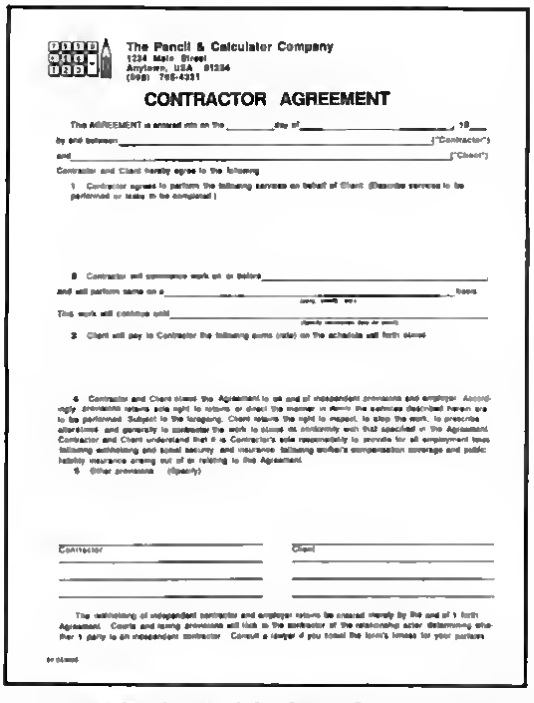
FormSet

BY DAVID PLOTKIN
START CONTRIBUTING EDITOR

(Editor's Note: *This column is dedicated to those of you who use — or would like to use — Spectre or pc-ditto. We'll keep you informed of emulator developments and look at some of the worthwhile products only available to the ST owner under Spectre and pc-ditto. This month, columnist David Plotkin takes a look at FormSet, a business forms software package for the Mac from Softview.*)

The first Macintosh package that *really* impressed me was Macintax from Softview. Macintax went well beyond typical tax software in a number of ways. First, printout quality was so good that you could submit the forms directly to the IRS without copying them onto the IRS's forms. It also linked forms, i.e. an amount entered on one form would show up on any other form where it was required. Finally, you could itemize, a godsend in an audit

Macintax was superbly designed and easy to use — but it was only useful at tax time. I remember thinking how nice it would be if those features could be built into a set of standard business forms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An example of one of the forms from FormSet from Softview. If you use Spectre 128 or Spectre GCR and run a small business, you'll want to simplify your business life with this smart forms package.

Enter FormSet

Apparently, someone at Softview had the same idea and the result was FormSet, a set of standard business forms which you can fill out and use for everyday business transactions. FormSet has many features that make it useful, although there are some rough edges that you'll have to get used to.

FormSet includes 70 forms, grouped into six categories: Operating, General Business, Accounting, Payable, Personnel and Sales. Some of the forms included are an employment application, petty cash report, expense report, invoices, packing lists, purchase order, inventory, estimates, contract, receipts and a profit/loss statement.

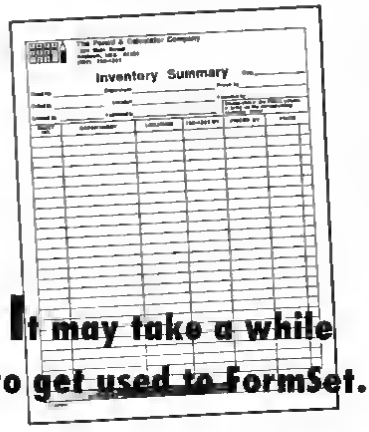
Forms are accessed in sets. When accessing a set of forms the first thing to do is to fill out the Customization form, which includes your company name, address, sales tax and other general information, all of which is used with the other forms in the set so that you don't have to enter the data on every form If you need different information (such as a different company name) on different forms, you will need to open two sets of forms and fill out the Customization form differently.

Once you've filled out the initial form, you can open any other form in the collection by selecting it from the drop-down menus. The forms are available under four different categories. To bring up a form, just click on it with the mouse and it will appear in its own window. More than one form can be open at a time, each with its own window and you can move between them by clicking on the appropriate window.

Now comes the fun part. To fill out a form, just place the cursor where you want to modify it and type in the data. The form will only let you enter data where appropriate, it won't let you type in data where the result is calculated, itemized, or linked from another form (more on this in a moment). For example, on the purchase order form, you can fill in the part number, quantity and price of each item. The form will then automatically calculate the unit total for each line and the total for the entire order, including any applicable sales tax! Thus, the program functions much like a spreadsheet, except that you don't have to define the formulas for the calculations — this is done for you in the form's definition.

As with Macintax, you can itemize almost any line item to show what it contains. You simply double-click on the area where you would normally enter a number. A special window opens containing several lines, each with a space to specify the itemized description and the value of the particular item. The items in the window are automatically totalled and the total placed in the main form when you close the itemization window. In fact, you can even itemize *lines* in an itemization window. The degree of such nesting is limited only by the memory in your machine.

Another handy feature is form linking. When a set of forms is linked, you fill out the data for each line of the "master" form on another (usually more detailed) form. A summary of the information on the detailed form is then shown on the master form. One good example of this is a set of invoice forms. The master invoice form is brought up on the screen when you open it, but you can't enter data directly into it. Instead, you double-click on the total column, and an invoice form appears. You fill it out, specifying the item purchased, price, etc., then close the invoice form. A summary of the information on the invoice appears on the appropriate line of the master invoice form. As more invoices are added, the master invoice form keeps track of the sum automatically. The master forms are marked to indicate that you must enter the information on other forms so that you don't try to enter the data on the master form. This notification does not print out.



It may take a while to get used to FormSet.

You can't customize the forms in FormSet. However, the forms are very detailed, including spaces for all sorts of information, such as boxes for checking which type of credit card customers are using or whether they're paying cash. Most of this is "smart" — the program won't let you check a credit card box if you already indicated that cash was used and clicking on another credit card box will erase the first one selected. FormSet also supports multiple-part forms so that you can print out a copy for the customer, salesperson, etc. You can specify the names of the multiple copies on the Customization form.

FormSet includes online help in the form of definitions and suggested uses for the selected fields. Forms that have been completely or partially filled out are shown as underlined or in outline font in the menus to indicate their condition.

High Learning Curve

It may take a while to get used to FormSet. It's important to remember that you never actually change the forms themselves; the data you enter is stored separately, so you don't have to make multiple copies of the forms. But because FormSet needs to know which forms are available, it takes a while to load the program. You can save some time by removing the form definition files for forms you don't use. This also saves disk space, and FormSet is smart enough to only show the available forms in its drop-down menus.

There are some awkward areas in this program. For example, although you can start a new set of forms by running the program, there seems to be no way to access previously saved sets of forms from within the program. The manual says you can open a previously saved form set, but the OPEN command wasn't available from the program. You can double-click on the saved form file (which runs FormSet automatically) from the desktop, and this seems to be the only way to access forms you used filled out previously. This is very clumsy.

FormSet comes with a utility which can "paste" your company logo onto forms, but it can only use ▶

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logos that are exactly the right size (a template as well as some example logos come with the program), and it will paste your logo onto every form in the folder. If you want different logos on different forms, you must rearrange them into different folders, then put them back in the folder from which you want to use them when you're finished.

Overall, the onscreen filling out of forms works very well and the itemizing and form-linking features are excellent. The proof of the pudding, of course, is how well these forms are printed out. The print quality is very good on an ImageWriter, and absolutely superb on both the LaserWriter and HP's Deskjet. Lines are crisp and clear and the text is very legible. The application uses multiple-size fonts to give you an idea onscreen of how the printed form will look.

FormSet includes 70 forms, grouped into six categories.

FormSet is very solid, and should be of tremendous use to anyone running a small business. Now, if they'd just write a package like this for the ST.. ■

David Plotkin is a chemical engineer for Chevron U.S.A. and is a contributing editor for START.

PRODUCTS MENTIONED

FormSet $99 Softview, Inc., 4820 Adohr Lane, Suite D, Camarillo, CA 93010, (805) 385-5000

Final Cut

Legend's New Sequencer Bridges the Gap

BY RICK DUFF

MIDI software for the ST can be grouped into one of two categories, beginner and advanced. This is especially true in the case of sequencers: the programs being released are either for the non-musician seeking an entry point into music making or for the professional seeking a great working tool — there are few programs that cater to both.

The major contributing factor to this problem is that software companies either go too far or not far enough. Advanced software has so many bells and whistles that it becomes overkill, not to mention being too darn expensive. Lower level programs tend to be made by the same companies as bare-bones versions of the onginals — mostly, it seems, to entice a person into buying the higher-level software. And the memory demands of these "full-featured" programs leave less for your songs and all 520ST owners out in the cold.

Enter Final Cut

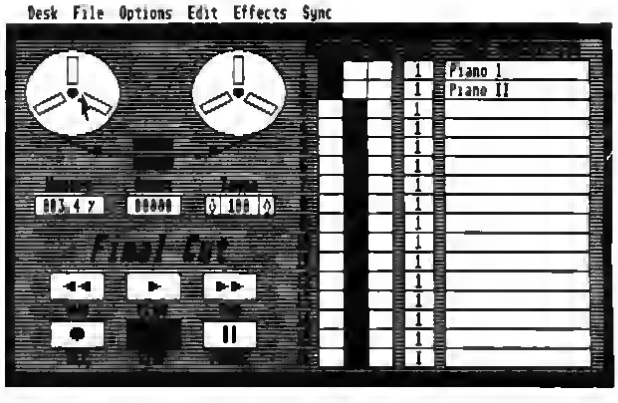
From Legend Software Systems comes Final Cut, a 16-track MIDI sequencer that's packed full of special features and easy to use. It runs on any ST or Mega with either a color or monochrome monitor. Copy-protection comes in the form of a hardware key that fits into your cartridge port.

Final Cut has everything a musician needs in a software sequencer. It has full MIDI event editing, Step Mode entry (if desired), MIDI thru, transposition and more. Further, it's designed to resemble a multitrack tape deck which makes it very easy for beginning musicians to learn MIDI, while still being useful to professionals.

The program makes good use of GEM, letting you use your mouse for all processing (though there are keyboard equivalents for most functions). One nice feature in particular is the ability to set your own expertise level. When you're first learning, you get more help but, as you become familiar with the program, the help disappears and doesn't get in the way.

Recording is as simple as selecting a track to record on and clicking the record button. A powerful edit feature is Copy/Merge, which lets you copy a track to another or merge two or more tracks into one. This prevents the supplied 16 tracks from becoming a limit.

Final Cut also lets you split tracks, putting the upper voices from a parent track onto one subtrack and the lower voices onto another — very useful when scoring from a piano part. Since you would most likely ▸



Final Cut's main screen is designed to resemble a multitrack tape deck, making this new MIDI sequencer from Legend Systems easy on beginners, while still being useful to professionals.

play with both hands at once, that would be on one track. With the split-tracks feature you could then divide the parts out for a two-hand score. The current version (2.21a) does not support standard MIDI files, although *this feature* is planned for the next version, due out hy the time you read this

There are options in Final Cut for appending one track onto the end of another, or repeating a track any numhers of times. Final Cut also has a cut-and-paste feature, making it extremely handy for composers to piece songs together.

One other nice feature I haven't even seen on many high-end sequencers is a function to UNHANG notes. A hanged note occurs when you stop recording, hut a note just "hangs" playing on your synthesizer. Hanged notes happen most often during extensive editing or dubhing

Quantizing (correcting the timing of a track) in Final Cut can be accomplished in a resolution down to the 64th note and allows for triplets. You can sync to other devices (another sequencer, drum machine, or a sync-to-tape machine) via a MIDI clock. You can put the sequencer into a Master or Slave sync mode, either to control a drum machine's tempo or have it control yours.

Final Cut was friendly and never missed a note.

Included with Final Cut are two utility programs. One lets you monitor incoming MIDI data and also test synchronization with other units. The other lets you convert songs saved in version 1.1 of Final Cut to the current format.

An Impressive Package

I found Final Cut easy to use and capable of some very nice results. I put it to the test, playing complex pieces like Gershwin's "Rhapsody in Blue." It handled all four hands of fast piano without a lost note. One helpful hint is to keep a cue sheet handy and write down the clock beat of the part of the piece you want to edit. This will make it much easier to locate that part and change your event later.

Final Cut is impressive, especially when you consider the small amount of RAM it uses. I found it loaded in as little as 115K, so even on a 520ST you can have complex and lengthy songs without running out of memory. This is positively amazing in these days when sequencers require at least 1MB of memory just to hoot.

The one thing I didn't care for was the hardware cartridge-key protection. Mine was difficult to insert, but once in worked fine By the way, never insert or remove something from your cartridge port while the computer is on or you risk considerable damage to the computer. The one good point of this type of copy-protection is that you can make unlimited backups of your diskette and install it onto a hard drive.

Final Cut utilizes GEM and works fine with desk accessories. The manual is well written and indexed. I found Legend Software Systems to be extremely friendly and competent when I called for technical support. In fact, the person who answered the telephone was the programmer himself. As an interesting side note· when I was at last summer's Consumer Electronics Show (CES) in Chicago, Atari displayed a MIDI Workstation with an ST running Final Cut.

Overall, my view of Final Cut runs extremely high. It does everything a sequencer needs to do. It offers professional editing and compositional features found only on much more expensive sequencers. It's simple enough that the beginner won't be lost, advanced enough that the professional will be comfortable and perfect for everyone in between. If you're searching for an entry-level sequencer, or looking to upgrade, I'd give Final Cut a try. ■

Rick Duff lives in Worthington, Ohio where he is a semiprofessional musician. This is his first article for START.

PRODUCTS MENTIONED

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The Cuckoo's Egg

REVIEWED BY ANDREW REESE START EDITOR

I love a good spy story, especially one about an amateur forced to try to outwit the pros. I've spent five hours on a bus riding to work every day for the past two years and a good spy story makes those rides (almost) pleasurable. When we received a copy of *The Cuckoo's Egg*, Clifford Stoll's true story of tracking a spy through computer networks, I jumped at the chance to review it. I was not disappointed.

Maggie Halloran

Cuckoo's Egg author Clifford Stoll was an astronomer when he first detected the presence of an intruder in the computer network he helped manage.

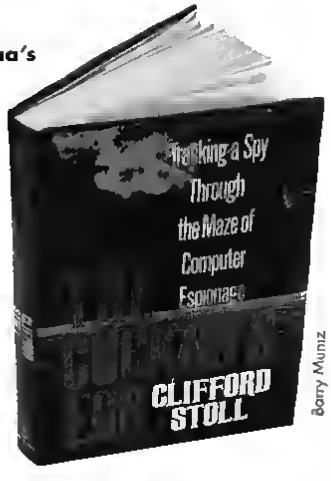
At the beginning of the hunt — and the book — Stoll is an astronomer at the Lawrence Berkeley Laboratory in Berkeley, California. Assigned to assist the systems administrators for the local network, Stoll's first task was to track down an apparent 75-cent billing error. Instead of finding a simple program glitch, Stoll found that a hacker had infiltrated the network through a back door in UNIX.

What followed this first discovery was a year of tracking the intruder through a special monitor devised by Stoll. The initial official U.S. response was apathetic, other than to close doorways into sensitive military computers. As the threat grew, Stoll, a typical Berkeley liberal, found himself becoming more and more intensely involved with the FBI, CIA, NSC and other federal security agencies, much to the chagrin of his friends.

Stoll even wired a pager to his monitoring computer so that he could be alerted to the hacker's presence at any time, day or night. And as the year went by, the unknown hacker intensified his intrusions until Stoll's life became centered, not on his usual work or his everyday life, but on the hacker.

The deeper the reader follows Stoll in *The Cuckoo's Egg*, the more fascinating details are revealed. For example, it became apparent that the hacker wasn't a Bay Area local — he was unfamiliar with the Berkeley dialect of UNIX! And he smoked Benson & Hedges cigarettes! It's an amazing story, one that will delight the computer user and non-user alike.

Despite Stoll's protestations that he was not a computer expert, he showed a great deal of savvy in creating systems and devices to monitor and trap the intruder. Finally, with the coopera- ▶



Barry Muniz

The Cuckoo's Egg is a marvelous true story of an amateur computer detective who helped crack an international spy ring.

tion of Tymnet, the German government and a few government agents who understood the significance of the invasion, the hacker was caught. If you read START regularly, you'll remember Marshall Rosenthal's piece in News, Notes and Quotes in the November 1989 issue about the West German hackers — the group that Stoll tracked is that very one!

It's an amazing story, one for the computer user and non-user alike.

One fascinating sidelight to the main story is included in an Epilogue. Remember the worm, or virus, that started in Cornell and paralyzed hundreds of computers across the country? Well, Clifford Stoll was one of the experts who tracked down and killed the worm. Remember the name of the alleged culprit — Robert Morris, Jr.? One of the main government agents who helped Stoll track down the German hackers was none other than the alleged virus' creator's father, Robert Morris, Sr.!

The Cuckoo's Egg is an excellent book, a book you may start reading for pleasure only to find effortlessly yourself learning about UNIX, Vax, LANs, Tymnet and a host of other arcane subjects. I recommend it highly. ■

PRODUCTS MENTIONED

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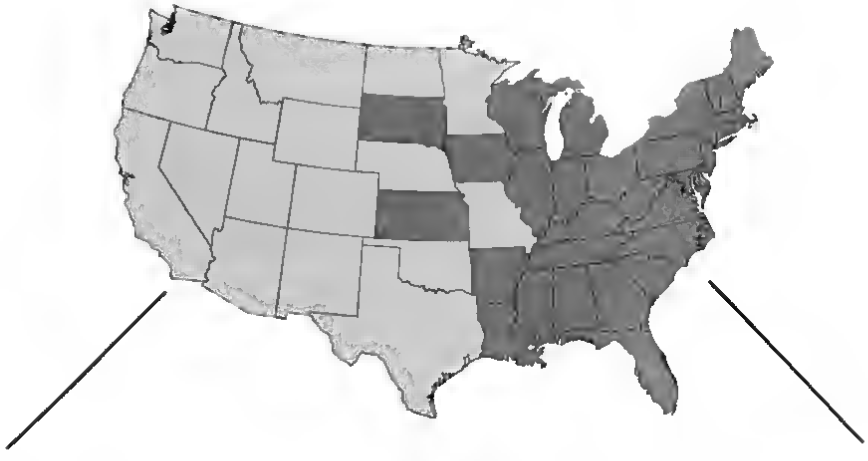

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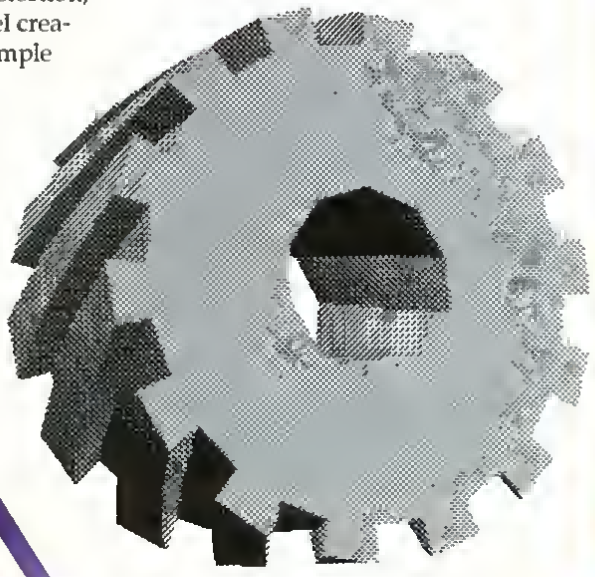

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SHIPPING AND HANDLING CHARGES

Software	U.S./CANADA	FOREIGN*
Up to $50.00	$3.00	$10.00
50.01-100.00	6.00	20.00
100.01-150.00	9.00	25.00
150.01-over	12.00	35.00

*Please remit with MasterCard or VISA number or check or money order in U.S. funds drawn on a U.S. bank. Wire transfers will not be accepted.

ORDER FORM

NAME _____

ADDRESS _____

CITY _____ STATE/COUNTY _____

ZIP CODE _____ PHONE NO. _____

QUANTITY	ITEM NO.	DESCRIPTION	PRICE EA.	TOTAL

Price and availability subject to change without notice

Subtotal of all items ordered (Minimum order $25.00)

California residents: add 6.5% sales tax

Shipping and handling charges (See schedule above)

Total

Method of payment:
- ☐ Check/Money order
- ☐ Master Card
- ☐ VISA

Credit Card No. _____
Expiration Date _____
Name _____
Signature _____

Mail To: The Catalog, 544 Second Street, San Francisco, CA 94107.